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R000001

R000002 ********************************************************************
R000003 *                                                                  *
R000004 *          THIS AGC PROGRAM SHALL ALSO BE REFERRED TO AS:          *
R000005 *                                                                  *
R000006 *                                                                  *
R000007 *                          COLOSSUS 2A                             *
R000008 *                                                                  *
R000009 *                                                                  *
R00001  *        THIS PROGRAM IS INTENDED FOR USE IN THE CM AS SPECIFIED    *
R000011 *        IN REPORT R-577. THIS PROGRAM WAS PREPARED UNDER DSR       *
R000012 *        PROJECT 55-23870, SPONSORED BY THE MANNED SPACECRAFT       *
R000013 *        CENTER OF THE NATIONAL AERONAUTICS AND SPACE               *
R000014 *        ADMINISTRATION THROUGH CONTRACT NAS 9-4065 WITH THE        *
R000015 *        INSTRUMENTATION LABORATORY, MASSACHUSETTS INSTITUTE OF     *
R000016 *        TECHNOLOGY, CAMBRIDGE, MASS.                               *
R000017 *                                                                  *
R000018 ********************************************************************

R000019          SUBMITTED:  MARGARET H. HAMILTON              DATE:  28 MAR 69
R00002               M.H.HAMILTON, COLOSSUS PROGRAMMING LEADER
R000021              APOLLO GUIDANCE AND NAVIGATION

R000022          APPROVED:   DANIEL J. LICKLY                  DATE:  28 MAR 69
R000023              D.J.LICKLY, DIRECTOR, MISSION PROGRAM DEVELOPMENT
R000024              APOLLO GUIDANCE AND NAVIGATION PROGRAM

R000025          APPROVED: FRED H. MARTIN                      DATE:  28 MAR 69
R000026              FRED H. MARTIN, COLOSSUS PROJECT MANGER
R000027              APOLLO GUIDANCE AND NAVIGATION PROGRAM

R000028          APPROVED: NORMAN E.SEARS                      DATE:  28 MAR 69
R000029              N.E. SEARS, DIRECTOR, MISSION DEVELOPMENT
R00003               APOLLO GUIDANCE AND NAVIGATION PROGRAM

R000031          APPROVED: RICHARD H. BATTIN                   DATE:  28 MAR 69
R000032              R.H. BATTIN, DIRECTOR, MISSION DEVELOPMENT
R000033              APOLLO GUIDANCE AND NAVIGATION PROGRAM

R000034          APPROVED: DAVID G. HOAG                       DATE:  28 MAR 69
R000036              D.G. HOAG, DIRECTOR
R000037              APOLLO GUIDANCE AND NAVIGATION PROGRAM

R000038          APPROVED: RALPH R. RAGAN                      DATE:  28 MAR 69
R000039              R.R. RAGAN, DEPUTY DIRECTOR
R00004               INSTRUMENTATION LABORATORY
R000041
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R0001   ASSEMBLY AND OPERATIONS INFORMATION
R0002   TAGS FOR RELATIVE SETLOC AND BLANK BANK CARDS
R0003   SUBROUTINE CALLS

R0004           COMERASE
R0005                   ERASABLE ASSIGNMENTS
R0006           COMAID
R0007                   INTERRUPT LEAD INS
R0008                   T4RUPT PROGRAM
R0009                   DOWNLINK LISTS
R0010                   FRESH START AND RESTART
R0011                   RESTART TABLES
R0012                   SXTMARK
R0013                   EXTENDED VERBS
R0014                   PINBALL NOUN TABLES
R0015                   CSM GEOMETRY
R0016                   IMU COMPENSATION PACKAGE
R0017                   PINBALL GAME  BUTTONS AND LIGHTS
R0018                   R60,R62
R0019                   ANGLEFIND
R0020                   GIMBAL LOCK AVOIDANCE
R0021                   KALCMANU STEERING
R0022                   SYSTEM TEST STANDARD LEAD INS
R0023                   IMU CALIBRATION AND ALIGNMENT
R0024           COMEKISS
R0025                   GROUND TRACKING DETERMINATION PROGRAM - P21
R0026                   P34-P35, P74-P75
R0027                   R31
R0028                   P76
R0029                   R30
R0030                   STABLE ORBIT - P38-P39
R0031           TROUBLE
R0032                   P11
R0033                   TPI SEARCH
R0034                   P20-P25
R0035                   P30,P37
R0036                   P32-P33, P72-P73
R0037                   P40-P47
R0038                   P51-P53
R0039                   LUNAR AND SOLAR EPHEMERIDES SUBROUTINES
R0040                   P61-P67
R0041                   SERVICER207
R0042                   ENTRY LEXICON
R0043                   REENTRY CONTROL
R0044                   CM BODY ATTITUDE
R0045                   P37,P70
R0046                   S-BAND ANTENNA FOR CM
R0047           TVCDAPS
R0048                   TVCINITIALIZE
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R0049                   TVCEXECUTIVE
R0050                   TVCMASSPROP
R0051                   TVCRESTARTS
R0052                   TVCDAPS
R0053                   TVCSTROKETEST
R0054                   TVCROLLDAP
R0056                   MYSUBS
R0057                   RCS-CSM DIGITAL AUTOPILOT
R0058                   AUTOMATIC MANEUVERS
R0059                   RCS-CSM DAP EXECUTIVE PROGRAMS
R0060                   JET SELECTION LOGIC
R0061                   CM ENTRY DIGITAL AUTOPILOT
R0062               CHIEFTAN
R0063                   DOWN-TELEMETRY PROGRAM
R0064                   INTER-BANK COMMUNICATION
R0065                   INTERPRETER
R0066                   FIXED-FIXED CONSTANT POOL
R0067                   INTERPRETIVE CONSTANTS
R0068                   SINGLE PRECISION SUBROUTINES
R0069                   EXECUTIVE
R0070                   WAITLIST
R0071                   LATITUDE LONGITUDE SUBROUTINES
R0072                   PLANETARY INERTIAL ORIENTATION
R0073                   MEASUREMENT INCORPORATION
R0074                   CONIC SUBROUTINES
R0075                   INTEGRATION INITIALIZATION
R0076                   ORBITAL INTEGRATION
R0077                   INFLIGHT ALIGNMENT ROUTINES
R0078                   POWERED FLIGHT SUBROUTINES
R0079                   TIME OF FREE FALL
R0080                   STAR TABLES
R0081                   AGC BLOCK TWO SELF-CHECK
R0082                   PHASE TABLE MAINTENANCE
R0083                   RESTARTS ROUTINE
R0084                   IMU MODE SWITCHING ROUTINES
R0085                   KEYRUPT, UPRUPT
R0086                   DISPLAY INTERFACE ROUTINES
R0087                   SERVICE ROUTINES
R0088                   ALARM AND ABORT
R0089                   UPDATE PROGRAM
R0090                   RTB OP CODES

R0091           SYMBOL TABLE LISTING
R0092           UNREFERENCED SYMBOL LISTING
R0093           ERASABLE & EQUALS CROSS-REFERENCE TABLE
R0094           SUMMARY OF SYMBOL TABLE LISTINGS
R0095           MEMORY TYPE & AVAILABLITY DISPLAY
R0096           COUNT TABLE
R0097           PARAGRAPHS GENERATED FOR THIS ASSEMBLY
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R0098 OCTAL LISTING
R0099 OCCUPIED LOCATIONS TABLE
R0100 SUBRS CALLED & PROGRAM STATUS

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P0101 VERB LIST FOR CSM

R0102 REGULAR VERBS

R0103 00 NOT IN USE
R0104 01 DISPLAY OCTAL COMP 1 IN R1
R0105 02 DISPLAY OCTAL COMP 2 IN R1
R0106 03 DISPLAY OCTAL COMP 3 IN R1
R0107 04 DISPLAY OCTAL COMP 1,2 IN R1,R2
R0108 05 DISPLAY OCTAL COMP 1,2,3 IN R1,R2,R3
R0109 06 DISPLAY DECIMAL IN R1 OR R1,R2 OR R1,R2,R3
R0110 07 DISPLAY DP DECIMAL IN R1,R2 (TEST ONLY)
R0111 08
R0112 09
R0113 10
R0114 11 MONITOR OCTAL COMP 1 IN R1
R0115 12 MONITOR OCTAL COMP 2 IN R1
R0116 13 MONITOR OCTAL COMP 3 IN R1
R0117 14 MONITOR OCTAL COMP 1,2 IN R1,R2
R0118 15 MONITOR OCTAL COMP 1,2,3 IN R1,R2,R3
R0119 16 MONITOR DECIMAL IN R1 OR R1,R2 OR R1,R2,R3
R0120 17 MONITOR DP DECIMAL IN R1,R2 (TEST ONLY)
R0121 18
R0122 19
R0123 20
R0124 21 LOAD COMPONENT 1 INTO R1
R0125 22 LOAD COMPONENT 2 INTO R2
R0126 23 LOAD COMPONENT 3 INTO R3
R0127 24 LOAD COMPONENT 1,2 INTO R1,R2
R0128 25 LOAD COMPONENT 1,2,3 INTO R1,R2,R3
R0129 26
R0130 27 DISPLAY FIXED MEMORY
R0131 28
R0132 29
R0133 30 REQUEST EXECUTIVE
R0134 31 REQUEST WAITLIST
R0135 32 RECYCLE PROGRAM
R0136 33 PROCEED WITHOUT DSKY INPUTS
R0137 34 TERMINATE FUNCTION
R0138 35 TEST LIGHTS
R0139 36 REQUEST FRESH START
R0140 37 CHANGE PROGRAM (MAJOR MODE)
R0141 38
R0142 39

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P0143 EXTENDED VERBS

R0144 40 ZERO CDU-S
R0145 41 COARSE ALIGN CDU-S
R0146 42 FINE ALIGN IMU-S
R0147 43 LOAD IMU ATT ERROR METERS
R0148 44 SET SURFACE FLAG
R0149 45 RESET SURFACE FLAG
R0150 46 ESTABLISH G+C CONTROL
R0151 47 MOVE LM STATE VECTOR INTO CM STATE VECTOR.
R0152 48 REQUEST DAP DATA LOAD ROUTINE (R03)
R0153 49 REQUEST CREW DEFINED MANEUVER ROUTINE (R62)
R0154 50 PLEASE PERFORM
R0155 51 PLEASE MARK
R0156 52 MARK ON OFFSET LANDING SITE
R0157 53 PLEASE PERFORM ALTERNATE LOS MARK
R0158 54 REQUEST RENDEZVOUS BACKUP SIGHTING MARK ROUTINE (R23)
R0159 55 INCREMENT AGC TIME (DECIMAL)
R0160 56 TERMINATE TRACKING (P20 + P25)
R0161 57 REQUEST RENDEZVOUS SIGHTING MARK ROUTINE (R21)
R0162 58 RESET STICK FLAG
R0163 59 PLEASE CALIBRATE
R0164 60 SET ASTRONAUT TOTAL ATTITUDE (N17) TO PRESENT ATTITUDE
R0165 61 DISPLAY DAP ATTITUDE ERROR
R0166 62 DISPLAY TOTAL ATTITUDE ERROR (WRT N22 (THETAD))
R0167 63 DISPLAY TOTAL ASTRONAUT ATTITUDE ERROR (WRT N17 (CPHIX))
R0168 64 REQUEST S-BAND ANTENNA ROUTINE
R0169 65 OPTICAL VERIFICATION OF PRELAUNCH ALIGNMENT
R0170 66 VEHICLES ARE ATTACHED. MOVE THIS VEHICLE STATE TO OTHER VEHICLE.
R0171 67
R0172 68 CSM STROKE TEST ON
R0173 69 CAUSE RESTART
R0174 70 UPDATE LIFTOFF TIME
R0175 71 UNIVERSAL UPDATE-BLOCK ADR
R0176 72 UNIVERSAL UPDATE-SINGLE ADR
R0177 73 UPDATE AGC TIME (OCTAL)
R0178 74 INITIALIZE ERASABLE DUMP VIA DOWNLINK
R0179 75 BACKUP LIFTOFF
R0180 76 SET PREFERRED ATTITUDE FLAG
R0181 77 RESET PREFERRED ATTITUDE FLAG
R0182 78 UPDATE PRELAUNCH AZIMUTH
R0183 79 REQUEST LUNAR LANDMARK SELECTION ROUTINE (R35)
R0184 80 UPDATE LEM STATE VECTOR
R0185 81 UPDATE CSM STATE VECTOR
R0186 82 REQUEST ORBIT PARAM DISPLAY (R30)
R0187 83 REQUEST RENDEZVOUS PARAM DISPLAY (R31)
R0188 84 START TARGET DELTA V (R32)
R0189 85 REQUEST RENDEZVOUS PARAMETER DISPLAY NO. 2 (R34)
R0190 86 REJECT RENDEZVOUS BACKUP SIGHTING MARK
R0191 87 SET VHF RANGE FLAG

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R0192   88 RESET VHF RANGE FLAG
R0193   89 REQUEST RENDEZVOUS FINAL ATTITUDE ROUTINE (R63)
R0194   90 REQUEST RENDEZVOUS OUT OF PLANE DISPLAY ROUTINE (R36)
R0195   91 DISPLAY BANK SUM
R0196   92 OPERATE IMU PERFORMANCE TEST (P07)
R0197   93 ENABLE W MATRIX INITIALIZATION
R0198   94 PERFORM CYSLUNAR ATTITUDE MANEUVER (P23)
R0199   95 NO UPDATE OF EITHER STATE VECTOR (P20 OR P22)
R0200   96 TERMINATE INTEGRATION AND GO TO P00
R0201   97 PERFORM ENGINE FAIL PROCEDURE
R0202   98 ENABLE TRANSLUNAR INJECT
R0203   99 PLEASE ENABLE ENGINE
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P0204 IN THE FOLLOWING NOUN LIST THE :NO LOAD: RESTRICTION MEANS THE NOUN
R0205 CONTAINS AT LEAST ONE COMPONENT WHICH CANNOT BE LOADED, I.E. OF
R0206 SCALE TYPE L (MIN/SEC) OR PP (2 INTEGERS).
R0207 IN THIS CASE VERBS 24 AND 25 ARE NOT ALLOWED, BUT VERBS 21, 22 OR 23
R0208 MAY BE USED TO LOAD ANY OF THE NOUN:S COMPONENTS WHICH ARE NOT OF THE
R0209 ABOVE SCALE TYPES.
R0210 THE :DEC ONLY: RESTRICTION MEANS ONLY DECIMAL OPERATION IS ALLOWED ON
R0211 EVERY COMPONENT IN THE NOUN. (NOTE THAT :NO LOAD: IMPLIES :DEC ONLY:.)

		NORMAL NOUNS	COMPONENTS	SCALE AND DECIMAL POINT	RESTRICTIONS
R0214	00	NOT IN USE			
R0215	01	SPECIFY MACHINE ADDRESS (FRACTIONAL)	3COMP	.XXXXX FOR EACH	
R0216	02	SPECIFY MACHINE ADDRESS (WHOLE)	3COMP	XXXXX. FOR EACH	
R0217	03	SPECIFY MACHINE ADDRESS (DEGREES)	3COMP	XXX.XX DEG FOR EACH	
R0218	04	SPARE			
R0219	05	ANGULAR ERROR/DIFFERENCE	1COMP	XXX.XX DEG	
R0220	06	OPTION CODE	2COMP	OCTAL ONLY FOR EACH	
R0221		LOADING NOUN 07 WILL SET OR RESET SELECTED BITS IN ANY ERASABLE REGISTER			
R0222	07	ECADR OF WORD TO BE MODIFIED	3COMP	OCTAL ONLY FOR EACH	
R0223		ONES FOR BITS TO BE MODIFIED			
R0224		1 TO SET OR 0 TO RESET SELECTED BITS			
R0225	08	ALARM DATA	3COMP	OCTAL ONLY FOR EACH	
R0226	09	ALARM CODES	3COMP	OCTAL ONLY FOR EACH	
R0227	10	CHANNEL TO BE SPECIFIED	1COMP	OCTAL ONLY	
R0228	11	TIG OF CSI	3COMP	00XXX. HRS	DEC ONLY
R0230				000XX. MIN	MUST LOAD 3 COMPS
R0232				0XX.XX SEC	
R0233	12	OPTION CODE	2COMP	OCTAL ONLY FOR EACH	
R0234		(USED BY EXTENDED VERBS ONLY)			
R0235	13	TIG OF CDH	3COMP	00XXX. HRS	DEC ONLY
R0237				000XX. MIN	MUST LOAD 3 COMPS
R0239				0XX.XX SEC	
R0240	14	SPARE			
R0241	15	INCREMENT MACHINE ADDRESS	1COMP	OCTAL ONLY	
R0242	16	TIME OF EVENT	3COMP	00XXX. HRS	DEC ONLY
R0244		(USED BY EXTENDED VERBS ONLY)		000XX. MIN	MUST LOAD 3 COMPS
R0246				0XX.XX SEC	
R0247	17	ASTRONAUT TOTAL ATTITUDE	3COMP	XXX.XX DEG FOR EACH	
R0248	18	AUTO MANEUVER BALL ANGLES	3COMP	XXX.XX DEG FOR EACH	
R0249	19	BYPASS ATTITUDE TRIM MANEUVER	3COMP	XXX.XX DEG FOR EACH	
R0250	20	ICDU ANGLES	3COMP	XXX.XX DEG FOR EACH	
R0251	21	PIPAS	3COMP	XXXXX. PULSES FOR EACH	
R0253	22	NEW ICDU ANGLES	3COMP	XXX.XX DEG FOR EACH	
R0254	23	SPARE			
R0255	24	DELTA TIME FOR AGC CLOCK	3COMP	00XXX. HRS	DEC ONLY
R0257				000XX. MIN	MUST LOAD 3 COMPS
R0259				0XX.XX SEC	
R0260	25	CHECKLIST	3COMP	XXXXX. FOR EACH	
R0261		(USED WITH PLEASE PERFORM ONLY)			

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R0262	26	PRIORITY/DELAY, ADRES, BBCON	3COMP	OCTAL ONLY FOR EACH	
R0263	27	SELF TEST ON/OFF SWITCH	1COMP	XXXXX.	
R0264	28	SPARE			
R0265	29	XSM LAUNCH AZIMUTH	1COMP	XXX.XX DEG	DEC ONLY

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P0267	30	TARGET CODES	3COMP	XXXXX. FOR EACH	
R0268	31	TIME OF LANDING SITE	3COMP	00XXX. HRS	DEC ONLY
R0270				000XX. MIN	MUST LOAD 3 COMPS
R0272				0XX.XX SEC	
R0273	32	TIME FROM PERIGEE	3COMP	00XXX. HRS	DEC ONLY
R0275				000XX. MIN	MUST LOAD 3 COMPS
R0277				0XX.XX SEC	
R0278	33	TIME OF IGNITION	3COMP	00XXX. HRS	DEC ONLY
R0280				000XX. MIN	MUST LOAD 3 COMPS
R0282				0XX.XX SEC	
R0283	34	TIME OF EVENT	3COMP	00XXX. HRS	DEC ONLY
R0285				000XX. MIN	MUST LOAD 3 COMPS
R0287				0XX.XX SEC	
R0288	35	TIME FROM EVENT	3COMP	00XXX. HRS	DEC ONLY
R0290				000XX. MIN	MUST LOAD 3 COMPS
R0292				0XX.XX SEC	
R0293	36	TIME OF AGC CLOCK	3COMP	00XXX. HRS	DEC ONLY
R0295				000XX. MIN	MUST LOAD 3 COMPS
R0297				0XX.XX SEC	
R0298	37	TIG OF TPI	3COMP	00XXX. HRS	DEC ONLY
R0300				000XX. MIN	MUST LOAD 3 COMPS
R0302				0XX.XX SEC	
R0303	38	TIME OF STATE VECTOR	3COMP	00XXX. HRS	DEC ONLY
R0305				000XX. MIN	MUST LOAD 3 COMPS
R0307				0XX.XX SEC	
R0308	39	DELTA TIME FOR TRANSFER	3COMP	00XXX. HRS	DEC ONLY
R0310				000XX. MIN	MUST LOAD 3 COMPS
R0312				0XX.XX SEC	

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P0313	MIXED NOUNS	COMPONENTS	SCALE AND DECIMAL POINT	RESTRICTIONS
R0315	40 TIME FROM IGNITION/CUTOFF	3COMP	XXBXX MIN/SEC	NO LOAD, DEC ONLY
R0317	VG,		XXXX.X FT/SEC	
R0318	DELTA V (ACCUMULATED)		XXXX.X FT/SEC	
R0319	41 TARGET AZIMUTH,	2COMP	XXX.XX DEG	
R0320	ELEVATION		XX.XXX DEG	
R0321	42 APOGEE,	3COMP	XXXX.X NAUT MI	DEC ONLY
R0323	PERIGEE,		XXXX.X NAUT MI	
R0324	DELTA V (REQUIRED)		XXXX.X FT/SEC	
R0325	43 LATITUDE,	3COMP	XXX.XX DEG	DEC ONLY
R0327	LONGITUDE,		XXX.XX DEG	
R0328	ALTITUDE		XXXX.X NAUT MI	
R0329	44 APOGEE,	3COMP	XXXX.X NAUT MI	NO LOAD, DEC ONLY
R0331	PERIGEE,		XXXX.X NAUT MI	
R0332	TFF		XXBXX MIN/SEC	
R0333	45 MARKS (VHF - OPTICS)	3 COMP	+XXBXX	NO LOAD, DEC ONLY
R0335	TFI OF NEXT BURN		XXBXX MIN/SEC	
R0336	MGA		XXX.XX DEG	
R0337	46 AUTOPILOT CONFIGURATION	2COMP	OCTAL ONLY FOR EACH	
R0338	47 THIS VEHICLE WEIGHT	2COMP	XXXXX. LBS	DEC ONLY
R0340	OTHER VEHICLE WEIGHT		XXXXX. LBS	
R0341	48 PITCH TRIM	2COMP	XXX.XX DEG	DEC ONLY
R0343	YAW TRIM,		XXX.XX DEG	
R0344	49 DELTA R	3COMP	XXXX.X NAUT MI	DEC ONLY
R0346	DELTA V		XXXX.X FT/SEC	
R0347	VHF OR OPTICS CODE		XXXXX.	
R0348	50 SPLASH ERROR,	3COMP	XXXX.X NAUT MI	NO LOAD, DEC ONLY
R0350	PERIGEE,		XXXX.X NAUT MI	
R0351	TFF		XXBXX MIN/SEC	
R0352	51 S-BAND ANTENNA ANGLES PITCH	2COMP	XXX.XX DEG	DEC ONLY
R0354	YAW		XXX.XX DEG	
R0355	52 CENTRAL ANGLE OF ACTIVE VEHICLE	1COMP	XXX.XX DEG	
R0356	53 RANGE,	3COMP	XXX.XX NAUT MI	DEC ONLY
R0358	RANGE RATE,		XXXX.X FT/SEC	
R0359	PHI		XXX.XX DEG	
R0360	54 RANGE,	3COMP	XXX.XX NAUT MI	DEC ONLY
R0362	RANGE RATE,		XXXX.X FT/SEC	
R0363	THETA		XXX.XX DEG	
R0364	55 PERIGEE CODE	3COMP	XXXXX.	DEC ONLY
R0366	ELEVATION ANGLE		XXX.XX DEG	
R0367	CENTRAL ANGLE OF PASSIVE VEHICLE		XXX.XX DEG	
R0368	56 REENTRY ANGLE,	2COMP	XXX.XX DEG	DEC ONLY
R0370	DELTA V		XXXXX. FT/SEC	
R0371	57 DELTA R	1COMP	XXXX.X NAUT MI	DEC ONLY
R0373	58 PERIGEE ALT (POST TPI)	3COMP	XXXX.X NAUT MI	DEC ONLY
R0375	DELTA V TPI		XXXX.X FT/SEC	
R0376	DELTA V TPF		XXXX.X FT/SEC	
R0377	59 DELTA VELOCITY LOS	3COMP	XXXX.X FT/SEC FOR EA.	DEC ONLY
R0379	60 GMAX,	3COMP	XXX.XX G	DEC ONLY

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R0381		VPRED,		XXXXX. FT/SEC	
R0382		GAMMA EI		XXX.XX DEG	
R0383	61	IMPACT LATITUDE,	3COMP	XXX.XX DEG	DEC ONLY
R0385		IMPACT LONGITUDE,		XXX.XX DEG	
R0386		HEADS UP/DOWN		+/- 00001	
R0387	62	INERTIAL VEL MAG (VI),	3COMP	XXXXX. FT/SEC	DEC ONLY
R0389		ALT RATE CHANGE (HDOT),		XXXXX. FT/SEC	
R0390		ALT ABOVE PAD RADIUS (H)		XXXX.X NAUT MI	
R0391	63	RANGE 297,431 TO SPLASH (RTGO),	3COMP	XXXX.X NAUT MI	NO LOAD, DEC ONLY
R0393		PREDICTED INERT VEL (VIO),		XXXXX. FT/SEC	
R0394		TIME FROM 297,431 (TFE)		XXBXX MIN/SEC	
R0395	64	DRAG ACCELERATION,	3COMP	XXX.XX G	DEC ONLY
R0397		INERTIAL VELOCITY (VI),		XXXXX. FT/SEC	
R0398		RANGE TO SPLASH		XXXX.X NAUT MI	
R0399	65	SAMPLED AGC TIME	3COMP	00XXX. HRS	DEC ONLY
R0401		(FETCHED IN INTERRUPT)		000XX. MIN	MUST LOAD 3 COMPS
R0403				0XX.XX SEC	
R0404	66	COMMAND BANK ANGLE (BETA),	3COMP	XXX.XX DEG	DEC ONLY
R0406		CROSS RANGE ERROR,		XXXX.X NAUT MI	
R0407		DOWN RANGE ERROR		XXXX.X NAUT MI	
R0408	67	RANGE TO TARGET,	3COMP	XXXX.X NAUT MI	DEC ONLY
R0410		PRESENT LATITUDE,		XXX.XX DEG	
R0411		PRESENT LONGITUDE		XXX.XX DEG	
R0412	68	COMMAND BANK ANGLE (BETA),	3COMP	XXX.XX DEG	DEC ONLY
R0414		INERTIAL VELOCITY (VI),		XXXXX. FT/SEC	
R0415		ALT RATE CHANGE (RDOT)		XXXXX. FT/SEC	
R0416	69	BETA	3COMP	XXX.XX DEG	DEC ONLY
R0418		DL		XXX.XX G	
R0419		VL		XXXXX. FT/SEC	
R0420	70	STAR CODE,	3COMP	OCTAL ONLY	
R0421		LANDMARK DATA,		OCTAL ONLY	
R0422		HORIZON DATA		OCTAL ONLY	
R0423	71	STAR CODE	3COMP	OCTAL ONLY	
R0424		LANDMARK DATA		OCTAL ONLY	
R0425		HORIZON DATA		OCTAL ONLY	
R0426	72	DELT ANG	3COMP	XXX.XX DEG	DEC ONLY
R0428	73	ALTITUDE	3COMP	XXXXX8. NAUT MI	
R04281		VELOCITY		XXXXX. FT/SEC	
R04282		FLIGHT PATH ANGLE		XXX.XX DEG	
R0429	74	COMMAND BANK ANGLE (BETA)	3COMP	XXX.XX DEG	
R04291		INERTIAL VELOCITY (VI)		XXXXX. FT/SEC	
R04292		DRAG ACCELERATION		XXX.XX G	
R0430	75	DELTA ALTITUDE CDH	3COMP	XXXX.X NAUT MI	NO LOAD, DEC ONLY
R0432		DELTA TIME (CDH-CSI OR TPI-CDH)		XXBXX MIN/SEC	
R0433		DELTA TIME (TPI-CDH OR TPI-NOMTPI)		XXBXX MIN/SEC	
R0434	76	SPARE			
R0435	77	SPARE			
R0436	78	SPARE			
R0437	79	SPARE			
R0438	80	TIME FROM IGNITION/CUTOFF	3COMP	XXBXX MIN/SEC	NO LOAD, DEC ONLY

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R0440		VG		XXXXX. FT/SEC	
R0441		DELTA V (ACCUMULATED)		XXXXX. FT/SEC	
R0441S	81	DELTA V (LV)	3COMP	XXXX.X FT/SEC FOR EACH	DEC ONLY
R0442	82	DELTA V (LV)	3COMP	XXXX.X FT/SEC FOR EACH	DEC ONLY
R0446	83	DELTA V (BODY)	3COMP	XXXX.X FT/SEC FOR EACH	DEC ONLY
R0448	84	DELTA V (OTHER VEHICLE)	3COMP	XXXX.X FT/SEC FOR EACH	DEC ONLY
R0450	85	VG (BODY)	3COMP	XXXX.X FT/SEC FOR EACH	DEC ONLY
R0452	86	DELTA V(LV)	3COMP	XXXXX. FT/SEC FOR EACH	DEC ONLY
R0454	87	MARK DATA SHAFT,	2COMP	XXX.XX DEG	
R0455		TRUNION		XX.XXX DEG	
R0456	88	HALF UNIT SUN OR PLANET VECTOR	3COMP	.XXXXX FOR EACH	DEC ONLY
R0458	89	LANDMARK LATITUDE,	3COMP	XX.XXX DEG	DEC ONLY
R0460		LONGITUDE/2,		XX.XXX DEG	
R0461		ALTITUDE		XXX.XX NAUT MI	
R0462	90	Y	3COMP	XXX.XX NM	DEC ONLY
R0464		Y DOT		XXXX.X FPS	
R0465		PSI		XXX.XX DEG	
R0466	91	OCDU ANGLES SHAFT,	2COMP	XXX.XX DEG	
R0467		TRUNION		XX.XXX DEG	
R0468	92	NEW OPTICS ANGLES SHAFT,	2COMP	XXX.XX DEG	
R0469		TRUNION		XX.XXX DEG	
R0470	93	DELTA GYRO ANGLES	3COMP	XX.XXX DEG FOR EACH	
R0471	94	NEW OPTICS ANGLES SHAFT	2COMP	XXX.XX DEG	
R0472		TRUNNION		XX.XXX DEG	
R0473	95	PREFERRED ATTITUDE ICDU ANGLES	3COMP	XXX.XX DEG FOR EACH	
R0474	96	+X-AXIS ATTITUDE ICDU ANGLES	3COMP	XXX.XX DEG FOR EACH	
R0475	97	SYSTEM TEST INPUTS	3COMP	XXXXX. FOR EACH	
R0476	98	SYSTEM TEST RESULTS AND INPUTS	3COMP	XXXXX.	
R0477				.XXXXX	
R0478				XXXXX.	
R0479	99	RMS IN POSITION	3COMP	XXXXX.FT	DEC ONLY
R0481		RMS IN VELOCITY		XXXX.X FT/SEC	
R0482		RMS OPTION		XXXXX.	

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P0483 REGISTERS AND SCALING FOR NORMAL NOUNS

R0484	NOUN	REGISTER	SCALE TYPE
R0485	00	NOT IN USE	
R0486	01	SPECIFY ADDRESS	B
R0487	02	SPECIFY ADDRESS	C
R0488	03	SPECIFY ADDRESS	D
R0489	04	SPARE	
R0490	05	DSPTEM1	H
R0491	06	OPTION1	A
R0492	07	XREG	A
R0493	08	ALMCADR	A
R0494	09	FAILREG	A
R0495	10	SPECIFY CHANNEL	A
R0496	11	TCSI	K
R0497	12	OPTIONX	A
R0498	13	TCDH	K
R0499	14	SPARE	
R0500	15	INCREMENT ADDRESS	A
R0501	16	DSPTEMX	C
R0502	17	CPHIX	D
R0503	18	THETAD	D
R0504	19	THETAD	D
R0505	20	CDUX	D
R0506	21	PIPAX	C
R0507	22	THETAD	D
R0508	23	SPARE	
R0509	24	DSPTEM2 +1	K
R0510	25	DSPTEM1	C
R0511	26	DSPTEM1	A
R0512	27	SMODE	C
R0513	28	SPARE	
R0514	29	DSPTEM1	D
R0515	30	DSPTEM1	C
R0516	31	DSPTEM1	K
R0517	32	-TPER	K
R0518	33	TIG	K
R0519	34	DSPTEM1	K
R0520	35	TTOGO	K
R0521	36	TIME2	K
R0522	37	TTPI	K
R0523	38	TET	K
R0524	39	T3TOT4	K

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P0525 REGISTERS AND SCALING FOR MIXED NOUNS

R0526	NOUN	COMP	REGISTER	SCALE TYPE
R0527	40	1	TTOGO	L
R0528		2	VGDISP	S
R0529		3	DVTOTAL	S
R0530	41	1	DSPTEM1	D
R0531		2	DSPTEM1 +1	E
R0532	42	1	HAPO	Q
R0533		2	HPER	Q
R0534		3	VGDISP	S
R0535	43	1	LAT	H
R0536		2	LONG	H
R0537		3	ALT	Q
R0538	44	1	HAPOX	Q
R0539		2	HPERX	Q
R0540		3	TFF	L
R0541	45	1	VHFCNT	PP
R0542		2	TTOGO	L
R0543		3	+MGA	H
R0544	46	1	DAPDATR1	A
R0545		2	DAPDATR2	A
R0546	47	1	CSMMASS	KK
R0547		2	LEMMASS	KK
R0548	48	1	PACTOFF	FF
R0549		2	YACTOFF	FF
R0550	49	1	N49DISP	Q
R0551		2	N49DISP +2	S
R0552		3	N49DISP +4	C
R0553	50	1	RSP-RREC	LL
R0554		2	HPERX	Q
R0555		3	TFF	L
R0556	51	1	RHOSB	H
R0557		2	GAMMASR	H
R0558	52	1	ACTCENT	H
R0559	53	1	RANGE	JJ
R0560		2	RRATE	S
R0561		3	RTHETA	H
R0562	54	1	RANGE	JJ
R0563		2	RRATE	S
R0564		3	RTHETA	H
R0565	55	1	NN1	C
R0566		2	ELEV	H
R0567		3	CENTANG	H
R0568	56	1	RTEGAM2D	H
R0569		2	RTEDVD	P
R0570	57	1	DELTAR	Q
R0571	58	1	POSTTPI	Q
R0572		2	DELVTPI	S

R0573		3	DELVTPF	S
R0574	59	1	DVLOS	S
R0575		2	DVLOS +2	S
R0576		3	DVLOS +4	S
R0577	60	1	GMAX	T
R0578		2	VPRED	P
R0579		3	GAMMAEI	H
R0580	61	1	LAT(SPL)	H
R0581		2	LNG(SPL)	H
R0582		3	HEADSUP	C
R0583	62	1	VMAGI	P
R0584		2	HDOT	P
R0585		3	ALTI	Q
R0586	63	1	RTGO	LL
R0587		2	VIO	P
R0588		3	TTE	L
R0589	64	1	D	MM
R0590		2	VMAGI	P
R0591		3	RTGON64	LL
R0592	65	1	SAMPTIME	K
R0593		2	SAMPTIME	K
R0594		3	SAMPTIME	K
R0595	66	1	ROLLC	H
R0596		2	XRNGERR	VV
R0597		3	DNRNGERR	LL
R0598	67	1	RTGON67	LL
R0599		2	LAT	H
R0600		3	LONG	H
R0601	68	1	ROLLC	H
R0602		2	VMAGI	P
R0603		3	RDOT	UU
R0604	69	1	ROLLC	H
R0605		2	Q7	MM
R0606		3	VL	UU
R0607	70	1	STARCODE	A
R0608		2	LANDMARK	A
R0609		3	HORIZON	A
R0610	71	1	STARCODE	A
R0611		2	LANDMARK	A
R0612		3	HORIZON	A
R0613	72	1	THETZERO	H
R0614	73	1	P21ALT	Q (MEMORY/100 TO DISPLAY TENS N.M.)
R06141		2	P21VEL	P
R06142		3	P21GAM	H
R0615	74	1	ROLLC	H
R06151		2	VMAGI	P
R06152		3	D	MM
R0616	75	1	DIFFALT	Q
R0617		2	T1TOT2	L
R0618		3	T2TOT3	L

R0619	76	SPARE		
R0620	77	SPARE		
R0621	78	SPARE		
R0622	79	SPARE		
R0623	80	1	TTOGO	L
R0624		2	VGDISP	P
R0625		3	DVTOTAL	P
R0626	81	1	DELVLVC	S
R06261		2	DELVLVC +2	S
R06262		3	DELVLVC +4	S
R0627	82	1	DELVLVC	S
R0628		2	DELVLVC +2	S
R0629		3	DELVLVC +4	S
R0632	83	1	DELVIMU	S
R0633		2	DELVIMU +2	S
R0634		3	DELVIMU +4	S
R0635	84	1	DELVOV	S
R0636		2	DELVOV +2	S
R0637		3	DELVOV +4	S
R0638	85	1	VGBODY	S
R0639		2	VGBODY +2	S
R0640		3	VGBODY +4	S
R0641	86	1	DELVLVC	P
R0642		2	DELVLVC +2	P
R0643		3	DELVLVC +4	P
R0644	87	1	MRKBUF1 +3	D
R0645		2	MRKBUF1 +5	J
R0646	88	1	STARSAV3	ZZ
R0647		2	STARSAV3 +2	ZZ
R0648		3	STARSAV3 +4	ZZ
R0649	89	1	LANDLAT	G
R0650		2	LANDLONG	G
R0651		3	LANDALT	JJ
R0652	90	1	RANGE	JJ
R0653		2	RRATE	S
R0654		3	RTHETA	H
R0655	91	1	CDUS	D
R0656		2	CDUT	J
R0657	92	1	SAC	D
R0658		2	PAC	J
R0659	93	1	OGC	G
R0660		2	OGC +2	G
R0661		3	OGC +4	G
R0662	94	1	MRKBUF1 +3	D
R0663		2	MRKBUF1 +5	J
R0664	95	1	PRAXIS	D
R0665		2	PRAXIS +1	D
R0666		3	PRAXIS +2	D
R0667	96	1	CPHIX	D
R0668		2	CPHIX +1	D

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R0669		3	CPHIX +2	D
R0670	97	1	DSPTEM1	C
R0671		2	DSPTEM1 +1	C
R0672		3	DSPTEM1 +2	C
R0673	98	1	DSPTEM2	C
R0674		2	DSPTEM2 +1	B
R0675		3	DSPTEM2 +2	C
R0676	99	1	WWPOS	XX
R0677		2	WWVEL	YY
R0678		3	WWOPT	C

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P0679 NOUN SCALES AND FORMATS

	-SCALE TYPE-	PRECISION	
R0680			
R0681	UNITS	DECIMAL FORMAT	-- AGC FORMAT
R0682	----------	----------	-- ----------
R0683	-A-		
R0684	OCTAL	XXXXX	SP OCTAL
R0685	-B-		-14
R0686	FRACTIONAL	.XXXXX	SP BIT 1 = 2 UNITS
R0687		(MAX .99996)	
R0688	-C-		
R0689	WHOLE	XXXXX.	SP BIT 1 = 1 UNIT
R0690		(MAX 16383.)	
R0691	-D-		15
R0692	CDU DEGREES	XXX.XX DEGREES	SP BIT 1 = 360/2 DEGREES
R0693		(MAX 359.99)	(USES 15 BITS FOR MAGNI-
R0694			TUDE AND 2-S COMP.)
R0695	-E-		14
R0696	ELEVATION DEGREES	XX.XXX DEGREES	SP BIT 1 = 90/2 DEGREES
R0697		(MAX 89.999)	
R0698	-F-		14
R0699	DEGREES (180)	XXX.XX DEGREES	SP BIT 1 = 180/2 DEGREES
R0700		(MAX 179.99)	
R0701	-G-		
R0702	DP DEGREES(90)	XX.XXX DEGREES	DP BIT 1 OF LOW REGISTER =
R0703			28
R0704			360/2 DEGREES
R0705	-H-		
R0706	DP DEGREES (360)	XXX.XX DEGREES	DP BIT 1 OF LOW REGISTER =
R0707			28
R0708		(MAX 359.99)	360/2 DEGREES
R0709	-J-		15
R0710	Y OPTICS DEGREES	XX.XXX DEGREES	SP BIT 1 = 90/2 DEGREES
R0711		(BIAS OF 19.775	(USES 15 BITS FOR MAGNI-
R0712		DEGREES ADDED FOR	TUDE AND 2-S COMP.)
R0713		DISPLAY, SUBTRACTED	
R0714		FOR LOAD.)	
R0715		NOTE: NEGATIVE NUM-	
R0716		BERS CANNOT BE	
R0717		LOADED.	
R0718	-K-		

```
R0719   TIME (HR, MIN, SEC)  00XXX. HR              DP BIT 1 OF LOW REGISTER =
R0720                       000XX. MIN                   -2
R0721                       0XX.XX SEC                 10   SEC
R0722                       (DECIMAL ONLY.
R0723                       MAX MIN COMP=59
R0724                       MAX SEC COMP=59.99
R0725                       MAX CAPACITY=745 HRS
R0726                                    39 MINS
R0727                                    14.55 SECS.
R0728                       WHEN LOADING, ALL 3
R0729                       COMPONENTS MUST BE
R0730                       SUPPLIED.)

R0731   -L-
R0732   TIME (MIN/SEC)      XXBXX MIN/SEC          DP BIT 1 OF LOW REGISTER =
R0733                       (B IS A BLANK                -2
R0734                       POSITION. DECIMAL          10   SEC
R0735                       ONLY, DISPLAY OR
R0736                       MONITOR ONLY. CANNOT
R0737                       BE LOADED.
R0738                       MAX MIN COMP=59
R0739                       MAX SEC COMP=59
R0740                       VALUES GREATER THAN
R0741                       59 MIN 59 SEC
R0742                       ARE DISPLAYED AS
R0743                       59 MIN 59 SEC.)

R0744   -M-                                                -2
R0745   TIME (SEC)          XXX.XX SEC             SP BIT 1 = 10   SEC
R0746                       (MAX 163.83)

R0747   -N-
R0748   TIME(SEC) DP        XXX.XX SEC             DP BIT 1 OF LOW REGISTER =
R0749                                                   -2
R0750                                                 10   SEC

R0751   -P-
R0752   VELOCITY 2          XXXXX. FEET/SEC        DP BIT 1 OF HIGH REGISTER =
R0753                       (MAX 41994.)                -7
R0754                                                 2   METERS/CENTI-SEC

R0755   -Q-
R0756   POSITION 4          XXXX.X NAUTICAL MILES  DP BIT 1 OF LOW REGISTER =
R0757                                              2 METERS

R0758   -S-
R0759   VELOCITY 3          XXXX.X FT/SEC          DP BIT 1 OF HIGH REGISTER =
R0760                                                  -7
R0761                                                 2   METERS/CENTI-SEC
```

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```
R0762   -T-                                                  -2
R0763   G                   XXX.XX G            SP BIT 1 = 10   G
R0764                       (MAX 163.83)

R0765   -FF-
R0766   TRIM DEGREES        XXX.XX DEG.         SP LOW ORDER BIT = 85.41 SEC
R0767                       (MAX 388.69)           OF ARC

R0768   -GG-
R0769   INERTIA             XXXXX8B. SLUG FT SQ SP FRACTIONAL PART OF
R0770                       (MAX 07733BB.)          20    2
R0771                                              2  KG M

R0772   -II-                                                    20
R0773   THRUST MOMENT       XXXXX3B. FT LBS     SP FRACTIONAL PART OF 2
R0774                       (MAX 0773388.)         NEWTON METER

R0775   -JJ-
R0776   POSITION5           XXX.XX NAUT MI      DP BIT 1 OF LOW REGISTER =
R0777                                              2 METERS
R0778   -KK-                                                    16
R0779   WEIGHT2             XXXXX. LBS          SP FRACTIONAL PART OF 2   KG

R0780   -LL-
R0781   POSITION6           XXXX.X NAUT MI      DP BIT 1 OF LOW REG =
R0782                                                          -28
R0783                                             (6,373,338)(2(PI))X2
R0784                                             ------------------------
R0785                                                     1852
R0786                                             NAUT. MI.

R0787   -MM-
R0788   DRAG ACCELERATION   XXX.XX G             DP BIT 1 OF LOW REGISTER =
R0789                       MAX (024.99)                -28
R0790                                             25X2    G

R0791   -PP-
R0792   2 INTEGERS          +XXBYY              DP BIT 1 OF HIGH REGISTER =
R0793                       (B IS A BLANK          1 UNIT OF XX
R0794                       POSITION. DECIMAL      BIT 1 OF LOW REGISTER =
R0795                       ONLY, DISPLAY OR       1 UNIT OF YY
R0796                       MONITOR ONLY. CANNOT   (EACH REGISTER MUST
R0797                       BE LOADED.)            CONTAIN A POSITIVE INTEGER
R0798                       (MAX 99899)            LESS THAN 100)

R0799   -UU-
R0800   VELOCITY/2VS        XXXXX. FEET/SEC     DP FRACTIONAL PART OF
R0801                       (MAX 51532.)           2VS FEET/SEC
R0802                                              (VS = 25766.1973)
```

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```
P0803   -VV-
R0804   POSITION8              XXXX.X NAUT MI        DP BIT 1 OF LOW REGISTER =
R0805                                                              -28
R0806                                                4 X 6,373,338 X 2
R0807                                                ---------------------
R0808                                                       1852
R0809                                                NAUT MI

R0810   -XX-
R0811   POSITION 9              XXXXX. FEET           DP BIT 1 OF LOW REGISTER =
R0812                                                    -9
R0813                                                2   METERS

R0814   -YY-
R0815   VELOCITY 4              XXXX.X FEET/SEC       DP FRACTIONAL PART OF
R0816                           (MAX 328.0)              METERS/CENTI-SEC

R08161  -ZZ-
R08162  DP FRACTIONAL           .XXXXX                DP BIT 1 OF HIGH REGISTER =
R08163                                                   -14
R08164                                               2   UNITS

R0817   THAT-S ALL ON THE NOUNS.
```

P0818 ALARM CODES FOR 504

R0819 REPORT DEFICIENCIES TO JOHN SUTHERLAND @ MIT 617-864-6900 X1458

R0820	*9	*18	*60	*25 COLUMN
R0822	CODE	* TYPE	SET BY	ALARM ROUTINE
R0824	00110	NO MARK SINCE LAST MARK REJECT	SXTMARK	ALARM
R0826	00112	MARK NOT BEING ACCEPTED	SXTMARK	ALARM
R0828	00113	NO INBITS	SXTMARK	ALARM
R0830	00114	MARK MADE BUT NOT DESIRED	SXTMARK	ALARM
R0832	00115	OPTICS TORQUE REQUESTWITH SWITCH NOT AT	EXT VERB OPTICS CDU	ALARM
R0834		CGC		
R0835	00116	OPTICS SWITCH ALTERED BEFORE 15 SEC ZERO	T4RUPT	ALARM
R0837		TIME ELAPSED.		
R0838	00117	OPTICS TORQUE REQUEST WITH OPTICS NOT	EXT VERB OPTICS CDU	ALARM
R0840		AVAILABLE (OPTIND=-0)		
R0841	00120	OPTICS TORQUE REQUEST WITH OPTICS	T4RUPT	ALARM
R0843		NOT ZEROED		
R0844	00121	CDUS NO GOOD AT TIME OF MARK	SXTMARK	ALARM
R0846	00122	MARKING NOT CALLED FOR	SXTMARK	ALARM
R0848	00124	P17 TPI SEARCH - NO SAFE PERICTR HERE.	TPI SEARCH	ALARM
R0850	00205	BAD PIPA READING	SERVICER	ALARM
R0852	00206	ZERO ENCODE NOT ALLOWED WITH COARSE ALIGN	IMU MODE SWITCHING	ALARM
R0854		+ GIMBAL LOCK		
R0855	00207	ISS TURNON REQUEST NOT PRESENT FOR 90 SEC	T4RUPT	ALARM
R0857	00210	IMU NOT OPERATING	IMU MODE SWITCH, IMU-2, R02, P51	ALARM,VARALARM
R0859	00211	COARSE ALIGN ERROR - DRIVE > 2 DEGREES	IMU MODE SWITCH	ALARM
R0861	00212	PIPA FAIL BUT PIPA IS NOT BEING USED	IMU MODE SWITCH,T4RPT	ALARM
R0863	00213	IMU NOT OPERATING WITH TURN-ON REQUEST	T4RUPT	ALARM
R0865	00214	PROGRAM USING IMU WHEN TURNED OFF	T4RUPT	ALARM
R0867	00215	PREFERRED ORIENTATION NOT SPECIFIED	P52,P54	ALARM
R0869	00217	BAD RETURN FROM STALL ROUTINES.	CURTAINS	ALARM2
R0871	00220	IMU NOT ALIGNED - NO REFSMMAT	R02,P51	VARALARM
R0873	00401	DESIRED GIMBAL ANGLES YIELD GIMBAL LOCK	IMF ALIGN, IMU-2	ALARM
R0875	00404	TARGET OUT OF VIEW - TRUN ANGLE > 90 DEG	R52	PRIOLARM
R0877	00405	TWO STARS NOT AVAILABLE	P52,P54	ALARM
R0879	00406	REND NAVIGATION NOT OPERATING	R21,R23	ALARM
R0881	00407	AUTO OPTICS REQUEST TRUN ANGLE > 50 DEG.	R52	ALARM
R0885	00421	W-MATRIX OVERFLOW	INTEGRV	VARALARM
R08852	00430	* INTEG. ABORT DUE TO SUBSURFACE S. V.	ALL CALLS TO INTEG	POOOOO
R0886	00600	IMAGINARY ROOTS ON FIRST ITERATION	P32, P72	VARALARM
R08861	00601	PERIGEE ALTITUDE LT PMIN1	P32,P72,	VARALARM
R08862	00602	PERIGEE ALTITUDE LT PMIN2	P32,P72,	VARALARM
R08863	00603	CSI TO CDH TIME LT PMIN22	P32,P72,P33,P73	VARALARM
R08864	00604	CDH TO TPI TIME LT PMIN23	P32,P72	VARALARM
R0887	00605	NUMBER OF ITERATIONS EXCEEDS LOOP MAXIMUM	P32,P72,P37	VARALARM
R08871	00606	DV EXCEEDS MAXIMUM	P32,P72	VARALARM
R0888	00607	* NO SOLN FROM TIME-THETA OR TIME-RADIUS	TIMETHET,TIMERAD	POOOOO

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R08886	00610	* LAMBDA LESS THAN UNITY	P37	POODOO
R0889	00611	NO TIG FOR GIVEN ELEV ANGLE	P34,P74	VARALARM
R0891	00612	STATE VECTOR IN WRONG SPHERE OF INFLUENCE	P37	VARALARM
R0893	00613	REENTRY ANGLE OUT OF LIMITS	P37	VARALARM
R0895	00777	PIPA FAIL CAUSED ISS WARNING.	T4RUPT	VARALARM
R08964	01102	CMC SELF TEST ERROR		ALARM2
R0897	01103	* UNUSED CCS BRANCH EXECUTED	ABORT	POODOO
R0899	01104	* DELAY ROUTINE BUSY	EXEC	BAILOUT
R0901	01105	DOWNLINK TOO FAST	T4RUPT	ALARM
R0903	01106	UPLINK TOO FAST	T4RUPT	ALARM
R0905	01107	PHASE TABLE FAILURE. ASSUME	RESATRT	ALARM
R0907		ERASABLE MEMORY IS DESTROYED		
R0908	01201	* EXECUTIVE OVERFLOW-NO VAC AREAS	EXEC	BAILOUT
R0910	01202	* EXECUTIVE OVERFLOW-NO CORE SETS	EXEC	BAILOUT
R0912	01203	* WAITLIST OVERFLOW-TOO MANY TASKS	WAITLIST	BAILOUT
R0914	01204	* NEGATIVE OR ZERO WAITLIST CALL	WAITLIST	POODOO
R0916	01206	* SECOND JOB ATTEMPTS TO GO TO SLEEP	PINBALL	POODOO
R0918		VIA KEYBOARD AND DISPLAY PROGRAM		
R0919	01207	* NO VAC AREA FOR MARKS	SXTMARK	BAILOUT
R0921	01210	* TWO PROGRAMS USING DEVICE AT SAME TIME	IMU MODE SWITCH	POODOO
R09221	01211	* ILLEGAL INTERRUPT OF EXTENDED VERB	SXTMARK	BAILOUT
R0923	01301	ARCSIN-ARCCOS ARGUMENT TOO LARGE	INTERPRETER	ALARM
R0927	01302	* SQRT CALLED WITH NEGATIVE ARGUMENT.ABORT	INTERPRETER	POODOO
R0929	01407	VG INCREASING	S40.8	ALARM
R0931	01426	IMU UNSATISFACTORY	P61, P62	ALARM
R0933	01427	IMU REVERSED	P61, P62	ALARM
R0935	01501	* KEYBOARD AND DISPLAY ALARM DURING	PINBALL	POODOO
R0937		INTERNAL USE (NVSUB). ABORT.		
R0938	01502	* ILLEGAL FLASHING DISPLAY	GOPLAY	POODOO
R0940	01520	V37 REQUEST NOT PERMITTED AT THIS TIME	V37	ALARM
R09411	01521	* P01 ILLEGALLY SELECTED	P01, P07	POODOO
R0942	01600	OVERFLOW IN DRIFT TEST	OPT PRE ALIGN CALIB	ALARM
R0944	01601	BAD IMU TORQUE	OPT PRE ALIGN CALIB	ALARM
R0946	01602	BAD OPTICS DURING VERIFICATION	OPTALGN CALIB (CSM)	ALARM
R0948	01703	INSUF. TIME FOR INTEG., TIG WAS SLIPPED	R41	ALARM
R0954	03777	ICDU FAIL CAUSED THE ISS WARNING	T4RUPT	VARALARM
R0956	04777	ICDU , PIPA FAILS CAUSED THE ISS WARNING	T4RUPT	VARALARM
R0958	07777	IMU FAIL CAUSED THE ISS WARNING	T4RUPT	VARALARM
R0960	10777	IMU , PIPA FAILS CAUSED THE ISS WARNING	T4RUPT	VARALARM
R0962	13777	IMU , ICDU FAILS CAUSED THE ISS WARNING	T4RUPT	VARALARM
R0964	14777	IMU,ICDU,PIPA FAILS CAUSED THE ISSWNING	T4RUPT	VARALARM
R0966		* INDICATES ABORT TYPE.ALL OTHERS ARE NON-ABORTIVE		

```
P0967            CHECKLIST CODES FOR 504

R0968            PLEASE REPORT ANY DEFICIENCIES IN THIS LIST TO JOHN SUTHERLAND

R0969   *9      *17      *26  COLUMN

R0970   R1 CODE    ACTION TO BE EFFECTED

R0971   00014   KEY IN   FINE ALIGNMENT OPTION
R0972   00015   PERFORM  CELESTIAL BODY ACQUISITION
R0973   00016   KEY IN   TERMINATE MARK SEQUENCE
R0974   00041   SWITCH   CM/SM SEPARATION TO UP
R0975   00062   SWITCH   AGC POWER DOWN
R0976   00202   PERFORM  GNCS AUTOMATIC MANEUVER
R0977   00203   SWITCH   TO CMC-AUTO
R0978   00204   PERFORM  SPS GIMBAL TRIM
R0979   00403   SWITCH   OPTICS TO MANUAL OR ZERO
R0980                      SWITCH DENOTES CHANGE POSITION OF A CONSOLE SWITCH
R0981                      PERFORM DENOTES START OR END OF A TASK
R0982                      KEY IN DENOTES KEY IN OF DATA THRU THE DSKY
```

L ASSEMBLY AND OPERATION INFORMATION USER'S PAGE NO. 26 EO

P0983 OPTION CODES FOR 504

R0984 PLEASE REPORT ANY DEFICIENCIES IN THIS LIST TO JOHN SUTHERLAND

R0985 THE SPECIFIED OPTION CODES WILL BE FLASHED IN COMPONENT R1 IN
R0986 CONJUNCTION WITH VERB04NOUN06 TO REQUEST THE ASTRONAUT TO LOAD INTO
R0987 COMPONENT R2 THE OPTION HE DESIRES.

R0988	*9	*17	*52	*11	*25 COLUMN
R0990	OPTION				
R0991	CODE	PURPOSE	INPUT FOR COMPONENT 2	PROGRAM(S)	APPLICABILITY
R0993	00001	SPECIFY IMU ORIENTATION	1=PREF 2=NOM 3=REFSMMAT	P50'S	ALL
R0995	00002	SPECIFY VEHICLE	1=THIS 2=OTHER	P21,R30	ALL
R0997	00003	SPECIFY TRACKING ATTITUDE	1=PREFERRED 2=OTHER	R63	ALL
R0999	00004	SPECIFY RADAR	1=RR 2=LR	R04	SUNDANCE + LUMINARY
R1001	00005	SPECIFY SOR PHASE	1=FIRST 2=SECOND	P38	COLOSSUS + LUMINARY
R1003	00006	SPECIFY RR COARSE ALIGN OPTION	1=LOCKON 2=CONTINUOUS DESIG.	V41N72	SUNDANCE + LUMINARY
R1005	00007	SPECIFY PROPULSION SYSTEM	1=SPS 2=RCS	P37	COLOSSUS
R1007	00010	SPECIFY ALIGNMENT MODE	0=ANY TIME 1=REFSMMAT +G	P57	LUMINARY
R1009			2=TWO BODIES 3=ONE BODY + G		
R1010	00011	SPECIFY SEPARATION MONITOR PHASE	1=DELTAV 2=STATE VECTOR UPDATE	P46	LUMINARY
R1012	00012	SPECIFY CSM ORBIT OPTION	1=NO ORBIT CHANGE 2=CHANGE	P22	LUMINARY
R1014			ORBIT TO PASS OVER LM		

L TAGS FOR RELATIVE SETLOC AND BLANK BANK CARDS USER'S PAGE NO. 1 E0

```
 0001                          44,2000  44,2000   FIXED    MEMORY 120000 - 167777
 0002   REF   1                                            COUNT  BANKSUM

R00025            MODULE 1 CONTAINS BANKS 0 THROUGH 5

 0003                             4000                     BLOCK  02
 0004                             4000             FFTAG1  EQUALS
 0005                             4000             FFTAG2  EQUALS
 0006                             4000             FFTAG3  EQUALS
 0007                             4000             FFTAG4  EQUALS
 0008                             4000             FFTAG7  EQUALS
 0009                             4000             FFTAG8  EQUALS
 0010                             4000             FFTAG9  EQUALS
 0011                             4000             FFTAG10 EQUALS
 0012                             4000             FFTAG12 EQUALS
 00125                            4000             P30SUBS EQUALS
 00126                            4000             STOPRAT EQUALS .
 00127                            4000             P23S    EQUALS
 0013       4 WORDS LEFT          5773   05773 1           BNKSUM 02
 0013                             5774   05774 0

 0014                             6000                     BLOCK  03
 0015                             6000             FFTAG5  EQUALS
 0016                             6000             FFTAG6  EQUALS
 00161                            6000             DAPS9   EQUALS
 00162                            6000             FFTAG13 EQUALS
 0017       2 WORDS LEFT          7775   07775 0           BNKSUM 03
 0017                             7776   07776 0

 0018                          00,2000                     BANK   00
 0019                          00,2000             DLAYJOB EQUALS
 0020       7 WORDS LEFT       00,3770   03770 1           BNKSUM 00
 0020                          00,3771   03771 0

 0021                          01,2000                     BANK   01
 0022                          01,2000             RESTART EQUALS
 0023       7 WORDS LEFT       01,3770   03770 1           BNKSUM 01
 0023                          01,3771   03771 0

 0024                          04,2000                     BANK   4
 0025                          04,2000             VERB37  EQUALS
 0026                          04,2000             CONICS1 EQUALS
 0027                          04,2000             PINBALL4 EQUALS
 0028                          04,2000             CSI/COH1 EQUALS
 0029                          04,2000             INTPRET2 EQUALS
 00291                         04,2000             IMUCAL1 EQUALS
```

L TAGS FOR RELATIVE SETLOC AND BLANK BANK CARDS USER'S PAGE NO. 2 E0

```
00292                          04,2000              STBLEORB EQUALS
00293                          04,2000              E/PROG   EQUALS
00294                          04,2000              MIDDGIM  EQUALS
0030     16 WORDS LEFT         04,3757   03757 1             BNKSUM 04
0030                           04,3760   03760 0

0031                           05,2000                       BANK   5
0032                           05,2000              FRANDRES EQUALS
0033                           05,2000              DOWNTELM EQUALS
00335                          05,2000              DAPMASS  EQUALS
00337                          05,2000              CDHTAG   EQUALS
0034      1 WORDS LEFT         05,3776   03776 1             BNKSUM 05

R00345          MODULE 2 CONTAINS BANKS 6 THROUGH 13

0035                           06,2000                       BANK   6
0036                           06,2000              IMUCOMP  EQUALS
0037                           06,2000              T4RUP    EQUALS
00375                          06,2000              IMUCAL2  EQUALS
00377                          06,2000              CSIPROG  EQUALS
0038      7 WORDS LEFT         06,3770   03770 1             BNKSUM 06
0038                           06,3771   03771 0

0039                           07,2000                       BANK   7
0040                           07,2000              SXTMARKE EQUALS
0041                           07,2000              R02      EQUALS
0042                           07,2000              MODESW   EQUALS
0043                           07,2000              XANG     EQUALS
0044                           07,2000              KEYRUPT  EQUALS
00445                          07,2000              CSIPROG6 EQUALS
0045      0 WORDS LEFT         07,2000   NO NEED             BNKSUM 07

0046                           10,2000                       BANK   10
0047                           10,2000              DISPLAYS EQUALS
0048                           10,2000              PHASETAB EQUALS
0049                           10,2000              COMGEOM2 EQUALS
0050                           10,2000              SXTMARK1 EQUALS
0051                           10,2000              P60S4    EQUALS
0052                           10,2000              OPTDRV   EQUALS
00525                          10,2000              CSIPROG8 EQUALS
0053      0 WORDS LEFT         10,2000   NO NEED             BNKSUM 10

0054                           11,2000                       BANK   11
0055                           11,2000              ORBITAL  EQUALS
0056                           11,2000              ORBITAL1 EQUALS                CONSTANTS
```

```
 0057                        11,2000             INTVEL   EQUALS
 0058                        11,2000             S52/2    EQUALS
 00585                       11,2000             CSIPROG5 EQUALS
 00586                       11,2000             INTINIT1 EQUALS
 0059     1 WORDS LEFT       11,3776  03776 1            BNKSUM 11


 0060                        12,2000                      BANK   12
 0061                        12,2000             CONICS   EQUALS
 00615                       12,2000             CSIPROG2 EQUALS
 00616                       12,2000             CSI/CDH2 EQUALS
 00618                       12,2000             MODCHG2  EQUALS
 0062     0 WORDS LEFT       12,2000  NO NEED            BNKSUM 12


 0063                        13,2000                      BANK   13
 0064                        13,2000             P76LOC   EQUALS
 0065                        13,2000             LATLONG  EQUALS
 0066                        13,2000             INTINIT  EQUALS
 0067                        13,2000             SR52/1   EQUALS
 00675                       13,2000             ORBITAL2 EQUALS
 00676                       13,2000             CDHTAGS  EQUALS
 00677                       13,2000             E/PROG1  EQUALS
 00678                       13,2000             MODCHG3  EQUALS
 0069     1 WORDS LEFT       13,3776  03776 1            BNKSUM 13

R0070   SPACER

R00705          MODULE 3 CONTAINS BANKS 14 THROUGH 21

 0071                        14,2000                      BANK   14
 0072                        14,2000             STARTAB  EQUALS
 0073                        14,2000             RT53     EQUALS
 0074                        14,2000             P50S1    EQUALS
 00745                       14,2000             MEASINC2 EQUALS
 00746                       14,2000             CSI/CDH3 EQUALS
 0075    14 WORDS LEFT       14,3761  03761 1            BNKSUM 14
 0075                        14,3762  03762 1


 0076                        15,2000                      BANK   15
 0077                        15,2000             P50S     EQUALS
 0078                        15,2000             ETRYDAP  EQUALS
 0079                        15,2000             S52/3    EQUALS
 0080     18 WORDS LEFT      15,3755  03755 0            BNKSUM 15
 0080                        15,3756  03756 0


 0081                        16,2000                      BANK   16
 0082                        16,2000             P40S1    EQUALS
```

```
0083                          16,2000                DAPROLL  EQUALS
0084                          16,2000                P50S2    EQUALS
00841                         16,2000                P23S1    EQUALS
00842                         16,2000                RTE2     EQUALS
0085     47 WORDS LEFT        16,3720   03720 1               BNKSUM 16
0085                          16,3721   03721 0

0086                          17,2000                         BANK   17
0087                          17,2000                DAPS4    EQUALS
0088                          17,2000                DAPS5    EQUALS
0089                          17,2000                DAPS7    EQUALS
00891                         17,2000                P50S3    EQUALS
0090     32 WORDS LEFT        17,3737   03737 1               BNKSUM 17
0090                          17,3740   03740 1

0091                          20,2000                         BANK   20
0092                          20,2000                DAPS6    EQUALS
0093                          20,2000                DAPS1    EQUALS
0094                          20,2000                DAPS2    EQUALS
00941                         20,2000                MANUSTUF EQUALS
00942                         20,2000                R36CM    EQUALS
00943                         20,2000                VAC5LOC  EQUALS
0095     31 WORDS LEFT        20,3740   03740 1               BNKSUM 20
0095                          20,3741   03741 0

0096                          21,2000                         BANK   21
0097                          21,2000                DAPS3    EQUALS
0098                          21,2000                MYSUBS   EQUALS
00981                         21,2000                KALCMON3 EQUALS
0099     10 WORDS LEFT        21,3765   03765 0               BNKSUM 21
0099                          21,3766   03766 0

R00995          MODULE 4 CONTAINS BANKS 22 THROUGH 27

0100                          22,2000                         BANK   22
0101                          22,2000                RTBCODES EQUALS
0102                          22,2000                RTBCODE1 EQUALS
0103                          22,2000                DAPS8    EQUALS
0104                          22,2000                APOPER1  EQUALS
0105                          22,2000                P40S5    EQUALS
0106                          22,2000                KALCMON2 EQUALS
0107                          22,2000                KALCMON1 EQUALS
01075                         22,2000                CSIPROG3 EQUALS
0108      2 WORDS LEFT        22,3775   03775 1               BNKSUM 22
0108                          22,3776   03776 1
```

L TAGS FOR RELATIVE SETLOC AND BLANK BANK CARDS USER'S PAGE NO. 5 EO

```
0109                          23,2000                    BANK   23
0110                          23,2000          P20S2     EQUALS
0111                          23,2000          INFLIGHT  EQUALS
0112                          23,2000          COMGEOM1  EQUALS
0113                          23,2000          POWFLITE  EQUALS
0114                          23,2000          POWFLIT1  EQUALS
0115                          23,2000          RENDGUID  EQUALS
0116                          23,2000          POWFLIT2  EQUALS
0117                          23,2000          R30LOC    EQUALS
0118                          23,2000          P11FOUR   EQUALS
01185                         23,2000          CSIPROG4  EQUALS
0119      5 WORDS LEFT        23,3772  03772 0           BNKSUM 23
0119                          23,3773  03773 1

0120                          24,2000                    BANK   24
0121                          24,2000          LOADDAP   EQUALS
0122                          24,2000          P40S      EQUALS
01225                         24,2000          CSIPROG7  EQUALS
0125     10 WORDS LEFT        24,3765  03765 0           BNKSUM 24
0125                          24,3766  03766 0

0126                          25,2000                    BANK   25
0127                          25,2000          REENTRY   EQUALS
01275                         25,2000          CDHTAG1   EQUALS
0128      3 WORDS LEFT        25,3774  03774 0           BNKSUM 25
0128                          25,3775  03775 1

0129                          26,2000                    BANK   26
0130                          26,2000          INTPRET1  EQUALS
0131                          26,2000          REENTRY1  EQUALS
0132                          26,2000          P60S      EQUALS
0133                          26,2000          P60S1     EQUALS
0134                          26,2000          P60S2     EQUALS
0135                          26,2000          P60S3     EQUALS
0136                          26,2000          PLANTIN   EQUALS                LUNAR ROT
0137                          26,2000          EPHEM     EQUALS
0138                          26,2000          P05P06    EQUALS
01381                         26,2000          26P50S    EQUALS
0139      0 WORDS LEFT        26,2000  NO NEED           BNKSUM 26

R0140

0141                          27,2000                    BANK   27
0142                          27,2000          TOF-FF    EQUALS
0143                          27,2000          TOF-FF1   EQUALS
0144                          27,2000          MANUVER   EQUALS
0145                          27,2000          MANUVER1  EQUALS
```

L TAGS FOR RELATIVE SETLOC AND BLANK BANK CARDS USER'S PAGE NO. 6 E0

```
0146                        27,2000             VECPT    EQUALS
0147                        27,2000             UPDATE1  EQUALS
0148                        27,2000             UPDATE2  EQUALS
0149                        27,2000             R22S1    EQUALS
01495                       27,2000             P60S5    EQUALS
01496                       27,2000             P40S2    EQUALS
0150    12 WORDS LEFT       27,3763  03763 0             BNKSUM 27
0150                        27,3764  03764 1

R01505          MODULE 5 CONTAINS BANKS 30 THROUGH 35

0151                        30,2000                      BANK   30
0152                        30,2000             IMUSUPER EQUALS
0153                        30,2000             LOWSUPER EQUALS
0154                        30,2000             FCSTART  EQUALS                STANDARD LOCATION FOR THIS.  (FOR EXTVB)
0155                        30,2000             LOPC     EQUALS
0156                        30,2000             P20S1    EQUALS
0157                        30,2000             P20S6    EQUALS
01575                       30,2000             P40S3    EQUALS
01577                       30,2000             R35A     EQUALS
0158    23 WORDS LEFT       30,3750  03750 0             BNKSUM 30
0158                        30,3751  03751 1

0159                        31,2000                      BANK   31
0160                        31,2000             R35      EQUALS
0161                        31,2000             RT23     EQUALS
0162                        31,2000             P30S1A   EQUALS
01621                       31,2000             R34      EQUALS
01625                       31,2000             CDHTAG2  EQUALS
01626                       31,2000             CSIPROG9 EQUALS
01627                       31,2000             R31      EQUALS
01628                       31,2000             P22S     EQUALS
01629                       31,2000             RTE3     EQUALS
0163    14 WORDS LEFT       31,3761  03761 1             BNKSUM 31
0163                        31,3762  03762 1

0164                        32,2000                      BANK   32
0165                        32,2000             MSGSCAN1 EQUALS
0166                        32,2000             RTE      EQUALS
0167                        32,2000             DELRSPL1 EQUALS
01675                       32,2000             IMUCAL3  EQUALS
0168     7 WORDS LEFT       32,3770  03770 1             BNKSUM 32
0168                        32,3771  03771 0

0169                        33,2000                      BANK   33
0170                        33,2000             TESTLEAD EQUALS
```

L TAGS FOR RELATIVE SETLOC AND BLANK BANK CARDS USER'S PAGE NO. 7 EO

```
0171                        33,2000             IMUCAL   EQUALS
0172      1 WORDS LEFT      33,3776   03776 1           BNKSUM 33


0173                        34,2000                      BANK   34
0175                        34,2000             P11ONE   EQUALS
0176                        34,2000             P20S3    EQUALS
0177                        34,2000             P20S4    EQUALS
01775                       34,2000             RTECON   EQUALS
0178     12 WORDS LEFT      34,3763   03763 0           BNKSUM 34
0178                        34,3764   03764 1


0179                        35,2000                      BANK   35
01795                       35,2000             RTECON1  EQUALS
0180                        35,2000             CSI/CDH  EQUALS
0181                        35,2000             P30S1    EQUALS
0182                        35,2000             P30S     EQUALS
0184                        35,2000             P17S1    EQUALS
01845                       35,2000             MEASINC3 EQUALS
01846                       35,2000             INTINIT2 EQUALS
0185      7 WORDS LEFT      35,3770   03770 1           BNKSUM 35
0185                        35,3771   03771 0
```

R01855 MODULE 6 CONTAINS BANKS 36 THROUGH 43

```
0186                        36,2000                      BANK   36
0188                        36,2000             MEASINC  EQUALS
0189                        35,2000             MEASINC1 EQUALS
0190                        36,2000             P17S     EQUALS
0191                        36,2000             RTE1     EQUALS
01911                       36,2000             S3435LOC EQUALS
0192      5 WORDS LEFT      36,3772   03772 0           BNKSUM 36
0192                        36,3773   03773 1


0193                        37,2000                      BANK   37
0194                        37,2000             P20S     EQUALS
0195                        37,2000             BODYATT  EQUALS
0196                        37,2000             RENDEZ   EQUALS
0197                        37,2000             SERVICES EQUALS
01975                       37,2000             P11TWO   EQUALS
01977                       37,2000             CDHTAG3  EQUALS
0198      4 WORDS LEFT      37,3773   03773 1           BNKSUM 37
0198                        37,3774   03774 0


0199                        40,2000                      BANK   40
0200                        40,2000             PINSUPER EQUALS
```

L TAGS FOR RELATIVE SETLOC AND BLANK BANK CARDS USER'S PAGE NO. 8 E0

```
0201                          40,2000            SELFSUPR EQUALS
0202                          40,2000            PINBALL1 EQUALS
02021                         40,2000            R36CM1   EQUALS
0203      7 WORDS LEFT        40,3770  03770 1             BNKSUM 40
0203                          40,3771  03771 0

0204                          41,2000                     BANK   41
0205                          41,2000            PINBALL2 EQUALS
02055                         41,2000            R36LM    EQUALS
0206      0 WORDS LEFT        41,2000  NO NEED            BNKSUM 41

0207                          42,2000                     BANK   42
0208                          42,2000            SBAND    EQUALS
0209                          42,2000            PINBALL3 EQUALS
02095                         42,2000            EXTVBS   EQUALS
02096                         42,2000            R36LM1   EQUALS
0210      5 WORDS LEFT        42,3772  03772 0             BNKSUM 42
0210                          42,3773  03773 1

0211                          43,2000                     BANK   43
0212                          43,2000            SELFCHEC EQUALS
0213                          43,2000            EXTVERBS EQUALS
0214      9 WORDS LEFT        43,3766  03766 0             BNKSUM 43
0214                          43,3767  03767 1

0215  REF  1                 26,3334            HI6ZEROS EQUALS ZEROVECS       ZERO VECTOR ALWAYS IN HIGH MEMORY
0216  REF  1                 04,3565            LO6ZEROS EQUALS ZEROVEC        ZERO VECTOR ALWAYS IN LOW MEMORY
0217  REF  1                 26,3332            HIDPHALF EQUALS UNITX
0218  REF  1                 04,3563            LODPHALF EQUALS XUNIT
0219  REF  1                 26,3324            HIDP1/4  EQUALS DP1/4TH
0220  REF  1                 04,3611            LODP1/4  EQUALS D1/4           2DEC .25
0221  REF  2  LAST   34      26,3332            HIUNITX  EQUALS UNITX
0222  REF  1                 26,3330            HIUNITY  EQUALS UNITY
0223  REF  1                 26,3326            HIUNITZ  EQUALS UNITZ
0224  REF  2  LAST   34      04,3563            LOUNITX  EQUALS XUNIT          2DEC .5
0225  REF  1                 04,3561            LOUNITY  EQUALS YUNIT          2DEC 0
0226  REF  1                 04,3557            LOUNITZ  EQUALS ZUNIT          2DEC 0
0227  REF  1                 11,3763            3/4LOWDP EQUALS 3/4            2DEC 3.0 B-2
0228  REF  1                 30,2000                     SBANK= LOWSUPER

R0229 ROPE SPECIFIC ASSIGNS OBVIATING NEED TO CHECK COMPUTER FLAG IN DETVRUZVING INTEGRATION AREA ENTRIES
0231  REF  1                 13,3105            OTHPREC  EQUALS LEMPREC
0232  REF  1                 13,2760            ATOPOTH  EQUALS ATOPLEM
0233  REF  1                 13,2705            ATOPTHIS EQUALS ATOPCSM
0234  REF  1                    0173            MOONTHIS EQUALS CMOONFLG
```

```
 02345  REF   1                 0174          MOONOTH  EQUALS LMOONFLG
 0235   REF   1              13,2720          MOVATHIS EQUALS MOVEACSM
 0236   REF   1              31,2032          STATEST  EQUALS V83CALL        * TEMPORARY
 0237   REF   1              13,3071          THISPREC EQUALS CSMPREC
 0238   REF   3  LAST   34  26,3332          THISAXIS =      UNITX
 02385  REF   1                 5054          ERASID   EQUALS LOWIO          DOWNLINK ERASABLE DUMP ID
 02388  REF   1                 6214          DELAYNUM EQUALS THREE
R0239   ********************************************************************************************************

R0241      THE FOLLOWING ECADRS ARE DEFINED TO FACILITATE EBANK SWITCHING. THEY ALSO MAKE IT EASIER FOR
R0243   ERASABLE CONTROL TO REARRANGE ERASABLE MEMORY WITHOUT DISRUPTING THE PROGRAMS WHICH SET EBANKS.
R0245   PRIOR TO ROPE RELEASE FIXED MEMORY CAN BE SAVED BY SETTING EACH EBXXXX =EBANKX (X=4,5,6,7).EBANKX OF COURSE
R0247   WILL BE THE BANK WHERE THE ERASABLES REFERENCED IN EBXXXX WILL BE STORED.

 0249                       07,2000                          BANK   7
 0250   REF   1            E7,1574                          EBANK= MARKDOWN
 0251   REF   2  LAST   35  07,2000   03674 1  EBMARKDO ECADR  MARKDOWN
 0252   REF   1            E7,1725                          EBANK= MRKBUF1
 0253   REF   2  LAST   35  07,2001   03725 1  EBMRKBUF ECADR  MRKBUF1

 0254                       24,2000                          BANK   24
 0255   REF   1            E7,1431                          EBANK= DVCNTR
 0256   REF   2  LAST   35  24,2000   03431 1  EBDVCNTR ECADR  DVCNTR
 0257   REF   1            E7,1672                          EBANK= P40TMP
 0258   REF   2  LAST   35  24,2001   03672 1  EBP40TMP ECADR  P40TMP

 0259                       34,2000                          BANK   34
 0260   REF   3  LAST   35  E7,1431                          EBANK= DVCNTR
 0261   REF   4  LAST   35  34,2000   03431 1  EBDVCNT  ECADR  DVCNTR
 0262   REF   1            E5,1426                          EBANK= QPLACES
 0263   REF   2  LAST   35  34,2001   02426 0  EBQPLACE ECADR  QPLACES

 0264                       37,2000                          BANK   37
 0265   REF   1               1231                          EBANK= RN1
 0266   REF   2  LAST   35  37,2000   01231 0  EBRN1    ECADR  RN1

R0267   ********************************************************************************************************
```

L SUBROUTINE CALLS USER'S PAGE NO. 1 E0 S3

0001	37,2000	SUBRO	COMERASE	030
0002	37,2000	SUBRO	COMAID	029
0003	37,2000	SUBRO	COMEKISS	020
0004	37,2000	SUBRO	TROUBLE	043
0005	37,2000	SUBRO	TVCDAPS	011
0006	37,2000	SUBRO	CHIEFTAN	028

*** END OF MAIN PROGRAM ***

```
R0001   CONVENTIONS AND NOTATIONS UTILIZED FOR ERASABLE ASSIGNMENTS.

R0002           EQUALS IS USED IN TWO WAYS.  IT IS OFTEN USED TO CHAIN A GROUP
R0003                 OF ASSIGNMENTS SO THAT THE GROUP MAY BE MOVED WITH THE
R0004                 CHANGING OF ONLY ONE CARD.  EXAMPLE.

A0005                                    X       EQUALS START
A0006                                    Y       EQUALS X        +SIZE.X
A0007                                    Z       EQUALS Y        +SIZE.Y

R0008                 (X, Y, AND Z ARE CONSECUTIVE AND BEGIN AT START.       )
R0009                 (SIZE.X AND SIZE.Y ARE THE RESPECTIVE SIZES OF X AND Y,
R0010                  USUALLY NUMERIC,  IE. 1, 2, 6, 180 ETC.                )

R0011           EQUALS OFTEN IMPLIES THE SHARING OF REGISTERS (DIFFERENT NAMES
R0012                 AND DIFFERENT DATA).  EXAMPLE.

A0013                                    X       EQUALS Y

R0014           = MEANS THAT MULTIPLE NAMES HAVE BEEN GIVEN TO THE SAME DATA.
R0015                 (THIS IS LOGICAL EQUIVALENCE, NOT SHARING)  EXAMPLE.

A0016                                    X       =       Y

R0017         THE SIZE AND UTILIZATION OF AN ERASABLE ARE OFTEN INCLUDED IN
R0018         THE COMMENTS IN THE FOLLOWING FORM.  M(SIZE)N.

R0019               M REFERS TO THE MOBILITY OF THE ASSIGNMENT.
R0020                    B   MEANS THAT THE SYMBOL IS REFERENCED BY BASIC
R0021                        INSTRUCTIONS AND THUS IS E-BANK SENSITIVE.
R0022                    I   MEANS THAT THE SYMBOL IS REFERENCED ONLY BY
R0023                        INTERPRETIVE INSTRUCTIONS, AND IS THUS E-BANK
R0024                        INSENSITIVE AND MAY APPEAR IN ANY E-BANK.

R0025               SIZE IS THE NUMBER OF REGISTERS INCLUDED BY THE SYMBOL.

R0026               N INDICATES THE NATURE OR PERMANENCE OF THE CONTENTS.
R0027                    PL MEANS THAT THE CONTENTS ARE PAD LOADED.
R0028                    DSP MEANS THAT THE REGISTER IS USED FOR A DISPLAY.
R0029                    PRM MEANS THAT THE REGISTER IS PERMANENT, IE. IT
R0030                        IS USED DURING THE ENTIRE MISSION FOR ONE
R0031                        PURPOSE AND CANNOT BE SHARED.
R0032                    TMP MEANS THAT THE REGISTER IS USED TEMPORARILY OR
R0033                        IS A SCRATCH REGISTER FOR THE ROUTINE TO WHICH
R0034                        IT IS ASSIGNED.  THAT IS, IT NEED NOT BE SET
R0035                        PRIOR TO INVOCATION OF THE ROUTINE NOR DOES IT
R0036                        CONTAIN USEFUL OUTPUT TO ANOTHER ROUTINE.  THUS
```

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R0037                       IT MAY BE SHARED WITH ANY OTHER ROUTINE WHICH
R0038                       IS NOT ACTIVE IN PARALLEL.
R0039                   IN  MEANS INPUT TO THE ROUTINE AND IT IS PROBABLY
R0040                       TEMPORARY FOR A HIGHER-LEVEL ROUTINE/PROGRAM.
R0041                  OUT  MEANS OUTPUT FROM THE ROUTINE, PROBABLY
R0042                       TEMPORARY FOR A HIGHER-LEVEL ROUTINE/PROGRAM.
```

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```
P0050           SPECIAL REGISTERS.

 0051                    0000        A          EQUALS 0
 0052                    0001        L          EQUALS 1          L AND Q ARE BOTH CHANNELS AND REGISTERS.
 0053                    0002        Q          EQUALS 2
 0054                    0003        EBANK      EQUALS 3
 0055                    0004        FBANK      EQUALS 4
 0056                    0005        Z          EQUALS 5          ADJACENT TO FBANK AND BBANK FOR DXCH Z
 0057                    0006        BBANK      EQUALS 6          (DTCB) AND DXCH FBANK (DTCF).
A0058                                                             REGISTER 7 IS A ZERO-SOURCE, USED BY ZL.

 0059                    0010        ARUPT      EQUALS 10         INTERRUPT STORAGE.
 0060                    0011        LRUPT      EQUALS 11
 0061                    0012        QRUPT      EQUALS 12
 0062                    0013        SAMPTIME   EQUALS 13         SAMPLED TIME 1 & 2.
 0063                    0015        ZRUPT      EQUALS 15         (13 AND 14 ARE SPARES.)
 0064                    0016        BANKRUPT   EQUALS 16         USUALLY HOLDS FBANK OR BBANK.
 0065                    0017        BRUPT      EQUALS 17         RESUME ADDRESS AS WELL.

 0066                    0020        CYR        EQUALS 20
 0067                    0021        SR         EQUALS 21
 0068                    0022        CYL        EQUALS 22
 0069                    0023        EDOP       EQUALS 23         EDITS INTERPRETIVE OPERATION CODE PAIRS.

 0070                    0024        TIME2      EQUALS 24
 0071                    0025        TIME1      EQUALS 25
 0072                    0026        TIME3      EQUALS 26
 0073                    0027        TIME4      EQUALS 27
 0074                    0030        TIME5      EQUALS 30
 0075                    0031        TIME6      EQUALS 31
 0076                    0032        CDUX       EQUALS 32
 0077                    0033        CDUY       EQUALS 33
 0078                    0034        CDUZ       EQUALS 34
 0079                    0035        COUT       EQUALS 35         OPTICS TRUNNION CDU (WAS OPTY).
 0080   REF   1          0035        OPTY       =      COUT
 0081                    0036        CDUS       EQUALS 36         OPTICS SHAFT CDU (WAS OPTX).
 0082   REF   1          0036        OPTX       =      CDUS
 0083                    0037        PIPAX      EQUALS 37
 0084                    0040        PIPAY      EQUALS 40
 0085                    0041        PIPAZ      EQUALS 41
 0086                    0042        BMAGX      EQUALS 42
 0087                    0043        BMAGY      EQUALS 43
 0088                    0044        BMAGZ      EQUALS 44
 0089                    0045        INLINK     EQUALS 45
 0090                    0046        RNRAD      EQUALS 46
 0091                    0047        GYROCTR    EQUALS 47
 0092                    0047        GYROCMD    EQUALS 47
 0093                    0050        CDUXCMD    EQUALS 50
 0094                    0051        CDUYCMD    EQUALS 51
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0095                        0052        CDUZCMD  EQUALS 52
0096                        0053        CDUTCMD  EQUALS 53          OPTICS TRUNNION COMMAND (WAS OPTYCMD).
0097  REF  1                0053        OPTYCMD  =      CDUTCMD
0098  REF  2  LAST  40      0053        TVCYAW   EQUALS CDUTCMD      SPS YAW COMMAND IN TVC MODE.
0099                        0054        CDUSCMD  EQUALS 54          OPTICS SHAFT COMMAND (WAS OPTXCMD).
0100  REF  1                0054        TVCPITCH EQUALS CDUSCMD     SPS PITCH COMMAND IN TVC MODE.
0101  REF  2  LAST  40      0054        OPTXCMD  =      CDUSCMD
0102                        0055        EMSD     EQUALS 55
0103                        0055        THRUST   EQUALS 55
0104                        0056        LEMONM   EQUALS 56
0105                        0057        LOCALARM EQUALS 57
0106                        0060        BANKALRM EQUALS 60

R0107          INTERPRETIVE REGISTERS ADDRESSED RELATIVE TO VAC AREA.

0108                        0042        LVSQUARE EQUALS 34D         SQUARE OF VECTOR INPUT TO ABVAL AND UNIT
0109                        0044        LV       EQUALS 36D         LENGTH OF VECTOR INPUT TO UNIT.
0110                        0046        X1       EQUALS 38D         INTERPRETIVE SPECIAL REGISTERS RELATIVE
0111                        0047        X2       EQUALS 39D         TO THE WORK AREA.
0112                        0050        S1       EQUALS 40D
0113                        0051        S2       EQUALS 41D
0114                        0052        QPRET    EQUALS 42D
```

```
P0115   INPUT/OUTPUT CHANNELS

A01151                                  *** CHANNEL ZERO IS TO BE USED IN AN INDEXED OPERATION ONLY. ***
 01152  REF   1            0001        LCHAN     EQUALS L
 01153  REF   1            0002        QCHAN     EQUALS Q
 0116                      0003        HISCALAR  EQUALS 3
 0117                      0004        LOSCALAR  EQUALS 4
 0118                      0005        PYJETS    EQUALS 5
 0119                      0006        ROLLJETS  EQUALS 6
 0120                      0007        SUPERBNK  EQUALS 7
 0121                      0010        OUTO      EQUALS 10
 0122                      0011        DSALMOUT  EQUALS 11
 0123                      0012        CHAN12    EQUALS 12
 0124                      0013        CHAN13    EQUALS 13
 0125                      0014        CHAN14    EQUALS 14
 0126                      0015        MNKEYIN   EQUALS 15
 0127                      0016        NAVKEYIN  EQUALS 16
 01271                     0030        CHAN30    EQUALS 30
 01272                     0031        CHAN31    EQUALS 31
 01273                     0032        CHAN32    EQUALS 32
 0128                      0033        CHAN33    EQUALS 33
 0129                      0034        DNTM1     EQUALS 34
 0130                      0035        DNTM2     EQUALS 35
R0131   END OF CHANNEL ASSIGNMENTS
```

```
P0135            FLAGWORDS

R0136   FLAGWRD0       STATE +0        (000-014)
R0137   FLAGWRD1       STATE +1        (015-029)
R0138   FLAGWRD2       STATE +2        (030-044)
R0139   FLAGWRD3       STATE +3        (045-059)
R0140   FLAGWRD4       STATE +4        (060-074)
R0141   FLAGWRD5       STATE +5        (075-089)
R0142   FLAGWRD6       STATE +6        (090-104)
R0143   FLAGWRD7       STATE +7        (105-119)
R0144   FLAGWRD8       STATE +8D       (120-134)
R0145   FLAGWRD9       STATE +9D       (135-149)
A0146

R0147            SORTED LIST OF

R0148            INTERPITIVE SWITCH BIT ASSIGNMENTS

R0149   INTERPRETIVE SWITCH BIT ASSIGNMENTS
R0150   FLAGWORD      DEC NUM          BIT + FLAG          EQUIVALENT FLAGWORDS
R0151   22DSPFLG      032D             BIT 13 FLAG 2
R0152   360SW         134D             BIT 1 FLAG 8
R0153   3AXISFLG      084D             BIT 6 FLAG 5
R0158   ADVTRK        125D             BIT 10 FLAG 8
R01565  AMOONFLG      13D              BIT 2 FLAG 0
R0157   APSESW        130D             BIT 5 FLAG 8
R0159   ASTNFLAG      108D             BIT 12 FLAG 7
R0161   ATTCHFLG      118D             BIT 2 FLAG 7
R0164   AVEGFLAG      029D             BIT 1 FLAG 1
R0165   AVEMIDSW      149D             BIT 1 FLAG 9
R0166   AVFLAG        040D             BIT 5 FLAG 2
R0169   CALCMAN2      043D             BIT 2 FLAG 2
R0171   CMDAPARM      093D             BIT 12 FLAG 6
R0172   CMOONFLG      123D             BIT 12 FLAG 8
R0173   CM/DSTBY      103D             BIT 2 FLAG 6
R0174   COGAFLAG      131D             BIT 4 FLAG 8
R0175   COMPUTER      082D             BIT 8 FLAG 5
R0176   CPHIFLAG      000D             BIT 15 FLAG 0
R0177   CULTFLAG      053D             BIT 7 FLAG 3
R0179   D60R9FLG      058D             BIT 2 FLAG 3
R0180   DAPBIT1       090D             BIT 15 FLAG 6
R0181   DAPBIT2       091D             BIT 14 FLAG 6
R0182   DIMOFLAG      059D             BIT 1 FLAG 3
R0184   DMENFLG       081D             BIT 9 FLAG 5
R0185   DRIFTFLG      030D             BIT 15 FLAG 2
R0186   DSKYFLAG      075D             BIT 15 FLAG 5
R0187   EGSW          97D              BIT 8 FLAG 6        KNOWNFLG  R57FLAG
```

R0189	ENG1FLAG	018D	BIT 12 FLAG 1		
R0190	ENG2FLAG	019D	BIT 11 FLAG 1		
R0191	ENGONFLG	083D	BIT 7 FLAG 5		
R0193	ERADFLAG	017D	BIT 13 FLAG 1		
R0194	ETPIFLAG	038D	BIT 7 FLAG 2	FIRSTFLG	OPTNSW
R0196	F2RTE	10D	BIT 5 FLAG 0		
R0197	FINALFLG	039D	BIT 6 FLAG 2		
R0198	FIRSTFLG	38D	BIT 7 FLAG 2	ETPIFLAG	OPTNSW
R0201	FREEFLAG	012D	BIT 3 FLAG 0		
R0202	GAMDIFSW	094D	BIT 11 FLAG 6		
R0204	GLOKFAIL	046D	BIT 14 FLAG 3		
R0207	GONEBY	112D	BIT 8 FLAG 7		
R0208	GONEPAST	095D	BIT 10 FLAG 6		
R0209	GRRBKFLG	085D	BIT 5 FLAG 5		
R0211	GUESSW	029D	BIT 2 FLAG 1		
R0212	GYMDIFSW	104D	BIT 1 FLAG 6		
R0213	.05GSW	102D	BIT 3 FLAG 6		
R0214	HIND	099D	BIT 6 FLAG 6		
R02152	IDLEFAIL	024D	BIT 5 FLAG 1		
R0216	IDLEFLAG	113D	BIT 7 FLAG 7		
R0217	IGNFLAG	107D	BIT 13 FLAG 7		
R0218	IMPULSW	036D	BIT 9 FLAG 2		
R0219	IMUSE	007D	BIT 8 FLAG 0		
R0220	INCORFLG	079D	BIT 11 FLAG 5		
R0221	INFINFLG	128D	BIT 7 FLAG 8		
R0222	INRLSW	100D	BIT 5 FLAG 6		
R02221	INTFLAG	151D	BIT 14 FLAG 10		
R0225	INTYPFLG	056D	BIT 4 FLAG 3		
R0227	ITSWICH	106D	BIT 14 FLAG 7		
R0229	KFLAG	014D	BIT 1 FLAG 0		
R0232	KNOWNFLG	097D	BIT 8 FLAG 6	EGSW	R57FLAG
R0234	LATSW	101D	BIT 4 FLAG 6		
R0235	LMOONFLG	124D	BIT 11 FLAG 8		
R0238	LUNAFLAG	048D	BIT 12 FLAG 3		
R02395	MAXDBFLG	138D	BIT 12 FLAG 9		
R0240	MGLVFLAG	088D	BIT 2 FLAG 5		
R0241	MID1FLAG	147D	BIT 3 FLAG 9		
R0242	MIDAVFLG	148D	BIT 2 FLAG 9		
R0243	MIDFLAG	002D	BIT 13 FLAG 0		
R0244	MKOVFLAG	072D	BIT 3 FLAG 4		
R0245	MOONFLAG	003D	BIT 12 FLAG 0		
R0246	MRKIDFLG	060D	BIT 15 FLAG 4		
R0247	MRKNVFLG	066D	BIT 9 FLAG 4		
R0248	MRUPTFLG	070D	BIT 5 FLAG 4		
R0251	MWAITFLG	064D	BIT 11 FLAG 4		
R0252	N22ORN17	144D	BIT 6 FLAG 9		
R0254	NEEDLFLG	006D	BIT 9 FLAG 0		
R0255	NEWIFLG	122D	BIT 13 FLAG 8		
R0256	NJETSFLG	015D	BIT 15 FLAG 1		
R0258	NODOFLAG	044D	BIT 1 FLAG 2		

R02581	NODOP01	018D	BIT 12 FLAG 1	
R0259	NORMHOR	004D	BIT 11 FLAG 0	
R0260	NORMSW	110D	BIT 10 FLAG 7	
R0261	NOSWITCH	098D	BIT 7 FLAG 6	
R0265	NRMIDFLG	062D	BIT 13 FLAG 4	
R0266	NRMNVFLG	067D	BIT 8 FLAG 4	
R0267	NRUPTFLG	071D	BIT 4 FLAG 4	
R0269	NWAITFLG	065D	BIT 10 FLAG 4	
R0272	OPTNSW	038D	BIT 7 FLAG 2	ETPIFLAG FIRSTFLG
R0274	ORBWFLAG	054D	BIT 6 FLAG 3	
R0275	ORDERSW	129D	BIT 6 FLAG 8	
R0276	P21FLAG 033D		BIT 12 FLAG 2	
R02765	P22MKFLG	49D	BIT 11 FLAG 3	
R0278	P39/79SW	126D	BIT 9 FLAG 8	
R0279	PDSPFLAG	063D	BIT 12 FLAG 4	
R0280	PFRATFLG	041D	BIT 4 FLAG 2	
R0281	PINBRFLG	069D	BIT 6 FLAG 4	
R0282	PRECIFLG	052D	BIT 8 FLAG 3	
R0283	PRFTRKAT	080D	BIT 10 FLAG 5	
R0284	PRIODFLG	061D	BIT 14 FLAG 4	
R0285	PRONVFLG	068D	BIT 7 FLAG 4	
R0286	QUITFLAG	145D	BIT 5 FLAG 9	
R0287	RZ1MARK	031D	BIT 14 FLAG 2	
R0288	R22CAFLG	143D	BIT 7 FLAG 9	
R0290	R23FLG	021D	BIT 9 FLAG 1	
R0291	R31FLAG	146D	BIT 4 FLAG 9	
R0293	R53FLAG	009D	BIT 6 FLAG 0	
R0294	R57FLAG	097D	BIT 8 FLAG 6	KNOWNFLG EGSW
R0296	R60FLAG	086D	BIT 4 FLAG 5	
R0297	REFSMFLG	047D	BIT 13 FLAG 3	
R02971	REINTFLG	158D	BIT 7 FLAG 10	
R0298	RELVELSW	096D	BIT 9 FLAG 6	
R0299	RENDWFLG	089D	BIT 1 FLAG 5	
R02995	RETROFLG	76D	BIT 14 FLAG 5	
R0300	RNDVZFLG	003D	BIT 7 FLAG 0	
R0304	RPQFLAG	120D	BIT 15 FLAG 8	
R0308	RVSW	111D	BIT 9 FLAG 7	
R0313	SAVECFLG	140D	BIT 10 FLAG 9	
R03135	SKIPVHF 035D		BIT 10 FLAG 2	
R0314	SLOPESW	027D	BIT 3 FLAG 1	
R03145	SLOWFLG	77D	BIT 13 FLAG 5	
R0315	SOLNSW	087D	BIT 3 FLAG 5	
R0316	SOURCFLG	142D	BIT 8 FLAG 9	
R0318	STATEFLG	055D	BIT 5 FLAG 3	
R0319	STEERSW	034D	BIT 11 FLAG 2	
R0320	STIKFLAG	016D	BIT 14 FLAG 1	
R03201	STRULLSW	92D	BIT 13 FLAG 8	
R0321	SURFFLAG	127D	BIT 8 FLAG 8	
R0323	SWTOVER	135D	BIT 15 FLAG 9	
R0324	TARG1FLG	020D	BIT 10 FLAG 1	

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R0325	TARG2FLG	021D	BIT 9 FLAG 1
R0326	TERMIFLG	105D	BIT 15 FLAG 7
R0327	TFFSW	119D	BIT 1 FLAG 7
R0328	TIMRFLAG	109D	BIT 11 FLAG 7
R0329	TRACKFLG	025D	BIT 5 FLAG 1
R03295	TRM03FLG	26D	BIT 4 FLAG 1
R0330	TRUNFLAG	011D	BIT 4 FLAG 0
R0332	UPDATFLG	023D	BIT 7 FLAG 1
R0334	UPLOCKFL	116D	BIT 4 FLAG 7
R0335	V37FLAG	114D	BIT 6 FLAG 7
R0336	V59FLAG	078D	BIT 12 FLAG 5
R03362	V82EMFLG	137D	BIT 13 FLAG 9
R0337	V94FLAG	139D	BIT 11 FLAG 9
R03375	V96ONFLG	132D	BIT 3 FLAG 8
R0338	VEHUPFLG	022D	BIT 8 FLAG 1
R0339	VERIFLAG	117D	BIT 3 FLAG 7
R0340	VFLAG	050D	BIT 10 FLAG 3
R0341	VHFRFLAG	141D	BIT 9 FLAG 9
R0343	VINTFLAG	057D	BIT 3 FLAG 3
R0344	XDELVFLG	037D	BIT 8 FLAG 2
R0345	XDSPFLAG	074D	BIT 1 FLAG 4

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```
P0352   INTERPRETIVE SWITCH BIT ASSIGNMENTS
 0353   REF   1                0074          FLAGWRD0 =      STATE +0        (000-014)

A0354                                                                       (SET)                (RESET)

A0355
 0356                           0000          CPHIFLAG =      BIT 15 FLAG 0
A0357                                        0000                            OUTPUT OF CALCGA IS  OUTPUT OF CALCGA IS
                                                                             CPHIX                THETAD
 03575  REF   1                5001          CPHIBIT  =      BIT15

A0358
 0359                           0001          JSWITCH  =      BIT 14 FLAG 0
A0360                                        001D                            INTEGRATION OF W     INTEGRATION OF STATE
                                                                             MATRIX               VECTOR
 03605  REF   1                5002          JSWCHBIT =      BIT14

A0361
 0362                           0002          MIDFLAG  =      BIT 13 FLAG 0
A0363                                        002D                            INTEGRATION WITH     INTEGRATION WITHOUT
                                                                             SOLAR PERTURBATIONS  SOLAR PERTURBATIONS
 03635  REF   1                5003          MIDFLBIT =      BIT13

A0364
 0365                           0003          MOONFLAG =      BIT 12 FLAG 0
A0366                                        0030                            MOON IS SPHERE OF    EARTH IS SPHERE OF
                                                                             INFLUENCE            INFLUENCE
 03665  REF   1                5004          MOONBIT  =      BIT12

A0369
 0370                           0004          NORFHOR  =      BIT 11 FLAG 0
                                             004D                            FAR HORIZON          NEAR HORIZON

 03705  REF   1                5005          NORFBIT  =      BIT11

A0373
 0374                           0005          ZMEASURE =      BIT 10 FLAG 0
A0375                                        005D                            MEASUREMENT PLANET   MEASUREMENT PLANET
A0376                                                                        AND PRIMARY PLANET   AND PRIMARY PLANET
                                                                             DIFFERENT            SAME
 03775  REF   1                5006          ZMEASBIT =      BIT10

A0379
 0380                           0006          NEEDLFLG =      BIT 9 FLAG 0
A0381                                        0060                            TOTAL ATTIDUDE       A/P FOLLOWING ERROR
                                                                             ERROR DISPLAYED      DISPLAYED
 03815  REF   1                5007          NEEDLBIT =      BIT9

A0382
 0383                           0007          IMUSE    =      BIT 8 FLAG 0
                                             0070                            IMU IN USE           IMU NOT IN USE
```

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```
 03835  REF   1                5010          IMUSEBIT =      BIT8

A0384                                                       BIT 7 FLAG 0
 0385                           0010          RNDVZFLG =      0008D          P20 RUNNING          P20 NOT RUNNING
 03865  REF   1                5011          RNDVZBIT =      BIT7

A0390                                                       BIT 6 FLAG 0
 0391                           0011          R53FLAG  =      0009D          V51 INITIATED        V51 NOT INITIATED


 03915  REF   1                5012          R53FLBIT =      BIT6

A0395                                                       BIT 5 FLAG 0
 0396                           0012          F2RTE    =      010D           IN TIME CRITICAL     NOT IN TIME CRITICAL
A0397                                                                       MODE                 MODE

 03975  REF   1                5013          F2RTEBIT =      BIT5

A0398                                                       BIT 4 FLAG 0
 0399                           0013          TRUNFLAG =      011D           DRIVING OF TRUNNION  DRIVING OF TRUNNION
A0400                                                                       ALLOWED              NOT ALLOWED

 04005  REF   1                5014          TRUNBIT  =      BIT4

A0403                                                       BIT 3 FLAG 0
 0404                           0014          FREEFLAG =      012D           (TEMPORARY FLAG USED IN MANY ROUTINES)

 04045  REF   1                5015          FREEFBIT =      BIT3

A0405                                                       BIT 2 FLAG 0
 0406                           0015          AMOONFLG =      0130           STATE VECTOR IN      STATE VECTOR IN
 0407   REF   1                5016          AMOONBIT =      BIT2           LUNAR SPHERE AT      EARTH SPHERE AT
A04071                                                                      MIDTOAVE             MIDTOAVE


A0406                                                       BIT 1 FLAG 0
 0409                           0016          KFLAG    =      140            SEARCH SECTOR LESS   SEARCH SECTOR MORE
A0410                                                                       THAN 180 DEGREES     THAN 180 DEGREES

 04105  REF   1                5017          KBIT     =      BIT1

 0411   REF   2  LAST   46      0075          FLAGWRD1 =      STATE +1       (015-029)

A0412                                                                       (SET)                (RESET)

A0413                                                       BIT 15 FLAG 1
 0414                           0017          NJETSFLG =      0150           TWO JET RCS BURN     FOUR JET RCS BURN

 04145  REF   2  LAST   46      5001          NJETSBIT =      BIT15
```

```
A0415
 0416                          0020          STIKFLAG =      BIT 14 FLAG 1
                                                             0160          RHC CONTROL          CMC CONTROL

 04165  REF   2  LAST   46     5002          STIKBIT  =      BIT14

A0417
                                                             BIT 13 FLAG 1
 0418                          0021          ERADFLAG =      0170          EARTH, COMPUTE       EARTH, USE FIXED
A0419                                                                       FISCHER ELLIPSOID    RADIUS
A04191                                                                     RADIUS
A04192                                                                     MOON, USE FIXED      MOON, USE RLS FOR
A04193                                                                           RADIUS               LUNAR RADIUS

 04195  REF   2  LAST   46     5003          ERADFBIT =      BIT13

A0420
                                                             BIT 12 FLAG 1
 0421                          0022          NODOPO1  =      0180          PO1 NOT ALLOWED      PO1 ALLOWED

 04211  REF   2  LAST   46     5004          NOPO1BIT =      BIT12

A0422
                                                             BIT 11 FLAG 1
 0423                          0023          ENG2FLAG =      019D          RCS BURN             SPS BURN

 04235  REF   2  LAST   46     5005          ENG2BIT  =      BIT11

A0427
                                                             BIT 10 FLAG 1
 0428                          0024          TARG1FLG =      020D          SIGHTING LEM         NOT SIGHTING LEM

 04285  REF   2  LAST   46     5006          TARG1BIT =      BIT10

A0429
                                                             BIT 9 FLAG 1
 0430                          0025          TARG2FLG =      021D          SIGHTING LANDMARK    SIGHTING STAR

 04305  REF   2  LAST   46     5007          TARG2BIT =      BIT9

A0431
                                                             BIT  9 FLAG 1
 0432                          0025          R23FLG   =      021D          R23 MARKING          R21 MARKING
A0433

 04335  REF   3  LAST   48     5007          R23BIT   =      BIT9

A0434
                                                             BIT 8 FLAG 1
 0435                          0026          VEHUPFLG =      022D          CSM STATE VECTOR     LEM STATE VECTOR
A0436                                                                      BEING UPDATED        BEING UPDATED

 04365  REF   2  LAST   47     5010          VEHUPBIT =      BIT8

A0437
                                                             BIT 7 FLAG 1
 0438                          0027          UPDATFLG =      023D          UPDATING BY MARKS    UPDATING BY MARKS
```

L ERASABLE ASSIGNMENTS

A0439							ALLOWED	NOT ALLOWED
04395	REF	2	LAST	47	5011	UPDATBIT =	BIT7	
A0440							BIT 6 FLAG 1	
04411					0030	IDLEFAIL =	024D	INHIBIT R41 ENABLE R41 (ENGFAIL)
04415	REF	2	LAST	47	5012	IDLEBIT =	BIT6	
A0442							BIT 5 FLAG 1	
0443					0031	TRACKFLG =	025D	TRACKING ALLOWED TRACKING NOT ALLOWED
04435	REF	2	LAST	47	5013	TRACKBIT =	BIT5	
A0444							BIT 4 FLAG 1	
0445					0032	TRM03FLG =	26D	REQUEST TO NO REQUEST TO
0446	REF	2	LAST	47	5014	TRM03BIT =	BIT4	TERMINATE P03 HAS TERMINATE P03 HAS
A0447								BEEN ENTERED BEEN ENTERED
A0450							BIT 3 FLAG 1	
0451					0033	SLOPESW =	27D	ITERATE WITH BIAS ITERATE WITH REGULA
A0452								METHOD IN ITERATOR FALSI METHOD IN
A04521								ITERATOR
04525	REF	2	LAST	47	5015	SLOPEBIT =	BIT3	
A0456							BIT 2 FLAG 1	
0457					0034	GUESSW =	028D	NO STARTING VALUE STARTING VALUE FOR
A0458								FOR ITERATION ITERATION EXISTS
04585	REF	2	LAST	47	5016	GUESSBIT =	BIT2	
A0459							BIT 1 FLAG 1	
0460					0035	AVEGFLAG =	029D	AVERAGEG (SERVICER) AVERAGEG (SERVICER)
A0461								TO CONTINUE TO CEASE
04615	REF	2	LAST	47	5017	AVEGBIT =	BIT1	
0462	REF	3	LAST	47	0076	FLAGWRD2 =	STATE +2	(030-044)
A0463								(SET) (RESET)
A0464							BIT 15 FLAG 2	
0465					0036	DRIFTFLG =	030D	T3RUPT CALLS GYRO T3RUPT DOES NO GYRO
A0466								COMPENSATION COMPENSATION
04665	REF	3	LAST	47	5001	DRFTBIT =	BIT15	

```
A0470
 0471                          0037          R21MARK  =      BIT 14 FLAG 2
A0472                                       0310           OPTION ONE FOR      OPTION TWO FOR
                                                           MARKRUPT            MARKRUPT

 04725 REF  3 LAST  48        5002          R21BIT   =      BIT14

A0476
 0477                          0040          22DSPFLG =      BIT 13 FLAG 2
                                             0320           DISPLAY DR,DV       DO NOT DISPLAY DR,DV

 04775 REF  3 LAST  48        5003          22DSPBIT =      BIT13

A0478
 0479                          0041          P21FLAG  =      BIT 12 FLAG 2
A0480                                       0330           SUCCEEDING PASS     1ST PASS THRU P21,
 0481 REF  3 LAST  48         5004          P21BIT   =      BIT12               THRU P21, USE BASE  CALCULATE BASE
 0482                          0042          STEERSW  =      0340               VECTOR FOR CALC.    VECTOR
                                                           STEERING TO BE DONE STEERING OMITTED

 04925 REF  3 LAST  48        5005          STEERBIT =      BIT11

A0483
 0484                          0043          SKIPVHF  =      BIT 10 FLAG 2
A0485                                       0350           DISREGARD RADAR     RADAR READ TO
 04851 REF  3 LAST  48        5006          SKIPVBIT =      BIT10               READ BECAUSE OF     PROCEED NORMALLY
A04852                                                     SFTWRE OR HDWRE
                                                           RESTART

A0486
 0487                          0044          IMPULSW  =      BIT 9 FLAG 2
A0488                                       0360           MINIMUM IMPULSE     STEERING BURN (NO
A0489                                                      BURN (CUTOFF TIME   CUTOFF TIME YET
                                                           SPECIFIED)          AVAILABLE)

 04895 REF  4 LAST  48        5007          IMPULBIT =      BIT9

A0490
 0491                          0045          XDELVFLG =      BIT 8 FLAG 2
A0492                                       0370           EXTERNAL DELTAV VG  LAMBERT (AIMPOINT)
                                                           COMPUTATION         VG COMPUTATION

 04925 REF  3 LAST  49        5011          XDELVBIT =      BIT7

A0493
 0494                          0046          ETPIFLAG =      BIT 7 FLAG 2
A0495                                       0380           ELEVATION ANGLE     TPI TIME SUPPLIED
                                                           SUPPLIED FOR P34,74 FOR P34,74

A0496
 0497 REF  1                   0046          FIRSTFLG =      BIT 7 FLAG 2
A0498                                       ETPIFLAG       FIRST PASS          SUCCEEDING PASS THRU
                                                           THRU S40.9          S40.9

 04985 REF  4 LAST  50        5011          FIRSTBIT =      BIT7

A0501                                                      BIT  7 FLAG 2
```

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```
 0502   REF   2  LAST   50      0046          OPTNSW   =      ETPIFLAG        SOI PHASE P38/P78   SOR PHASE OF P38/P78

 05025  REF   3  LAST   49      5012          FINALBIT =      BIT6

A0503                                                       BIT 6 FLAG 2
 0504                           0047          FINALFLG =      0390            LSAT PASS THROUGH   INTERIM PASS THROUGH
A0505                                                                          RENDEZVOUS PROGRAM  RENDEZVOUS PROGRAM
A0506                                                                          COMPUTATIONS        COMPUTATIONS

 05065  REF   3  LAST   49      5013          AVFLBIT  =      BIT5

A0507                                                       BIT 5 FLAG 2
 0508                           0050          AVFLAG   =      0400            LEM IS ACTIVE       CSM IS ACTIVE
A0509                                                                          VEHICLE             VEHICLE

A0510                                                       BIT 4 FLAG 2
 0511                           0051          PFRATFLG =      0410            PREFERRED ATTITUDE  PREFERRED ATTITUDE
A0512                                                                          COMPUTED            NOT COMPUTED

 05125  REF   3  LAST   49      5014          PFRATBIT =      BIT4

A0513                                                       BIT 3 FLAG 2
A0514                                                  =    0420

A0516                                                       BIT 2 FLAG 2
 0517                           0053          CALCMAN2 =      0430            PERFORM MANEUVER    BYPASS STARTING
A0518                                                                          STARTING PROCEDURE  PROCEDURE

 05185  REF   3  LAST   49      5016          CALC2BIT =      BIT2

A0519                                                       BIT 1 FLAG 2
 0520                           0054          NODOFLAG =      0440            V37 NOT PERMITTED   V37 PERMITTED

 05205  REF   3  LAST   49      5017          NODOBIT  =      BIT1

 0521   REF   4  LAST   49      0077          FLAGWRD3 =      STATE +3        (045-059)

A0522                                                                          (SET)               (RESET)

A0523                                                       BIT 15 FLAG 3
A0524                                                  =    0450
A0525

A0525                                                       BIT 14 FLAG 3
 0527                           0056          GLOKFAIL =      0460            GIMBAL LOCK HAS     NOT IN GIMBAL LOCK
A0528                                                                          OCCURED

 05285  REF   4  LAST   50      5002          GLOKFBIT =      BIT14
```

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```
A0529                                                   BIT 13 FLAG 3
 0530                       0057        REFSMFLG =      0470        REFSMMAT GOOD       REFSMMAT NO GOOD

 05305  REF   4  LAST   50  5003        REFSMBIT =      BIT13

A0531                                                   BIT 12 FLAG 3
 0532                       0060        LUNAFLAG =      0480        LUNAR LAT-LONG      EARTH LAT-LONG

 05325  REF   4  LAST   50  5004        LUNABIT  =      BIT12

A0533                                                   BIT 11 FLAG 3
 0534                       0061        P22MKFLG =      490         P22 DOWNLINKED MARK P22 DOWLINK MARK
A0535                                                                DATA WAS JUST TAKEN DATA NOT JUST TAKEN

 05355  REF   4  LAST   50  5005        P22MKBIT =      BIT11

A0537                                                   BIT 10 FLAG 3
 0538                       0062        VFLAG    =      0500        LESS THAN TWO STARS TWO STARS IN FIELD
A0539                                                                IN FIELD OF VIEW    OF VIEW

 05395  REF   4  LAST   50  5006        VFLAGBIT =      BIT10

A0540                                                   BIT 9 FLAG 3
A0541                                   =               0510

A0542                                                   BIT 8 FLAG 3
 0543                       0064        PRECIFLG =      052D        CSMPREC, LEMPREC    INTGRV CALLED
 0544   REF   3  LAST   48  5010        PRECIBIT =      BIT8        OR INTEGRVS CALLED

A0545                                                   BIT 7 FLAG 3
 0546                       0065        CULTFLAG =      053D        STAR OCCULTED       STAR NOT OCCULTED

 05465  REF   5  LAST   50  5011        CULTBIT  =      BIT7

A0547                                                   BIT 6 FLAG 3
 0548                       0066        ORBWFLAG =      054D        W MATRIX VALID FOR  W MATRIX INVALID FOR
A0549                                                                ORBITAL NIVIGATION  ORBITAL NAVIGATION

 05495  REF   4  LAST   51  5012        ORBWFBIT =      BIT6

A0550                                                   BIT 5 FLAG 3
 0551                       0067        STATEFLG =      055D        PERMANENT STATE     PERMANENT STATE
A0552                                                                VECTOR UPDATED      VECTOR NOT UPDATED

 05525  REF   4  LAST   51  5013        STATEBIT =      BIT5

A0553                                                   BIT 4 FLAG 3
 0554                       0070        INTYPFLG =      056D        CONIC INTEGRATION   ENCKE INTEGRATION
```

```
 05545  REF   4  LAST   51      5014          INTYBIT  =     BIT4

A0555                                                      BIT 3 FLAG 3
 0556                          0071          VINTFLAG =     057D          CSM STATE VECTOR    LEM STATE VECTOR
A0557                                                                     BEING INTEGRATED    BEING INTEGRATED

 05575  REF   3  LAST   49      5015          VINTFBIT =     BIT3

A0558                                                      BIT 2 FLAG 3
 0559                          0072          D6DR9FLG =     058D          DIMENSION OF W IS 9 DIMENSION OF W IS 6
A0560                                                                    FOR INTEGRATION     FOR INTEGRATION

 05605  REF   4  LAST   51      5016          D6DR9BIT =     BIT2

A0561                                                      BIT 1 FLAG 3
 0562                          0073          DIMOFLAG =     059D          W MATRIX IS TO BE   W MATRIX IS NOT TO
A0563                                                                    USED                BE USED

 0564   REF   5  LAST   51      0100          FLAGWRD4 =     STATE +4      (060-074)

A0565                                                                    (SET)               (RESET)

 05655  REF   4  LAST   51      5017          DIMOBIT  =     BIT1

A0566                                                      BIT 15 FLAG 4
 0567                          0074          MRKIDFLG =     060D          MARK DISPLAY IN     NO MARK DISPLAY IN
A0568                                                                    ENDIDLE             ENDIDLE

 05685  REF   4  LAST   49      5001          MRKIDBIT =     BIT15

A0569                                                      BIT 14 FLAG 4
 0570                          0075          PRIODFLG =     061D          PRIORITY DISPLAY IN NO PRIORITY DISPLAY
A0571                                                                    ENDIDLE             IN ENDIDLE

 05715  REF   5  LAST   51      5002          PRIODBIT =     BIT14

A0572                                                      BIT 13 FLAG 4
 0573                          0076          NRMIDFLG =     062D          NORMAL DISPLAY IN   NO NORMAL DISPLAY
A0574                                                                    ENDIDLE             IN ENDIDLE

 05745  REF   5  LAST   52      5003          NRMIDBIT =     BIT13

A0575                                                      BIT 12 FLAG 4
 0576                          0077          PDSPFLAG =     063D          CAN'T INTERRUPT     SEE M. HAMILTON
A0577                                                                    PRIORITY DISPLAY

 05775  REF   5  LAST   52      5004          PDSPFBIT =     BIT12

A0578                                                      BIT 11 FLAG 4
 0579                          0100          MWAITFLG =     064D          HIGHER PRIORITY     NO HIGHER PRIORITY
```

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```
A0580                                                          DISPLAY OPERATING   DISPLAY OPERATING
A0581                                                          WHEN MARK DISPLAY   WHEN MARK DISPLAY
A0582                                                          INITIATED           INITIATED

 05825  REF   5  LAST   52      5005          MWAITBIT =      BIT11

A0583                                                                  BIT 10 FLAG 4
 0584                          0101          NWAITFLG =      0065D     HIGHER PRIORITY     NO HIGHER PRIORITY
A0585                                                          DISPLAY OPERATING   DISPLAY OPERATING
A0586                                                          WHEN NORMAL         WHEN NORMAL DISPLAY
A0587                                                          DISPLAY INITIATED   INITIATED

 05875  REF   5  LAST   52      5006          NWAITBIT =      BIT10

A0588                                                                  BIT 9 FLAG 4
 0589                          0102          MRKNVFLG =      0066D     ASTRONAUT USING     ASTRONAUT NOT USING
A0590                                                          KEYBOARD WHEN MARK  KEYBOARD WHEN MARK
A0591                                                          DISPLAY INITIATED   DISPLAY INITIATED

 05915  REF   5  LAST   50      5007          MRKNVBIT =      BIT9

A0592                                                                  BIT 8 FLAG 4
 0593                          0103          NRMNVFLG =      0067D     ASTRONAUT USING     ASTRONAUT NOT USING
A0594                                                          KEYBOARD WHEN       KEYBOARD WHEN
A0595                                                          NORMAL DISPLAY      NORMAL DISPLAY
A0596                                                          INITIATED           INITIATED

 05965  REF   4  LAST   52      5010          NRMNVBIT =      BIT8

A0597                                                                  BIT 7 FLAG 4
 0598                          0104          PRONVFLG =      0068D     ASTRONAUT USING     ASTRONAUT NOT USING
A0599                                                          KEYBOARD WHEN       KEYBOARD WHEN
A0600                                                          PRIORITY DISPLAY    PRIORITY DISPLAY
A0601                                                          INITIATED           INITIATED

 06015  REF   6  LAST   52      5011          PRONVBIT =      BIT7

A0602                                                                  BIT 6 FLAG 4
 0603                          0105          PINBRFLG =      0069D     ASTRONAUT HAS       ASTRONAUT HAS NOT
A0604                                                          INTERFERED WITH     INTERFERED WITH
A0605                                                          EXISTING DISPLAY    EXISTING DISPLAY

 06055  REF   5  LAST   52      5012          PINBRBIT =      BIT6

A0606                                                                  BIT 5 FLAG 4
 0607                          0106          MRUPTFLG =      070D      MARK DISPLAY        MARK DISPLAY NOT
A0608                                                          INTERRUPTED BY      INTERRUPTED BY
A0609                                                          PRIORITY DISPLAY    PRIORITY DISPLAY

 06095  REF   5  LAST   52      5013          MRUPTBIT =      BIT5
```

```
A0610                                                   BIT 4 FLAG 4
 0611                   0107        NRUPTFLG =          071D            NORMAL DISPLAY      NORMAL DISPLAY NOT
A0612                                                                   INTERRUPTED BY      INTERRUPTED BY
A0613                                                                   PRIORITY OR MARK    PRIORITY OR MARK
A0614                                                                   DISPLAY             DISPLAY

 06145 REF   5 LAST   53   5014        NRUPTBIT =          BIT4

A0615                                                   BIT 3 FLAG 4
 0616                   0110        MKOVFLAG =          072D            MARK DISPLAY OVER   NO MARK DISPLAY OVER
A0617                                                                   NORMAL              NORMAL

 06175 REF   4 LAST   53   5015        MKOVBIT  =          BIT3

A0617?                                                  BIT 2 FLAG 4    DISPLAY BIT
A0618                                           =       073D            CLEARED AT INTERVALS
A0619

A0620                                                   BIT 1 FLAG 4    MARK DISPLAY NOT TO NO SPECIAL MARK
 0621                   0112        XDSPFLAG =          074D            BE INTERRUPTED      INFORMATION.

 06215 REF   5 LAST   53   5017        XDSPBIT  =          BIT1

 0622  REF   6 LAST   53   0101        FLAGWRD5 =          STATE +5        (075-099)

A0623                                                                   (SET)               (RESET)

A0624                                                   BIT 15 FLAG 5
 0625                   0113        DSKYFLAG =          075D            DISPLAYS SENT TO    NO DISPLAYS TO DSKY
A0626                                                                   DSKY
A06265

 062655 REF   5 LAST   53   5001        DSKYBIT  =          BIT15

A0627                                                   BIT 14 FLAG 5
 0628                   0114        RETROFLG =          76D             P37 PREMANEUVER     ORBIT NOT RETROGRADE
 06285  REF   6 LAST   53   5002        RETROBIT =          BIT14           ORBIT IS RETROGRADE

A0630                                                   BIT 13 FLAG 5
 0631                   0115        SLOWFLG  =          77D             P37 TRANSEARTH      SLOW DOWN IS NOT
 0632   REF   6 LAST   53   5003        SLOWBIT  =          BIT13           COAST SLOW DOWN     DESIRED
A0633                                                                   IS DESIRED

A0637                                                   BIT 12 FLAG 5
 0638                   0116        V59FLAG  =          078D            CALIBRATING FOR     NORMAL MARKING FOR
A0639                                                                   P 23                P 23

 06395 REF   6 LAST   53   5004        V59FLBIT =          BIT12

A0640                                                   BIT 11 FLAG 5
```

```
 0641                           0117            INCORFLG =      079D            FIRST INCORPORATION SECOND INCORPORATION

 06415  REF   6  LAST   54      5005            INCORBIT =      BIT11

A0642
                                                                BIT 10 FLAG 5
 0643                           0120            RNGSCFLG =      80D             ANOTHER TAG FOR PRFTKAT


A0646
                                                                BIT 10 FLAG 5
 0647   REF   1                 0120            PRFTRKAT =      RNGSCFLG        PREF TRACK ATT      +X AXIS TRACK ATT
A0648

 06485  REF   6  LAST   54      5006            PRFTRBIT =      BIT10

A0649
                                                                BIT 9 FLAG 5
 0650                           0121            DMENFLG  =      081D            DIMENSION OF W IS 9 DIMENSION OF W IS 6
A0651                                                                           FOR INCORPORATION   FOR INCORPORATION

 06515  REF   6  LAST   54      5007            DMENFBIT =      BIT9

A0652
                                                                BIT 8 FLAG 5
 0653                           0122            COMPUTER =      082D            COMPUTER IS CMC     COMPUTER IS LGC

 06535  REF   5  LAST   54      5010            COMPTBIT =      BIT8

A0654
                                                                BIT 7 FLAG 5
 0655                           0123            ENGONFLG =      0830            ENGINE TURNED ON    ENGINE TURNED OFF

 06555  REF   7  LAST   54      5011            ENGONBIT =      BIT7

A0656
                                                                BIT 6 FLAG 5
 0657                           0124            3AXISFLG =      0840            MANEUVER SPECIFIED  MANEUVER SPECIFIED
A0658                                                                           BY THREE AXES       BY ONE AXIS

 06585  REF   6  LAST   54      5012            3AXISBIT =      BIT6

A0662
                                                                BIT 5 FLAG 5
 0663                           0125            GRRBKFLG =      085D            BACKUP GRR RECEIVED BACKUP GRR NOT
A0664                                                                                               RECEIVED

 06545  REF   6  LAST   54      5013            GRRBKBIT =      BIT5

A0665
                                                                BIT 4 FLAG 5
 0666                           0126            R60FLAG  =      0860            R61 MUST USE R60    NORMAL R61
A0667

 06675  REF   6  LAST   55      5014            R60FLBIT =      BIT4

A0672
                                                                BIT 3 FLAG 5
 0673                           0127            SOLNSW   =      870             LAMBERT DOES NOT    LAMBERT CONVERGES OR
```

L ERASABLE ASSIGNMENTS

```
A0674                                                                   CONVERGE, OR TIME-  TIME-RADIUS NON
A0674                                                                   RADIUS NEARLY CIRC. CIRCULAR.

 0674  REF   5  LAST   55      5015          SOLNSBIT =      BIT3

A0675                                                   BIT 2 FLAG 5
 0676                          0130          MGLVFLAG =      0880      LOCAL VERTICAL      MIDDLE GIMBAL ANGLE
A0677                                                                   COORDINATES         COMPUTED
A0678                                                                   COMPUTED

 0678  REF   5  LAST   53      5016          MGLVFBIT =      BIT2

A0679                                                   BIT 1 FLAG 5
 0680                          0131          RENDWFLG =      0890      W MATRIX VALID      W MATRIX INVALID
A0681                                                                   FOR RENDEZVOUS      FOR RENDEZVOUS
A0682                                                                   NAVIGATION          NAVIGATION

 0682  REF   6  LAST   55      5017          RENDWBIT =      BIT1

 0683  REF   7  LAST   55      0102          FLAGWRD6 =      STATE +6  (090-104)

A0684                                                                   (SET)               (RESET)

A0687                                                   BIT 15 FLAG 6
 0688                          0132          DAPBIT1  =      090D      1 SATURN 1 TVC      0 RCS    0 NO

 0688  REF   6  LAST   55      5001          DAPIBIT  =      BIT15

A0689                                                   BIT 14 FLAG 6
 0690                          0133          DAPBIT2  =      091D      1 A/P    0 A/P      1 A/P    0 A/P

 0690  REF   7  LAST   55      5002          DAP2BIT  =      BIT14

A0694                                                   BIT 13 FLAG 6
 0695                          0134          STRULLSW =      92D       DO STEERULL         DO ULAGEOFF ONLY
A0696
 0696  REF   7  LAST   55      5003          STRULBIT =      BIT13

A0697                                                   BIT 13 FLAG 6
 0698  REF   1                 0134          ENTRYDSP =      STRULLSW  DO ENTRY DISPLAY    OMIT ENTRY DISPLAY
A0699                                                                   VIA ENTRYVN.

 0699  REF   8  LAST   57      5003          ENDSPBIT =      BIT13

A0706                                                   BIT 12 FLAG 6
 0707                          0135          CMDAPARM =      093D      ALOW ENTRY FIRINGS  INHIBIT ENTRY FIRING
A0708                                                                   AND CALCULATIONS    AND CONTROL FUNCTION
```

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```
 07085  REF   7  LAST   55      5004          CMARMBIT =      BIT12

A0709                                                      BIT 11 FLAG 6
 0710                           0136          GAMDIFSW =      0940          CALCULATE GAMDOT    GAMDOT NOT TO BE
A0711                                                                                            CALCULATED

 07115  REF   7  LAST   56      5005          GMDIFBIT =      BIT11

A0714                                                      BIT 10 FLAG 6
 0715                           0137          GONEPAST =      095D          LATERAL CONTROL     LATERAL CONTROL
A0716                                                                       CALCULATIONS TO BE  CALCULATIONS TO BE
A0717                                                                       OMITTED             DONE

 07175  REF   7  LAST   56      5006          GONEBIT  =      BIT10

A0718                                                      BIT 9 FLAG 6
 0719                           0140          RELVELSW =      096D          TARGETING USES      TARGETING USES
A0720                                                                       EARTH-RELATIVE      INERTIAL VELOCITY
A0721                                                                       VELOCITY

 07215  REF   7  LAST   56      5007          RELVBIT  =      BIT9

A0724                                                      BIT 8 FLAG 6
 0725                           0141          EGSW     =      097D          IN FINAL PHASE      NOT IN FINAL PHASE

 07255  REF   6  LAST   56      5010          EGFLGBIT =      BIT8

A0726                                                      BIT 8 FLAG 6
 0727   REF   1                0141          KNOWNFLG =      EGSW          LANDMARK KNOWN      LANDMARK UNKNOWN

 07275  REF   7  LAST   58      5010          KNOWNBIT =      BIT8

A0728                                                      BIT 8  FLAG 6
 0729   REF   1                0141          R57FLAG  =      KNOWNFLG      DO NOT DO R57       DO R57, TRUNION
A0730                                                                       TRUNION BIAS HAS    BIAS NEEDED
A0731                                                                       BEEN OBTAINED.

 07315  REF   8  LAST   58      5010          R57BIT   =      BIT8

A0735                                                      BIT 7 FLAG 6
 0736                           0142          NOSWITCH =      098D          LATERAL ROLL        LATERAL ROLL MANUVER
 0737   REF   8  LAST   56      5011          NOSWBIT  =      BIT7          MANUVER INHIBITED   PERMITED IN ENTRY
A07375                                                                      IN ENTRY


A0740                                                      BIT 6 FLAG 6
 0741                           0143          HINO     =      099D          ITERATING HUNTEST   ITERATING OF HUNTEST
A0742                                                                       CALCULATIONS TO BE  CALCULATIONS TO BE
A0743                                                                       DONE AFTER RANGE    OMITTED AFTER RANGE
A0744                                                                       PREDICTION          PREDICTION
```

L ERASABLE ASSIGNMENTS

```
 07445  REF   7  LAST   56      5012            HINDBIT  =      BIT6

A0748                                                        BIT 5 FLAG 6
 0749                           0144            INRLSW   =      100D          INITIAL ROLL        INITIAL ROLL
A0750                                                                         V(LV)               V(LV)

 07505  REF   7  LAST   56      5013            INRLBIT  =      BIT5

A0751                                                                         ATTITUDE NOT HELD   ATTITUDE HELD

A0754                                                        BIT 4 FLAG 6
 0755                           0145            LATSW    =      101D          DOWNLIFT NOT        DOWNLIFT INHIBITED
A0756                                                                         INHIBITED

 07565  REF   7  LAST   56      5014            LATSWBIT =      BIT4

A0759                                                        BIT 3 FLAG 6
 0760                           0146            .05GSW   =      102D          DRAG OVER .05G      DRAG LESS THAN .05G

 07605  REF   6  LAST   57      5015            .05GBIT  =      BIT3

A0761                                                        BIT 3 FLAG 6
A0762                                           =        =      102D

A0764                                                        BIT 2 FLAG 6
 0765                           0147            CM/DSTBY =      103D          ENTRY DAP ACTIVATED ENTRY DAP NOT
A0766                                                                                             ACTIVATED

 07665  REF   6  LAST   57      5016            CM/DSBIT =      BIT2

A0769                                                        BIT 1 FLAG 6
 0770                           0150            GYMDIFSW =      104D          CDU DIFFERENCES AND CDU DIFFERENCES AND
A0775                                                                         BODY RATES COMPUTED BODY RATES NOT
A0776                                                                                             COMPUTED

 07765  REF   7  LAST   57      5017            GYMDIBIT =      BIT1

 0777   REF   8  LAST   57      0103            FLAGWRD7 =      STATE +7      (105-119)

A0778                                                                         (SET)               (RESET)

A0779                                                        BIT 15 FLAG 7
 0780                           0151            TERMIFLG =      105D          TERMINATE R52       DO NOT TERMINATE R52
 0781   REF   7  LAST   57      5001            TERMIBIT =      BIT15

A0786                                                        BIT 14 FLAG 7
 0787                           0152            ITSWICH  =      106D          ACCEPT NEXT LAMBERT TEST LAMBERT ANSWER
A0788                                                                         TPI SEARCH SOLUTION AGAINST LIMITS
```

```
 07885  REF   8  LAST   57      5002            ITSWBIT  =      BIT14

A0789                                                        BIT 13 FLAG 7
 0790                           0153            IGNFLAG  =      107D            TIG HAS ARRIVED     TIG HAS NOT ARRIVED

 07905  REF   9  LAST   57      5003            IGNFLBIT =      BIT13

A0791                                                        BIT 12 FLAG 7
 0792                           0154            ASTNFLAG =      108D            ASTRONAUT HAS       ASTRONAUT HAS NOT
A0793                                                                           OKAYED IGNITION     OKAYED IGNITION

 07935  REF   8  LAST   58      5004            ASTNBIT  =      BIT12

A0794                                                        BIT 11 FLAG 7
 0795                           0155            TIMRFLAG =      109D            CLOKTASK OPERATING  CLOKTASK INOPERATIVE

 07955  REF   8  LAST   58      5005            TIMRBIT  =      BIT11

A0799                                                        BIT 10 FLAG 7
 0800                           0156            NORMSW   =      110D            UNIT NORMAL INPUT   LAMBERT COMPUTE ITS
A0801                                                                          TO LAMBERT.         OWN UNIT NORMAL.

 08015  REF   8  LAST   58      5006            NORMSBIT =      BIT10

A0806                                                        BIT 9 FLAG 7
 0807                           0157            RVSW     =      111D            DO NOT COMPUTE FINAL COMPUTE FINAL STATE
A08071                                                                         STATE VECTOR IN     VECTOR IN TIME-THETA
A08075                                                                         TIME-THETA.

 080735 REF   8  LAST   58      5007            RVSWBIT  =      BIT9

A0808                                                        BIT 8 FLAG 7
 0809                           0160            GONEBY   =      112D            PASSED TARGET       APPROACHING TARGET

 08095  REF   9  LAST   58      5010            GONBYBIT =      BIT8

A0810                                                        BIT 7 FLAG 7
A0811                                                   =    113D
A08115                                                  =    BIT7

A0812                                                        BIT 6 FLAG 7
 0813                           0162            V37FLAG  =      114D            AVERAGEG (SERVICER) AVERAGEG (SERVICER)
A0814                                                                          RUNNING             OFF

 08145  REF   8  LAST   59      5012            V37FLBIT =      BIT6

A0815                                                        BIT 5 FLAG 7
A0816                                                   =    115D
```

```
A0817                                          =       BIT5
A0818

A0819                                                  BIT 4 FLAG 7
 0820                          0164             UPLOCKFL =      116D          K-KBAR-K FAIL       NO K-KBAR-K FAIL

 08205  REF   8  LAST   59     5014             UPLOCBIT =      BIT4

A0821                                                  BIT 3 FLAG 7
 0822                          0165             VERIFLAG =      117D          CHANGED WHEN V33E OCCURS AT END OF P27

 08225  REF   7  LAST   59     5015             VERIFBIT =      BIT3

A0823                                                  BIT 2 FLAG 7
 0824                          0166             ATTCHFLG =      118D          LM,CM ATTACHED      LM,CM NOT ATTACHED

 08245  REF   7  LAST   59     5016             ATTCHBIT =      BIT2

A0825                                                  BIT 1 FLAG 7
 0826                          0167             TFFSW    =      119D          CALCULATE TPERIGEE  CALCULATE TFF

 08265  REF   8  LAST   59     5017             TFFSWBIT =      BIT1

 0827   REF   9  LAST   59     0104             FLAGWRD8 =      STATE +8D     (120-134)

A0828                                                          (SET)               (RESET)

A0829                                                  BIT 15 FLAG 8
 0830                          0170             RPQFLAG  =      120D          RPQ NOT COMPUTED    RPQ COMPUTED

 08305  REF   8  LAST   59     5001             RPQFLBIT =      BIT15

A0831                                                  BIT 14 FLAG 8
A0832                                          =       121D
A0833

A0834                                                  BIT 13 FLAG 8
 0835                          0172             NEWIFLG  =      122D          FIRST PASS THROUGH  SUCCEEDING ITERATION
A0836                                                                        INTEGRATION         OF INTEGRATION

 08365  REF  10  LAST   60     5003             NEWIBIT  =      BIT13

A0837                                                  BIT 12 FLAG 8
 0838                          0173             CMOONFLG =      123D          PERMANENT CSM STATE PERMANENT CSM STATE
 0839   REF   9  LAST   60     5004             CMOONBIT =      BIT12         IN LUNAR SPHERE     IN EARTH SPHERE

A0840                                                  BIT 11 FLAG 8
 0841                          0174             LMOONFLG =      124D          PERMANENT LM  STATE PERMANENT LM  STATE
 0842   REF   9  LAST   60     5005             LMOONBIT =      BIT11         IN LUNAR SPHERE     IN EARTH SHPERE
```

```
A0843
 0844                          0175          ADVTRK   =      BIT 10 FLAG 8
A0845                                                      125D              ADVANCE GROUND TRACK NOT ADVANCED
                                                           SIGHTING WANTED   GROUND TRACK

 08455  REF   9  LAST   60     5006          ADVTKBIT =     BIT10

A0846
 0847                          0176          P39/79SW =     BIT 9 FLAG 8
A0848                                                      126D              P39/79 OPERATING    P38/78 OPERATING
 08485  REF   9  LAST   60     5007          P39SWBIT =     BIT9

A0849
 0850                          0177          SURFFLAG =     BIT 8 FLAG 8
A0851                                                      127D              LM ON LUNAR SURFACE LM NOT ON LUNAR
                                                                                                 SURFACE
 08515  REF  10  LAST   60     5010          SURFFBIT =     BIT8

A0854
 0855                          0200          INFINFLG =     BIT 7 FLAG 8
A0855                                                      128D              NO CONIC SOLUTION   CONIC SOLUTION
A08561                                                                       (CLOSURE THROUGH    EXISTS.
                                                                             INFINITY REQUIRED).
 08565  REF   9  LAST   5B     5011          INFINBIT =     BIT7

A0857
 0858                          0201          ORDERSW  =     BIT 6 FLAG 8
A08581                                                     129D              ITERATOR USES 2ND   ITERATOR USES 1ST
                                                           ORDER MINIMUM MODE. ORDER STANDARD MODE.

 08585  REF   9  LAST   60     5012          ORDERBIT =     BIT6

A0859
 0860                          0202          APSESW   =     BIT 5 FLAG 8
A08605                                                     130D              RDESIRED OUTSIDE    RDESIRED INSIDE
A0861                                                                        PERICENTER-APOCENTER PERICENTER-APOCENTE
                                                                             RANGE IN TIME-RAD   RANGE IN TIME-RADIUS
 08615  REF   3  LAST   59     5013          APSESBIT =     BIT5

A0862
 08625                         0203          COGAFLAG =     BIT 4 FLAG 8
A0863                                                      131D              NO CONIC  SOLUTION  CONIC SOLUTION
A08631                                                                       TOO CLOSE TO        EXISTS (COGA DOES
A0864                                                                        RECTILINEAR (COGA   NOT  OVERFLOW).
                                                                             OVERFLOWS).
 08645  REF   9  LAST   61     5014          COGAFBIT =     BIT4

A0865                                                      BIT 3 FLAG 8
```

L ERASABLE ASSIGNMENTS

```
 0866                          0204          V96ONFLG =      132D            P00 INTEGRATION HAS P00 INTEGRATION IS
A0867                                                                       BEEN INHIBITED BY   PROCEEDING REGULARLY
 08675 REF   8 LAST   61      5015          V96ONBIT =      BIT3            V96

A0868                                                      BIT 2 FLAG 8
A0869                                              =       133D


A0870                                                      BIT 1 FLAG 8
 0871                          0206          360SW    =      134D            TRANSFER ANGLE NEAR TRANSFER ANGLE NOT
A0872                                                                       360 DEGREES         NEAR 360 DEGREES

 08725 REF   9 LAST   61      5017          360SWBIT =      BIT1

 0873  REF  10 LAST   61      0105          FLAGWRD9 =      STATE +9D       (135 - 149)

A0874                                                                       (SET)               (RESET)
A0875                                                      BIT 15 FLAG 9
 0876                          0207          SWTOVER  =      135D            SWITCHOVER HAS      NO SWITCHOVER YET
A0877                                                                       OCCURRED

 08775 REF   9 LAST   61      5001          SWTOVBIT =      BIT15

A0878                                                      BIT 14 FLAG 9
A0879                                              =       136D

 087965 REF   9 LAST   60     5002          V67FLBIT =      BIT14

A0880                                                      BIT 13 FLAG 9
 0881                          0211          V82EMFLG =      137D            MOON VICINITY       EARTH VICINITY
A08815


 088155 REF  11 LAST   61      5003          V82EMBIT =      BIT13

A0882                                                      BIT 12 FLAG 9
 0883                          0212          MAXDBFLG =      138D            MAX DB SELECTED     MIN DB SELECTED
A0884

 08845  REF  10 LAST   61      5004          MAXDBBIT =      BIT12

A0885                                                      BIT 11 FLAG 9
 0886                          0213          V94FLAG  =      139D            V94 ALLOWED DURING  V94 NOT ALLOWED
A0887                                                                       P23

 08875  REF  10 LAST   61      5005          V94FLBIT =      BIT11

A0888                                                      BIT 10 FLAG 9
 0889                          0214          SAVECFLG =      140D            P23 DISPLAY AND     P23 DISPLAY AND
A0890                                                                       DATA STORAGE AFTER  DATA STORAGE BEFORE
```

L ERASABLE ASSIGNMENTS

```
A0891                                                          MARK IS DONE        MARK IS DONE

 08915  REF  10  LAST   62      5006          SAVECBIT =      BIT10

A0892                                                          BIT  9 FLAG 9
 0893                          0215          VHFRFLAG =      141D                ALLOW R22 TO        STOP ACCEPTANCE
A0894                                                                             ACCEPT RANGE        OF RANGE DATA
A0895                                                                             DATA

 08955  REF  10  LAST   62      5007          VHFRBIT  =      BIT9

A0896                                                          BIT  8 FLAG 9
 0897                          0216          SOURCFLG =      142D                SOURCE OF INPUT     SOURCE OF INPUT
A0898                                                                             DATA IS FROM        DATA IS FROM
A0899                                                                             VHF RADAR           OPTICS MARK

 08995  REF  11  LAST   62      5010          SOURCBIT =      BIT8

A0900                                                          BIT  7 FLAG 9
 0901                          0217          R22CAFLG =      143D                R-22 CALCULATIONS   R-22 CALCULATIONS
A0902                                                                             ARE GOING ON        ARE NOT GOING ON

 09025  REF  10  LAST   62      5011          R22CABIT =      BIT7

A0903                                                          BIT  6 FLAG 9
 0904                          0220          N22ORN17 =      144D                COMPUTE TOTAL       COMPUTE TOTAL
A0905                                                                             ATTITUDE ERRORS     ATTITUDE ERRORS
A0906                                                                             WRT N22 (V62)       WRT N17 (V63)

 09065  REF  10  LAST   62      5012          N2217BIT =      BIT6

A0907                                                          BIT  5 FLAG 9
 0908                          0221          QUITFLAG =      145D                TERMINATE AND EXIT  CONTINUE INTEGRATION
 09085  REF   9  LAST   62      5013          QUITBIT  =      BIT5                FROM INTEGRATION

A0909                                                          BIT  4 FLAG 9
 0910                          0222          R31FLAG  =      146D                R31 SELECTED (V83)  R34 SELECTED (V85)

 09105  REF  10  LAST   62      5014          R31FLBIT =      BIT4

A0911                                                          BIT  3 FLAG 9
 0912                          0223          MID1FLAG =      147D                INTEGRATE TO TDEC   INTEGRATE TO THE
A0913                                                                                             THEN-PRESENT TIME

 09135  REF   9  LAST   63      5015          MID1FBIT =      BIT3

A0914                                                          BIT  2 FLAG 9
 0915                          0224          MIDAVFLG =      148D                INTEGRATION ENTERED INTEGRATION WAS
A0916                                                                             FROM ONE OF MIDTOAV NOT ENTERED VIA
A0917                                                                              PORTALS            MIDTOAV
```

```
 09175  REF   8  LAST   61      5016          MIDAVBIT =     BIT2

A0918                                                      BIT  1 FLAG 9
 0919                          0225          AVEMIDSW =     149D            AVETOMID CALLING    NO AVETOMID W INTEGR
A0920                                                                       FOR W.MATRIX INTEGR ALLOW SET UP RN,VN,
A0921                                                                       DONT WRITE OVER RN, PIPTIME
A0922                                                                       VN,PIPTIME

 09225  REF  10  LAST   63      5017          AVEMOBIT =     BIT1

A0923                                                                       (SET)               (RESET)

 0924   REF  11  LAST   63      0106          FLGWRD10 =     STATE    +10D   (150-164)
A0925

 09255  REF  12  LAST   65      0106          RASFLAG  =     STATE    +10D

A0926                                                      BIT 15 FLAG 10
A0927                                                =     150D
A0928

A0929                                                      BIT 14 FLAG 10
 0930                          0227          INTFLAG  =     151D            INTEGRATION IN      INTEGRATION NOT IN
A0931                                                                       PROGRESS            PROGRESS
 09315  REF  10  LAST   63      5002          INTFLBIT =     BIT14

A0932                                                      BIT 13 FLAG 10
A0933                                                =     152D
A0934

A0935                                                      BIT 12 FLAG 10
A0936                                                =     153D

A0938                                                      BIT 11 FLAG 10
A0939                                                =     154D

A0941                                                      BIT 10 FLAG 10
A0942                                                =     155D
A0943

A0944                                                      BIT  9 FLAG 10
A0945                                                =     156D
A0946

A0947                                                      BIT  8 FLAG 10
A0948                                                =     157D
A0949
```

```
A0950                                                   BIT  7 FLAG 10
 0951                       0236          REINTFLG =     158D          INTEGRATION ROUTINE INTEGRATION ROUTINE
A0952                                                                   TO BE RESTARTED     NOT TO BE RESTARTED
 09525 REF  11 LAST   64    5011          REINTBIT =     BIT7

A0953                                                   BIT  6 FLAG 10
A0954                                          =       159D
A0955

A0956                                                   BIT  5 FLAG 10
A0957                                          =       160D
A0958

A0959                                                   BIT  4 FLAG 10
A0960                                          =       161D
A0961

A0962                                                   BIT  3 FLAG 10
A0963                                          =       162D
A0964

A0965                                                   BIT  2 FLAG 10
A0966                                          =       163D
A0967

A0968                                                   BIT  1 FLAG 10
A0969                                          =       164D
A0970

A0971


 0972  REF  13 LAST   65    0107          FLGWRD11 =     STATE +11D    (165 - 179)

A0973                                                                 (SET)               (RESET)

A0974                                                   BIT 15 FLAG 11
 0975                       0245          S32.1F1  =     165D          DELTAN AT CSI TIME  DVT1 LESS THAN MAX
 0976  REF  10 LAST   63    5001          S32BIT1  =     BIT15         ONE EXCEEDS MAX

A0977                                                   BIT 14 FLAG 11
 0978                       0246          S32.1F2  =     166D          FIRST PASS OF       REITERATION OF
 0979  REF  11 LAST   65    5002          S32BIT2  =     BIT14         NEWTON INTERATION   NEWTON

A0980                                                   BIT 13 FLAG 11
 0981                       0247          S32.1F3A =     167D          BIT 13 AND BIT 12 FUNCTION AS AN ORDERED
 09811 REF  12 LAST   63    5003          S32BIT3A =     BIT13         PAIR (13,12) INDICATING THE POSSIBLE OC-
A0982                                                                 CURRENCE OF 2NEWTON ITERATIONS FOR S32.1
A0983                                                   BIT 12 FLAG 11 IN THE PROGRAM IN THE FOLLOWING ORDER:
 0984                       0250          S32.1F3B =     168D          (0,1) (I.E.BIT 13 RESET, BIT 12 SET)
```

```
 0985   REF  11  LAST   63      5004          S3229T3B =      BIT12               = FIRST NEWTON ITERATION BEING DONE
A09851                                                                          (0,0)= FIRST PASS OF 2ND NEWTON ITER.
A09852                                                                          (1,1)= 50 FPS STAGE OF 2ND NEWT ITER.
A09853                                                                          (1,0)= REMAINDER OF 2ND NEWTON ITER.

A0986                                                          BIT 11 FLAG 11
A0987                                                  =       169D
A0988

A0989                                                          BIT 10 FLAG 11
A0990                                                  =       170D
A0991

A0992                                                          BIT  9 FLAG 11
A0993                                                  =       171D
A0994

A0995                                                          BIT  8 FLAG 11
A0996                                                  =       172D
A0997

A0998                                                          BIT  7 FLAG 11
A0999                                                  =       173D
A1000

A1001                                                          BIT  6 FLAG 11
A1002                                                  =       174D
A1003

A1004                                                          BIT  5 FLAG 11
A1005                                                  =       175D
A1006

A1007                                                          BIT  4 FLAG 11
A1008                                                  =       176D
A1009

A1010                                                          BIT  3 FLAG 11
A1011                                                  =       177D
A1012

A1013                                                          BIT  2 FLAG 11
A1014                                                  =       178D
A1015

A1016                                                          BIT  1 FLAG 11
A1017                                                  =       179D
A1018
```

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P1019 GENERAL ERASABLE ASSIGNMENTS.

```
 1020                          0061                    SETLOC 61
R1021          INTERRUPT TEMPORARY STORAGE POOL.  (11D)
R1022            (ITEMP1 THROUGH RUPTREG4)

R1023          ANY OF THESE MAY BE USED AS TEMPORARIES DURING INTERRUPT OR WITH INTERRUPT INHIBITED. THE ITEMP SERIES
R1025   IS USED DURING CALLS TO THE EXECUTIVE AND WAITLIST - THE RUPTREGS ARE NOT.

 1027                          0061    0061    ITEMP1   ERASE
 1028   REF   1                0061            WAITEXIT EQUALS ITEMP1
 1029   REF   2  LAST   68      0061            EXECTEM1 EQUALS ITEMP1

 1030                          0062    0062    ITEMP2   ERASE
 1031   REF   1                0062            WAITBANK EQUALS ITEMP2
 1032   REF   2  LAST   68      0062            EXECTEM2 EQUALS ITEMP2

 1033                          0063    0063    ITEMP3   ERASE
 1034   REF   1                0063            RUPTSTOR EQUALS ITEMP3
 1035   REF   2  LAST   68      0063            WAITADR  EQUALS ITEMP3
 1036   REF   3  LAST   68      0063            NEWPRIO  EQUALS ITEMP3

 1037                          0064    0064    ITEMP4   ERASE
 1038   REF   1                0064            LOCCTR   EQUALS ITEMP4
 1039   REF   2  LAST   68      0064            WAITTEMP EQUALS ITEMP4

 1040                          0065    0065    ITEMP5   ERASE
 1041   REF   1                0065            NEWLOC   EQUALS ITEMP5

 1042                          0066    0066    ITEMP6   ERASE
A1043                                          NEWLOC+1 EQUALS ITEMP6          DP ADDRESS.

 1044                          0067                    SETLOC 67
 1045                          0067    0067    NEWJOB   ERASE                  MUST BE AT LOC 67 DUE TO WIRING.


 1046                          0070    0070    RUPTREG1 ERASE
 1047                          0071    0071    RUPTREG2 ERASE
 1048                          0072    0072    RUPTREG3 ERASE
 1049                          0073    0073    RUPTREG4 ERASE
 1050   REF   1                0073            KEYTEMP1 EQUALS RUPTREG4
 1051   REF   2  LAST   68      0073            OSRUPTEM EQUALS RUPTREG4

R1052          FLAGWORD RESERVATIONS.                                          (12D)

 1054                          0074    0107    STATE    ERASE  +11D

R10554          PAD LOAD  FOR  DAPS                                            (1)

 10556                         0110    0110    EMDOT    ERASE                  I(1)PL  SPS FLOW RATE, SC. AT B+3 KG/CS
```

```
R10557          EXIT FOR V83                                                    (1D)

 105585                         0111    0111   STATEXIT ERASE                  1(1)    STQ AD RESS F R STATEXP


R10559          UNUSED ERASABLES ********(2)

 105591                         0112    0113   ERASFILL ERASE          +1


R1056           EXEC TEMPORARIES WHICH MAY BE USED BETWEEN CCS NEWJOBS.
R1057           (INTB15+ THROUGH RUPTMXM)                                       (32D)

 1059                           0114    0114   INTB15+  ERASE                  REFLECTS 15TH BIT OF INDEXABLE ADDRESSES
 1060   REF   1                 0114           DSEXIT   EQUALS INTB15+         RETURN FOR DSPIN
 1061   REF   2  LAST   69      0114           EXITEM   EQUALS INTB15+         RETURN FOR SCALE FACTOR ROUTINE SELECT
 1062   REF   3  LAST   69      0114           BLANKRET EQUALS INTB15+         RETURN FOR 2BLANK

 1063                           0115    0115   INTBIT15 ERASE                  SIMILAR TO ABOVE.
 1064   REF   1                 0115           WRDRET   EQUALS INTBIT15        RETURN FOR 5BLANK
 1065   REF   2  LAST   69      0115           WDRET    EQUALS INTBIT15        RETURN FOR DSPWD
 1066   REF   3  LAST   69      0115           DECRET   EQUALS INTBIT15        RETURN FOR PUTCOM(DEC LOAD)
 1067   REF   4  LAST   69      0115           21/22REG EQUALS INTBIT15        TEMP FOR CHARIN

R1068           THE REGISTERS BETWEEN ADDRWD AND PRIORITY MUST STAY IN THE FOLLOWING ORDER FOR INTERPRETIVE TRACE.

 1070                           0116    0116   ADDRWD   ERASE                  12 BIT INTERPRETIVE OPERAND SUB-ADDRESS.
 1071                           0117    0117   POLISH   ERASE                  HOLDS CADR MADE FROM POLISH ADDRESS.
 1072   REF   1                 0117           UPDATRET EQUALS POLISH          RETURN FOR UPDATNN, UPDATV8
 1073   REF   2  LAST   69      0117           CHAR     EQUALS POLISH          TEMP FOR CHARIN
 1074   REF   3  LAST   69      0117           ERCNT    EQUALS POLISH          COUNTER FOR ERROR LIGHT RESET
 1075   REF   4  LAST   69      0117           DECOUNT  EQUALS POLISH          COUNTER FOR SCALING AND DISPLAY (DEC)

 1076                           0120    0120   FIXLOC   ERASE                  WORK AREA ADDRESS.
 1077                           0121    0121   OVFIND   ERASE                  SET NON-ZERO ON OVERFLOW.

 1078                           0122    0127   VBUF     ERASE  +5              TEMPORARY STORAGE USED FOR VECTORS.
 1079   REF   1                 0122           SGNON    EQUALS VBUF            TEMP FOR +,- ON
 1080   REF   2  LAST   69      0122           NOUNTEM  EQUALS VBUF            COUNTER FOR MIXNOUN FETCH
 1081   REF   3  LAST   69      0122           DISTEM   EQUALS VBUF            COUNTER FOR OCTAL DISPLAY VERBS
 1082   REF   4  LAST   69      0122           DECTEM   EQUALS VBUF            COUNTER FOR FETCH (DEC DISPLAY VERBS)

 1083   REF   5  LAST   69      0123           SGNOFF   EQUALS VBUF    +1      TEMP FOR +,- ON
 1084   REF   6  LAST   69      0123           NVTEMP   EQUALS VBUF    +1      TEMP FOR NVSUB
 1085   REF   7  LAST   69      0123           SFTEMP1  EQUALS VBUF    +1      STORAGE FOR SF CONST HI PART(=SFTEMP2-1)
 1086   REF   8  LAST   69      0123           HITEMIN  EQUALS VBUF    +1      TEMP FOR LOAD OF HRS, MIN, SEC
A1087                                                                                   MUST = LOTEMIN-1.
 1088   REF   9  LAST   69      0124           CODE     EQUALS VBUF    +2      FOR DSPIN
 1089   REF  10  LAST   69      0124           SFTEMP2  EQUALS VBUF    +2      STORAGE FOR SF CONST LO PART(=SFTEMP1+1)
 1090   REF  11  LAST   69      0124           LOTEMIN  EQUALS VBUF    +2      TEMP FOR LOAD OF HRS, MIN, SEC
```

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```
A1091                                                                   MUST = HITEMIN+1.
 1092   REF  12  LAST   69      0125           MIXTEMP  EQUALS VBUF    +3      FOR MIXNOUN DATA
 1093   REF  13  LAST   70      0125           SIGNRET  EQUALS VBUF    +3      RETURN FOR +,- ON

R1094   ALSO MIXTEMP+1 = VBUF+4, MIXTEMP+2 = VBUF+5.

 1095                            0130    0132   BUF      ERASE  +2              TEMPORARY SCALAR STORAGE.
 1096                            0133    0134   BUF2     ERASE  +1
 1097   REF  1                   0130           INDEXLOC EQUALS BUF             CONTAINS ADDRESS OF SPECIFIED INDEX.
 1098   REF  2  LAST   70        0130           SWWORD   EQUALS BUF             ADDRESS OF SWITCH WORD.
 1099   REF  3  LAST   70        0131           SWBIT    EQUALS BUF +1          SWITCH BIT WITHIN SWITCH WORD.
 1100                            0135    0135   MPTEMP   ERASE                 TEMPORARY USED IN MULTIPLY AND SHIFT.
 1101   REF  1                   0135           DMPNTEMP EQUALS MPTEMP          DMPSUB TEMPORARY
 1102                            0136    0136   DOTINC   ERASE                 COMPONENT INCREMENT FOR DOT SUBROUTINE.
 1103   REF  1                   0136           DVSIGN   EQUALS DOTINC          DETERMINES SIGN OF DDV RESULT.
 1104   REF  2  LAST   70        0136           ESCAPE   EQUALS DOTINC          USED IN ARCSIN/ARCCOS.
 1105   REF  3  LAST   70        0136           ENTRET   EQUALS DOTINC          EXIT FROM ENTER

 1106                            0137    0137   DOTRET   ERASE                 RETURN FROM DOT SUBROUTINE.
 1107   REF  1                   0137           DVNORMCT EQUALS DOTRET          DIVIDEND NORMALIZATION COUNT IN DDV.
 1108   REF  2  LAST   70        0137           ESCAPE2  EQUALS DOTRET          ALTERNATE ARCSIN/ARCCOS SWITCH.
 1109   REF  3  LAST   70        0137           WDCNT    EQUALS DOTRET          CHAR COUNTER FOR DSPWD
 1110   REF  4  LAST   70        0137           INREL    EQUALS DOTRET          INPUT BUFFER SELECTOR ( X,Y,Z, REG )

 1111                            0140    0140   MATINC   ERASE                 VECTOR INCREMENT IN MXV AND VXM.
 1112   REF  1                   0140           MAXDVSW  EQUALS MATINC          +0 IF DP QUOTIENT IS NEAR ONE - ELSE -1.
 1113   REF  2  LAST   70        0140           POLYCNT  EQUALS MATINC          POLYNOMIAL LOOP COUNTER
 1114   REF  3  LAST   70        0140           DSPMMTEM EQUALS MATINC          DSPCOUNT SAVE FOR DSPMM
 1115   REF  4  LAST   70        0140           MIXBR    EQUALS MATINC          INDICATOR FOR MIXED OR NORMAL NOUN

 1116                            0141    0141   TEM1     ERASE                 EXEC TEMP
 1117   REF  1                   0141           POLYRET  EQUALS TEM1
 1118   REF  2  LAST   70        0141           DSREL    EQUALS TEM1            REL ADDRESS FOR DSPIN

 1119                            0142    0142   TEM2     ERASE                 EXEC TEMP
 1120   REF  1                   0142           DSMAG    EQUALS TEM2            MAGNITUDE STORE FOR DSPIN
 1121   REF  2  LAST   70        0142           IDADDTEM EQUALS TEM2            MIXNOUN INDIRECT ADDRESS STORAGE

 1122                            0143    0143   TEM3     ERASE                 EXEC TEMP
 1123   REF  1                   0143           COUNT    EQUALS TEM3            FOR DSPIN

 1124                            0144    0144   TEM4     ERASE                 EXEC TEMP
 1125   REF  1                   0144           LSTPTR   EQUALS TEM4            LIST POINTER FOR GRABUSY
 1126   REF  2  LAST   70        0144           RELRET   EQUALS TEM4            RETURN FOR RELDSP
 1127   REF  3  LAST   70        0144           FREERET  EQUALS TEM4            RETURN FOR FREEDSP
 1128   REF  4  LAST   70        0144           DSPWDRET EQUALS TEM4            RETURN FOR DSPSIGN
 1129   REF  5  LAST   70        0144           SEPSCRET EQUALS TEM4            RETURN FOR SEPSEC
 1130   REF  6  LAST   70        0144           SEPMNRET EQUALS TEM4            RETURN FOR SEPMIN

 1131                            0145    0145   TEM5     ERASE                 EXEC TEMP
```

```
 1132   REF  1                  0145          NOUNADD  EQUALS TEM5          TEMP STORAGE FOR NOUN ADDRESS

 1133                           0146    0146  NNADTEM  ERASE                TEMP FOR NOUN ADDRESS TABLE ENTRY
 1134                           0147    0147  NNTYPTEM ERASE                TEMP FOR NOUN TYPE TABLE ENTRY
 1135                           0150    0150  IDAD1TEM ERASE                TEMP FOR INDIR ADRESS TABLE ENTRY(MIXNN)
A1136                                                                       MUST = IDAD2TEM-1, = IDAD3TEM-2.
 1137                           0151    0151  IDAD2TEM ERASE                TEMP FOR INDIR ADRESS TABLE ENTRY(MIXNN)
A1138                                                                       MUST = IDAD1TEM+1, = IDAD3TEM-1.
 1139                           0152    0152  IDAD3TEM ERASE                TEMP FOR INDIR ADRESS TABLE ENTRY(MIXNN)
A1140                                                                       MUST = IDAD1TEM+2, = IDAD2TEM+1.
 1141                           0153    0153  RUTMXTEM ERASE                TEMP FOR SF ROUT TABLE ENTRY(MIXNN ONLY)

R1142          AX*SR*T STORAGE.                                             (6D)

 1144   REF  3 LAST  70         0142          DEXDEX   EQUALS TEM2          B(1)TMP
 1145   REF  2 LAST  70         0143          DEX1     EQUALS TEM3          B(1)TMP
 1146   REF  7 LAST  70         0144          DEX2     EQUALS TEM4          B(1)TMP
 1147   REF  2 LAST  71         0145          RTNSAVER EQUALS TEM5          B(1)TMP
 1148   REF  1                  0133          TERM1TMP EQUALS BUF2          B(2)TMP

 1149   REF  1                  0143          DEXI     =      DEX1
```

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```
P1150           DYNAMICALLY ALLOCATED CORE SETS FOR JOBS.                    (84D)

 1152                       0154    0162   MPAC     ERASE  +6               MULTI-PURPOSE ACCUMULATOR.
 1153                       0163    0163   MODE     ERASE                   +1 FOR TP, +0 FOR DP, OR -1 FOR VECTOR.
 1154                       0164    0164   LOC      ERASE                   LOCATION ASSOCIATED WITH JOB.
 1155                       0165    0165   BANKSET  ERASE                   USUALLY CONTAINS BBANK SETTING.
 1156                       0166    0166   PUSHLOC  ERASE                   WORD OF PACKED INTERPRETIVE PARAMETERS.
 1157                       0167    0167   PRIORITY ERASE                   PRIORITY OF PRESENT JOB AND WORK AREA.

 1158                       0170    0277           ERASE  +710              SEVEN SETS OF 12 REGISTERS EACH.

R1159           SPECIAL DOWNLINK BUFFER.-OVERLAYED BY P27 STORAGE-

R1160           P27(UPDATE PROGRAM) STORAGE. -OVERLAYS SPEC DNLNK BUFF-      (24D)

 1162                       0300    0327   COMPNUMB ERASE          +23D     B(1)TMP NUMBER OF ITEMS TO BE UPLINKED.
 1163   REF   1             0301           UPOLDMOD EQUALS COMPNUMB +1      B(1)TMP HOLDS INTERRUPTED PROGRAM NUMBER
 1164   REF   1             0302           UPVERB   EQUALS UPOLDMOD +1      B(1) TMP VERB NUMBER
 1165   REF   1             0303           UPCOUNT  EQUALS UPVERB   +1      B(1)TMP UPBUFF INDEX
 1166   REF   1             0304           UPBUFF   EQUALS UPCOUNT  +1      B(20D)

R1168           MORE P27 STORAGE.                                            (2D)

 1170                       0330    0330   UPTEMP   ERASE                   B(1)TMP SCRATCH
 1171                       0331    0331   UPVERBSV ERASE                   B(1)TMP
 1172   REF   1             0330           INTWAK1Q EQUALS UPTEMP           (06D)


R1180                   (20 REGISTERS OF ENTRY DOWNLINK WILL GO HERE.)

A1181                                                   THE FOLLOWING ARE INDEXED FOR TM. IN ENTRY DAP.

 1182   REF   1             0304           CMTMTIME =      UPBUFF           B(1) (VEHICLE BODY RATE INFO IS
 1183   REF   1             0305           SW/NDX   =      CMTMTIME +1      B(1)  TELEMETERED EACH 0.2 SEC. DURING
 1184   REF   2 LAST   72   0324           ENDBUF   =      CMTMTIME +16D    B(1)  ENTRY.)

 11842  REF   1             0325           V1       =      ENDBUF   +1      I(2) REENTRY, P64-P65
 11843  REF   1             0327           A0       =      V1       +2      I(2) REENTRY, P64-P65
A11844                                                                      HI-ORDER WORD ONLY ON DNLNK.
R1185

R1186           ALIGNMENT STORAGE.                                           (5D)
R1188           (CANNOT SHARE WITH PRECISION INTEGRATION OR KEPLER STORAGE.)

 1189   REF   2 LAST   72   0300           QMAJ     EQUALS COMPNUMB         B(1)TMP
 1190   REF   1             0301           MARKINDX EQUALS QMAJ     +1      B(1)TMP
 1191   REF   1             0302           BESTI    EQUALS MARKINDX +1      I(1)TMP
 1192   REF   1             0303           BESTJ    EQUALS BESTI    +1      I(1)TMP
 1193   REF   1             0304           STARIND  EQUALS BESTJ    +1      I(1)TMP
```

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R1194 ALIGNMENT/S40.2,3 COMMON STORAGE. (18D)

```
 1196   REF   2  LAST   72      0306          XSMD     EQUALS UPBUFF   +2     I(6)TMP
 1197   REF   1                 0314          YSMD     EQUALS XSMD     +6     I(6)TMP
 1198   REF   1                 0322          ZSMD     EQUALS YSMD     +6     I(6)TMP

 1199   REF   2  LAST   73      0306          XSCREF   =      XSMD                    SPACE CRAFT AXES IN REF COORDS.
 1200   REF   2  LAST   73      0314          YSCREF   =      YSMD
 1201   REF   1                 0322          ZSCREF   =      ZSMD


 1202                           0026          ZPRIME   =      22D
 1203                           0026          PDA      =      22D
 1204                           0020          COSTH    =      16D
 1205                           0022          SINTH    =      18D
 1206                           0024          THETA    =      20D
 1207                           0040          STARM    =      32D
```

R1208 DOWNLINK STORAGE. (18)

```
 12095  REF   1                 0332          DNLSTADR EQUALS DNLSTCOD       CONTENTS NO LONGER AN ADDR BUT A CODE
 1210                           0332    0332  DNLSTCOD ERASE                 B(1)PRM ID CODE OF DOWNLIST
 1211                           0333    0333  DUMPCNT  ERASE                 B(1)PRM
 1212                           0334    0334  LDATALST ERASE                 B(1)
 1213                           0335    0335  DNTMGOTO ERASE                 B(1)
 1214                           0336    0336  TMINDEX  ERASE                 B(1)
 1215   REF   1                 0336          DUMPLOC  EQUALS TMINDEX        CONTAINS ECADR OF AGC DP WORD BEING DUMP
A1216                                                                        ED AND COUNT OF COMPLETE DUMPS ALREADY S
A1217                                                                        ENT.
 1218                           0337    0337  DNQ      ERASE                 B(1)
 1219                           0340    0353  DNTMBUFF ERASE   +11D         B(12) PRM DOWNLINK SNAPSHOT BUFFER
A1220
```

R1221 OPTICS MARKING . UNSHARED. (8D)

```
 1223                           0354    0354  MKNDX    ERASE
 1224                           0355    0356  MKT2T1   ERASE  +1
 1225                           0357    0357  MKCDUY   ERASE
 1226                           0360    0360  MKCDUS   ERASE
 1227                           0361    0361  MKCDUZ   ERASE
 1228                           0362    0362  MKCDUT   ERASE
 1229                           0363    0363  MKCDUX   ERASE
```

R1230 FOR EXCLUSIVE USE OF SYS TEST STANDARD LEAD INS (2)

```
 1232                           0364    0365  EBUF2    ERASE  +1             B(2)   UNSHARED
A1233
```

```
R1234           UNSWITCHED FOR DISPLAY INTERFACE ROUTINES.                  (10D)

 1236                       0366    0366   RESTREG  ERASE                   B(1)PRM FOR DISPLAY RESTARTS
 1237                       0367    0367   NVWORD   ERASE
 1238                       0370    0370   MARKNV   ERASE
 1239                       0371    0371   NVSAVE   ERASE
R1240                (RETAIN THE ORDER OF CADRFLSH TO FAILREG +2 FOR DOWNLINK PURPOSES)
 1242                       0372    0372   CADRFLSH ERASE                   B(1)TMP
 1243                       0373    0373   CADRMARK ERASE                   B(1)TMP
 1244                       0374    0374   TEMPFLSH ERASE                   B(1)TMP
 1245                       0375    0377   FAILREG  ERASE          +2       B(3)PRM  3 ALARM-ABORT USER'S 2CADR

 1246                       0400                   SETLOC 400
R1247           VAC AREAS.  -BE CAREFUL OF PLACEMENT-                       (220D)

 1249                       0400    0400   VAC1USE  ERASE                   B(1)PRM
 1250                       0401    0453   VAC1     ERASE  +42D             B(43)PRM
 1251                       0454    0454   VAC2USE  ERASE                   B(1)PRM
 1252                       0455    0527   VAC2     ERASE  +42D             B(43)PRM
 1253                       0530    0530   VAC3USE  ERASE                   B(1)PRM
 1254                       0531    0603   VAC3     ERASE  +42D             B(43)PRM
 1255                       0604    0604   VAC4USE  ERASE                   B(1)PRM
 1256                       0605    0657   VAC4     ERASE  +42D             B(43)PRM
 1257                       0660    0660   VAC5USE  ERASE                   B(1)PRM
 1258                       0661    0733   VAC5     ERASE  +42D             B(43)PRM

R1259           WAITLIST REPEAT FLAG.                                       (1D)

 1261                       0734    0734   RUPTAGN  ERASE                   B(1)PRM
 1262  REF  1               0734           KEYTEMP2 =      RUPTAGN

R1263           STARALIGN ERASABLES.                                        (13D)

 1265                       0735    0735   STARCODE ERASE                   B(1)DSP NOUN 70 FOR P22,51 AND P52,53.
 1266                       0736    0751   STARALGN ERASE  +11D
 1267  REF  1               0736           SINCDU   =      STARALGN
 1268  REF  2  LAST  74     0744           COSCDU   =      STARALGN +6

 1269  REF  1               0742           SINCDUX  =      SINCDU   +4
 1270  REF  2  LAST  74     0736           SINCDUY  =      SINCDU
 1271  REF  3  LAST  74     0740           SINCDUZ  =      SINCDU   +2
 1272  REF  1               0750           COSCDUX  =      COSCDU   +4
 1273  REF  2  LAST  74     0744           COSCDUY  =      COSCDU
 1274  REF  3  LAST  74     0746           COSCDUZ  =      COSCDU   +2

R1275           PHASE TABLE AND RESTART COUNTERS.                           (12D)
```

L ERASABLE ASSIGNMENTS

```
 1277                          0752    0752   -PHASE1  ERASE                  B(1)PRM
 1278                          0753    0753   PHASE1   ERASE                  B(1)PRM
 1279                          0754    0754   -PHASE2  ERASE                  B(1)PRM
 1280                          0755    0755   PHASE2   ERASE                  B(1)PRM
 1281                          0756    0756   -PHASE3  ERASE                  B(1)PRM
 1282                          0757    0757   PHASE3   ERASE                  B(1)PRM
 1283                          0760    0760   -PHASE4  ERASE                  B(1)PRM
 1284                          0761    0761   PHASE4   ERASE                  B(1)PRM
 1285                          0762    0762   -PHASE5  ERASE                  B(1)PRM
 1286                          0763    0763   PHASE5   ERASE                  B(1)PRM
 1287                          0764    0764   -PHASE6  ERASE                  B(1)PRM
 1288                          0765    0765   PHASE6   ERASE                  B(1)PRM

R1289          AX*SR*T STORAGE.                                              (6D)

 1291                          0766    0773   CDUSPOT  ERASE  +5              B(6)

 1292  REF  1                  0766           CDUSPOTY =      CDUSPOT
 1293  REF  2  LAST  75        0770           CDUSPOTZ =      CDUSPOT +2
 1294  REF  3  LAST  75        0772           CDUSPOTX =      CDUSPOT +4
```

```
R1299          VERB 37 STORAGE.                                              (2D)

 1301                          0774    0774   MINDEX   ERASE                  B(1)TMP  INDEX FOR MAJOR MODE
 1302                          0775    0775   MMNUMBER ERASE                  B(1)TMP  MAJOR MODE REQUESTED VIA V37

R1303          PINBALL INTERRUPT STORAGE.                                    (1D)

 1305                          0776    0776   DSPCNT   ERASE                  B(1)PRM DSPOUT COUNTER

R1306          PINBALL EXECUTIVE ACTION.                                     (44D)

 1308                          0777    0777   DSPCOUNT ERASE                  DISPLAY POSITION INDICATOR
 1309                          1000    1000   DECBRNCH ERASE                  +DEC, - DEC, OCT INDICATOR
 1310                          1001    1001   VERBREG  ERASE                  VERB CODE
 1311                          1002    1002   NOUNREG  ERASE                  NOUN CODE
 1312                          1003    1003   XREG     ERASE                  R1 INPUT BUFFER
 1313                          1004    1004   YREG     ERASE                  R2 INPUT BUFFER
 1314                          1005    1005   ZREG     ERASE                  R3 INPUT BUFFER
 1315                          1006    1006   XREGLP   ERASE                  LO PART OF XREG (FOR DEC CONV ONLY)
 1316                          1007    1007   YREGLP   ERASE                  LO PART OF YREG (FOR DEC CONV ONLY)
 1317  REF  1                  1007           HITEMOUT =      YREGLP         TEMP FOR DISPLAY OF HRS, MIN, SEC
A1318                                                                              MUST = LOTEMOUT-1.
 1319                          1010    1010   ZREGLP   ERASE                  LO PART OF ZREG (FOR DEC CONV ONLY)
 1320  REF  1                  1010           LOTEMOUT =      ZREGLP         TEMP FOR DISPLAY OF HRS, MIN, SEC
A1321                                                                              MUST = HITEMOUT+1.
```

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```
 1322                    1011    1011   MODREG   ERASE                 MODE CODE
 1323                    1012    1012   DSPLOCK  ERASE                 KEYBOARD/SUBROUTINE CALL INTERLOCK
 1324                    1013    1013   REQRET   ERASE                 RETURN REGISTER FOR LOAD
 1325                    1014    1014   LOADSTAT ERASE                 STATUS INDICATOR FOR LOADTST
 1326                    1015    1015   CLPASS   ERASE                 PASS INDICATOR CLEAR
 1327                    1016    1016   NOUT     ERASE                 ACTIVITY COUNTER FOR DSPTAB
 1328                    1017    1017   NOUNCADR ERASE                 MACHINE CADR FOR NOUN
 1329                    1020    1020   MONSAVE  ERASE                 N/V CODE FOR MONITOR. (= MONSAVE1-1)
 1330                    1021    1021   MONSAVE1 ERASE                 NOUNCADR FOR MONITOR(MAT&S) =MONSAVE +1
 1331                    1022    1022   MONSAVE2 ERASE                 B(1)PRM NVMONOPT OPTIONS
 1332                    1023    1036   DSPTAB   ERASE  +11D           0-10D, DISPLAY PANEL BUFF. 11D, C/S LTS.
 1333                    1037    1037   NVQTEM   ERASE                 NVSUB STORAGE FOR CALLING ADDRESS
A1334                                                                   MUST = NVBNKTEM-1
 1335                    1040    1040   NVBNKTEM ERASE                 NVSUB STORAGE FOR CALLING BANK
A1336                                                                   MUST = NVQTEM+1
 1337                    1041    1041   VERBSAVE ERASE                 NEEDED FOR RECYCLE
 1338                    1042    1042   CADRSTOR ERASE                 ENDIDLE STORAGE
 1339                    1043    1043   DSPLIST  ERASE                 WAITING REG FOR DSP SYST INTERNAL USE
 1340                    1044    1044   EXTVBACT ERASE                 EXTENDED VERB ACTIVITY INTERLOCK
 1341                    1045    1047   DSPTEM1  ERASE        +2       BUFFER STORAGE AREA 1 (MOSTLY FOR TIME)
 1342                    1050    1052   DSPTEM2  ERASE        +2       BUFFER STORAGE AREA 2 (MOSTLY FOR DEG)
 1343   REF   1          1051           DSPTEMX  EQUALS DSPTEM2 +1    B(2) S-S DISPLAY BUFFER FOR EXT. VERBS.
 1344   REF   1          1045           NORMTEM1 EQUALS DSPTEM1        B(3)DSP NORMAL DISPLAY REGISTERS.
A1345

R13451          DISPLAY FOR EXTENDED VERBS                             (2D)

 13453  REF   1          1051           OPTIONX  EQUALS DSPTEMX        B(2) EXTENDED VERB OPTION CODE  N12(V82)
A13454

R1346           TBASE S AND PHSPRDT S.                                 (12D)

 1348                    1053    1053   TBASE1   ERASE                 B(1)PRM
 1349                    1054    1054   PHSPRDT1 ERASE                 B(1)PRM
 1350                    1055    1055   TBASE2   ERASE                 B(1)PRM
 1351                    1056    1056   PHSPRDT2 ERASE                 B(1)PRM
 1352                    1057    1057   TBASE3   ERASE                 B(1)PRM
 1353                    1060    1060   PHSPRDT3 ERASE                 B(1)PRM
 1354                    1061    1061   TBASE4   ERASE                 B(1)PRM
 1355                    1062    1062   PHSPRDT4 ERASE                 B(1)PRM
 1356                    1063    1063   TBASE5   ERASE                 B(1)PRM
 1357                    1064    1064   PHSPRDT5 ERASE                 B(1)PRM
 1358                    1065    1065   TBASE6   ERASE                 B(1)PRM
 1359                    1066    1066   PHSPRDT6 ERASE                 B(1)PRM

R1360           MORE UNSWITCHED FOR DISPLAY INF                        (5D).
```

```
 1362                       1067    1067   EBANKSAV ERASE
 1363                       1070    1070   MARKEBAN ERASE
 1364                       1071    1071   EBANKTEM ERASE
 1365                       1072    1072   MARK2PAC ERASE
 1366                       1073    1073   R1SAVE   ERASE

R1367          IMU COMPENSATION UNSWITCHED ERASABLE.                    (10)

 1369                       1074    1074   1/PIPADT ERASE                   B(1)PRM
 1370  REF  1               1074           OLDBT1   =      1/PIPADT

R1371          SINGLE PRECISION SUBROUTINE TEMPORARIES.                 (30)

A1373                                                  SPSIN, SPCOS, SPROOT VARIABLES.
A1374                                                  DO NOT SHARE. THESE ARE USED BY DAPS IN INTERRUPT
A1375                                                  AND CURRENTLY ARE NOT PROTECTED. IF OTHER USERS
A1376                                                  MATERIALIZE, THEN THIS CAN BE CHANGED.

 1377                       1075    1075   HALFY    ERASE
 1378                       1076    1076   ROOTRET  ERASE
 1379                       1077    1077   SQRARG   ERASE
 1380  REF  1               1075           TEMK     EQUALS HALFY
 1381  REF  1               1076           SQ       EQUALS ROOTRET
```

L ERASABLE ASSIGNMENTS

```
P1382           UNSWITCHED FOR ORBIT INTEGRATION.                                   (21D)

 1384                                1100    1124   TDEC     ERASE  +200              I(2)
 1385   REF   1                     1102           COLREG   EQUALS TDEC     +2      I(1)
 1386   REF   1                     1103           LAT      EQUALS COLREG   +1      I(2)DSP NOUN 43,67 FOR P20,22,51 R52,53.
 1387   REF   1                     1103           LANDLAT  =      LAT                     NOUN 89    FOR P22.
 1388   REF   2 LAST   78           1105           LONG     EQUALS LAT      +2      I(2)DSP NOUN 43,67 FOR P20,22,51 R52,53.
 1389   REF   1                     1107           ALT      EQUALS LONG     +2      I(2)DSP NOUN 43    FOR P20,22,51 R52,53.
 1390   REF   1                     1111           VV       EQUALS ALT      +2      I(6)
 1391   REF   1                     1117           ZV       EQUALS VV       +6      I(6)
R1392

R1393           MARK STORAGE.                                                       (2)

 1395                                1125    1125   VHFCNT   ERASE                  B(1) PRM NO. OF VHF MARKS(P20(R22)).
 1396                                1126    1126   TRKMKCNT ERASE                  B(1) PRM NO. OF VHF MARKS (P20(R22)).

 1397   REF   1                     1126           MARKCTR  =      TRKMKCNT        B(1) MARK COUNTER USED BY R32

R1398           MISCELLANEOUS UNSWITCHED.                                           (16D)

 1400                                1127    1127   IRETURN1 ERASE                  B(1)  RET ADDR USED BY MIDTOAV1 AND 2
A1401                                                                               CALLED BY P40,P41,P42,  P61,P62
 1402                                1130    1130   RATEINDX ERASE                   (1)    USED BY KALCMANU
 1403                                1131    1131   OPTION1  ERASE                  B(1)   NOUN 06 USES THIS
 1404                                1132    1132   OPTION2  ERASE                  B(1)   NOUN 06 USES THIS
 1405                                1133    1134   LONGCADR ERASE  +1              B(2)    LONGCALL REGISTER
 1406                                1135    1136   LONGBASE ERASE  +1              B(2)    LONGCALL REGISTER
 1407                                1137    1140   LONGTIME ERASE  +1              B(2)    LONGCALL REGISTER
 1408                                1141    1144   DELAYLOC ERASE          +3
 1409                                1145    1145   NVWORD1  ERASE                  B(1)
 1410                                1146    1146   TEMPR60  ERASE                  B(1)
 1411                                1147    1147   PRIOTIME ERASE                  B(1)
 1412   REF   1                     1127           P30/RET  EQUALS IRETURN1
A14125

R14129          MISC.  INCLUDING RESTART COUNTER, GIMBAL ANGLE  SAVE  AND
R1413           STANDBY VERB ERASABLES. REDOCTR BEFORE THETAD (DWNLNK)              (16D)

 1415                                1150    1151   TIME2SAV ERASE  +1              B(2)TMP
 1416                                1152    1153   SCALSAVE ERASE  +1              B(2)TMP
 1417                                1154    1154   REDOCTR  ERASE                  B(1)PRM CONTAINS NUMBER OF RESTARTS.
 1418                                1155    1157   THETAD   ERASE  +2              B(3)PRM DESIRED GIM ANGLES FOR MANEUVER.
 1419   REF   1                     1155           CPHI     =      THETAD                  (OUTER)
 1420   REF   2 LAST   78           1156           CTHETA   =      THETAD  +1              (INNER)
 1421   REF   3 LAST   78           1157           CPSI     =      THETAD  +2              (MIDDLE)
```

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R14211          ENTRY VARIABLES SHARED FOR TM.

 14212  REF   4  LAST   78     1155          ROOTREF  =       THETAD          I(2)    P65
 14213  REF   1                1157          VREF     =       ROOTREF +2      I(2)    P65   HI-ORDER WORD ONLY DNLNK'D
 1422                          1160    1160  DESOPTT  ERASE                  B(1)DSP NOUN 92 FOR P20,22,52, R52.
 1423                          1161    1161  DESOPTS  ERASE                  B(1)DSP NOUN 92 FOR P20,22,52, R52.

 1424                          1162    1167  DELV     ERASE  +5               I(6)
 1425   REF   1                1162          DELVX    =      DELV
 1426   REF   2  LAST   79     1164          DELVY    =      DELV     +2
 1427   REF   3  LAST   79     1166          DELVZ    =      DELV     +4


R14271          P20, CONICS   (SHARING WITH TIME 2 SAV AND SCAL SAV ONLY)     (3D)

 14273  REF   1                1150          POINTEX  EQUALS TIME2SAV         I(1) POINT AXS EXIT
 14274  REF   1                1151          VHFTIME  EQUALS POINTEX  +1      I(2) DOWNLINK OF VHF RANGE TIME +1M
A14275


R1428           PERM STATE VECTORS FOR BOOST AND DOWNLINK -WHOLE MISSION-     (14D)

 1430                          1170    1175  RN       ERASE  +5               B(6)PRM
 1431                          1176    1203  VN       ERASE  +5               B(6)PRM
 1432                          1204    1205  PIPTIME  ERASE  +1               B(2)PRM (MUST BE FOLLOWED BY GDT/2)


R1433           SERVICER STORAGE.                                             (45D)

R1435           (SERVICER STORAGE AND PII STORAGE IN UNSWITHCHED SHOULD NOT
R1436           OVERLAY EACH OTHER AND THE TOTAL ERASABLE REQUIRED SHOULD NOT
R1437           EXCEED THE ERASABLE STORAGE REQUIRED BY RENDEZVOUS GUIDANCE)

 1438   REF   1                1206          GDT/2    EQUALS PIPTIME  +2      B(6)TMP (MUST FOLLOW PIPTIME)
 1439   REF   1                1214          GDBL/2   EQUALS GDT/2    +6      B(6)TMP
 1440   REF   1                1222          AVEGEXIT EQUALS GDBL/2   +6      B(2)TMP
 1441   REF   1                1222          AVGEXIT  =      AVEGEXIT
 1442   REF   2  LAST   79     1224          TEMX     EQUALS AVEGEXIT +2      B(1)TMP
 1443   REF   1                1225          TEMY     EQUALS TEMX     +1      B(1)TMP
 1444   REF   1                1226          TEMZ     EQUALS TEMY     +1      B(1)TMP
 1445   REF   1                1227          PIPCTR   EQUALS TEMZ     +1      B(1)TMP
 1446   REF   1                1230          PIPAGE   EQUALS PIPCTR   +1      B(1)TMP


 1447   REF   1                1231          RN1      EQUALS PIPAGE   +1      B(6)TMP
 1448   REF   3  LAST   35     1237          VN1      EQUALS RN1      +6      B(6)TMP
 1449   REF   1                1245          PIPTIME1 EQUALS VN1      +6      B(2)TMP
 1450   REF   1                1247          GDT1/2   EQUALS PIPTIME1 +2      B(6)TMP
 1451   REF   1                1255          GDBL1/2  EQUALS GDT1/2   +6      B(6)TMP
A1452
```

```
R1453           ENTRY STORAGE.                                          (10)

 1455   REF  1              1263        ENTRYVN  EQUALS GOBL1/2  +6     B(1)TMP VN CODE FOR ENTRY DISPLAYS P60S.
A1456

R1457           P11 STORAGE.                                            (9D)

 1459   REF  1              1263        PADLONG  EQUALS ENTRYVN         (2)PL   LONGITUDE OF LAUNCH PAD
 1460   REF  1              1265        LIFTTEMP EQUALS PADLONG  +2     (2)TMP
 1461   REF  1              1267        TEPHEM1  EQUALS LIFTTEMP +2     (3)TMP
 1462   REF  1              1272        PGNCSALT EQUALS TEPHEM1  +3     (2)PL  ALTITUDE

R1463           RENDEZVOUS NAVIGATION STORAGE.(SEE COMMENT IN SERVICER STORAGE)(58D)

 1465                       1206  1277  CSMPOS   ERASE  +57D            I(6)TMP
 1466   REF  1              1214        LEMPOS   EQUALS CSMPOS   +6     I(6)TMP
 1467   REF  1              1222        RCL      EQUALS LEMPOS   +6     I(2)TMP
 1468   REF  1              1224        MARKTIME EQUALS RCL      +2     B(2)TMP
 1469   REF  1              1226        VTEMP    EQUALS MARKTIME +2     B(6)TMP
 1470   REF  1              1234        UM       EQUALS VTEMP    +6     I(6)TMP
 1471   REF  1              1242        MARKDATA EQUALS UM       +6     B(2)TMP
 1472   REF  1              1244        USTAR    EQUALS MARKDATA +2     I(6)TMP
 1473   REF  1              1252        WIXA     EQUALS USTAR    +6     B(1)TMP
 1474   REF  1              1253        WIXB     EQUALS WIXA     +1     B(1)TMP
 1475   REF  1              1254        ZIXA     EQUALS WIXB     +1     B(1)TMP
 1476   REF  1              1255        ZIXB     EQUALS ZIXA     +1     B(1)TMP
 1477   REF  1              1256        DELTAX   EQUALS ZIXB     +1     I(18)TMP

 1478   REF  1              1256        VHFRANGE EQUALS DELTAX           (2)
 1479   REF  2 LAST  80     1272        UCL      EQUALS DELTAX   +12D    (6)     LM-CSM LINE OF SIGHT 1/2 UNIT V

R1480           **** CONICSEX (MEAS INC) ****

 1481   REF  3 LAST  80     1256        TRIPA    EQUALS DELTAX
 1482   REF  4 LAST  80     1261        TEMPVAR  EQUALS DELTAX   +3
A1483

 1484                       1300  1301  TEMPOR1  ERASE  +1               B(2)TMP

R1485           T4RUPT ERASABLE.                                        (60)

 1487                       1302  1302  DSRUPTSW ERASE
 1488                       1303  1303  OPTIND   ERASE
 1489                       1304  1304  LGYRO    ERASE
 1490                       1305  1306  COMMANDO ERASE  +1
```

```
 1491                          1307    1307   ZONE     ERASE                 B(1)PRM USED IN SHAFT STOP MONITOR
 1492  REF   1                 0035           LASTYCMD =       OPTY          DUMMY TO MAKE RR BENCH TEST ASSEMBLE
 1493  REF   2 LAST   81       0035           LASTXCMD =       OPTY          DUMMY TO MAKE RR BENCH TEST ASSEMBLE

R1494          UNSWITCHED DAP ERASABLE.                                     (4D)

 1496                          1310    1310   T6LOC    ERASE
 1497                          1311    1311   T6ADR    ERASE
 1498                          1312    1313   T5LOC    ERASE  +1

R1499          MODE SWITCHING ERASABLE.                                     (14D)

 1501                          1314    1314   SWSAMPLE ERASE                 B(1)PRM
 1502                          1315    1315   DESOPMOD ERASE                 B(1)PRM
 1503                          1316    1316   WTOPTION ERASE                 B(1)PRM
 1504                          1317    1317   ZOPTCNT  ERASE                 B(1)PRM
 1505                          1320    1320   IMODES30 ERASE                 B(1)PRM
 1506                          1321    1321   IMODES33 ERASE                 B(1)PRM
 1507                          1322    1324   MODECADR ERASE  +2             B(3)TMP
 1508  REF   1                 1322           IMUCADR  =       MODECADR
 1509  REF   2 LAST   81       1323           OPTCADR  =       MODECADR +1
 1510  REF   3 LAST   81       1324           RADCADR  =       MODECADR +2
 1511                          1325    1327   ATTCADR  ERASE  +2             B(3)PRM
 1512  REF   1                 1327           ATTPRIO  =       ATTCADR  +2
 1513                          1330    1330   MARKSTAT ERASE                 B(1)PRM
 1514                          1331    1331   OPTMODES ERASE                 B(1)PRM
A1515

R1516          RCSDAP ERASABLE.                                             (1D)

 1518                          1332    1332   HOLDFLAG ERASE                 B(1)PRM
A1519

A1520

R1524          CRS61.1 STORAGE.  -USED IN R53 (VERB 89)-                    (5D)

 1526                          1333    1335   CPHIX    ERASE  +2             B(3)DSP NOUN 96 CALCULATED BY CRS61.1
A1527

 1528                          1336    1337   TEVENT   ERASE  +1             B(2)     TIME OF EVENT FOR DOWNLIST
 1529  REF   1                 1336           TLIFTOFF =       TEVENT
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R1530           P34-P35 STORAGE                                                 (1D)

 1532                           1340    1340   NORMEX   ERASE
A1533


R1535           SELF-CHECK ASSIGNMENTS.                                         (17D)

R1537                                  (DO NOT MOVE, S-C IS ADDRESS SENSITIVE)

 1538                           1357    1377   SELFERAS ERASE  1357 - 1377     ***MUST NOT BE MOVED***
 1539   REF   1                 1357           SFAIL    EQUALS SELFERAS        B(1)
 1540   REF   1                 1360           ERESTORE EQUALS SFAIL    +1    B(1)
 1541   REF   1                 1361           SELFRET  EQUALS ERESTORE +1    B(1)    RETURN
 1542   REF   1                 1362           SMODE    EQUALS SELFRET  +1    B(1)
 1543   REF   1                 1363           ALMCADR  EQUALS SMODE    +1    B(2)     ALARM-ABORT USER'S 2CADR
 1544   REF   1                 1365           ERCOUNT  EQUALS ALMCADR  +2    B(1)
 1545   REF   1                 1366           SCOUNT   EQUALS ERCOUNT  +1    B(3)
 1546   REF   1                 1371           SKEEP1   EQUALS SCOUNT   +3    B(1)
 1547   REF   1                 1372           SKEEP2   EQUALS SKEEP1   +1    B(1)
 1548   REF   1                 1373           SKEEP3   EQUALS SKEEP2   +1    B(1)
 1549   REF   1                 1374           SKEEP4   EQUALS SKEEP3   +1    B(1)
 1550   REF   1                 1375           SKEEP5   EQUALS SKEEP4   +1    B(1)
 1551   REF   1                 1376           SKEEP6   EQUALS SKEEP5   +1    B(1)
 1552   REF   1                 1377           SKEEP7   EQUALS SKEEP6   +1    B(1)

A1553


R1554           USED BY P30 ROUTINES TO WRITE ONLY NEVER READ IN COLOSSUS

 1555   REF   1                 0000           DISPDEX  EQUALS A
R1556           ERASABLE FOR SXTMARK CDU CHECK DELAY.  -PAD LOADED-             (1D)

 1558                           1341    1341   COUCHKWD ERASE                  B(1) PL


R1558Z          R57 STORAGE. -MUST BE UNSHARED EXCEPT IN BOOST OR ENTRY-        (1D)

 15583                          1342    1342   TRUNBIAS ERASE                  B(1)PRM RESULT OF R57 CALIBR OF TRUNION
A1558Y


R1559S          KEPLER  STORAGE                                                 (6D)

 15587                          1343    1344   XMODULO  ERASE          +1      I(2) GREATER 2PI KEPLER
 15588                          1345    1346   TMODULO  ERASE          +1      I(2) GREATER 2 KEPLER
 15589                          1347    1350   EPSILONT ERASE          +1      I(2) TMP
A1559
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R1560           P37    **RETURN TO EARTH  (PAD LOAD) ****                    (2D)

 1561                   1351    1352   RTED1    ERASE          +1     I(2)PL VGAMMA POLY COEF                B-3

R1562           P40    ***STEERING ROUTINE*** PAD LOAD                       (1D)

 1564                   1353    1353   DVTHRESH ERASE                 I(1)PL  DELTA V THRESHOLD FOR LOW THRUST
A1565                                                                         ROUTINE                        B-2

R15651          P23     ***PAD LOAD****                                      (2D)

 15653                  1354    1355   HORIZALT ERASE          +1     I(2)PL  HORIZION ALTITUDE       M  8-29

R1566           P-20        ALTERNATE LOS VARIANCE     PAD LOAD*****         (1D)

A1568                                                                                              -16
 1569                   1356    1356   ALTVAR   ERASE                 I(2)PL MILLARD. SQUARED SCALED 2

 1570  REF   2  LAST   82     1377          END-UE   EQUALS SELFERAS +16D   LAST USED UNSWITCHED ERASABLE
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P3000                   EBANK=3 ASSIGNMENTS

 3001                       E3,1400                      SETLOC 1400

R3002           WAITLIST TASK LISTS.                                        (26D)

 3004                       E3,1400  E3,1407   LST1      ERASE  +7         B(8D)PRM  DELTA T S.
 3005                       E3,1410  E3,1431   LST2      ERASE  +17D       B(18D)PRM TASK 2CADR ADDRESSES.

R3006           RESTART STORAGE.                                            (2D)

 3008                       E3,1432  E3,1433   RSBBQ     ERASE  +1         B(2)PRM SAVE BB AND Q FOR RESTARTS.

R3009           MORE LONGCALL STORAGE. (MUST BE IN LST1 S BANK).            (2D)

 3011                       E3,1434  E3,1435   LONGEXIT  ERASE  +1         B(2)TMP MAY BE SELDOM OVERLAYED.

R3012           PHASE-CHANGE LISTS PART II.                                 (12D)

 3014                       E3,1436  E3,1436   PHSNAME1  ERASE             B(1)PRM
 3015                       E3,1437  E3,1437   PHSBB1    ERASE             B(1)PRM
 3016                       E3,1440  E3,1440   PHSNAME2  ERASE             B(1)PRM
 3017                       E3,1441  E3,1441   PHSBB2    ERASE             B(1)PRM
 3018                       E3,1442  E3,1442   PHSNAME3  ERASE             B(1)PRM
 3019                       E3,1443  E3,1443   PHSBB3    ERASE             B(1)PRM
 3020                       E3,1444  E3,1444   PHSNAME4  ERASE             B(1)PRM
 3021                       E3,1445  E3,1445   PHSBB4    ERASE             B(1)PRM
 3022                       E3,1446  E3,1446   PHSNAME5  ERASE             B(1)PRM
 3023                       E3,1447  E3,1447   PHSBB5    ERASE             B(1)PRM
 3024                       E3,1450  E3,1450   PHSNAME6  ERASE             B(1)PRM
 3025                       E3,1451  E3,1451   PHSBB6    ERASE             B(1)PRM

R3026           IMU COMPENSATION PARAMETERS.                                (22D)

 3028                       E3,1452  E3,1452   PBIASX    ERASE             B(1)  PIPA BIAS, PIPA SCALE FACTR TERMS
 3029   REF   1             E3,1452            PIPABIAS  =      PBIASX          INTERMIXED.
 3030                       E3,1453  E3,1453   PIPASCFX  ERASE
 3031   REF   1             E3,1453            PIPASCF   =      PIPASCFX
 3032                       E3,1454  E3,1454   PBIASY    ERASE
 3033                       E3,1455  E3,1455   PIPASCFY  ERASE
 3034                       E3,1456  E3,1456   PBIASZ    ERASE
 3035                       E3,1457  E3,1457   PIPASCFZ  ERASE

 3036                       E3,1460  E3,1460   NBDX      ERASE             GYRO BIAS DRIFTS
 3037   REF   1             E3,1460            GBIASX    =      NBDX
 3038                       E3,1461  E3,1461   NBDY      ERASE
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 3039                       E3,1462  E3,1462   NBDZ     ERASE

 3040                       E3,1463  E3,1463   ADIAX    ERASE          ACCELERATION SENSITIVE DRIFT ALONG THE
 3041                       E3,1464  E3,1464   ADIAY    ERASE              INPUT AXIS
 3042                       E3,1465  E3,1465   ADIAZ    ERASE

 3043                       E3,1466  E3,1466   ADSRAX   ERASE          ACCELERATION SENSITIVE DRIFT ALONG THE
 3044                       E3,1467  E3,1467   ADSRAY   ERASE              SPIN REFERENCE AXIS
 3045                       E3,1470  E3,1470   ADSRAZ   ERASE

 3046                       E3,1471  E3,1476   GCOMP    ERASE  +5       CONTAINS COMPENSATING TORQUES

 3047                       E3,1477  E3,1477   GCOMPSW  ERASE
 3048  REF   1              E3,1471            COMMAND  EQUALS GCOMP
 3049  REF   2  LAST   85   E3,1474            CDUIND   EQUALS GCOMP   +3


R3050          STATE VECTORS FOR ORBIT INTEGRATION.                    (44D)

R3052                              (DIFEQCNT THRU XKEP MUST BE IN SAME
R3053                                EBANK AS RRECTCSM, RRECTLEM ETC
R3054                                BECAUSE THE COPY-CYCLES (ATOPCSM,
R3055                                PTOACSM ETC) ARE EXECUTED IN BASIC.
R3056                                 ALL OTHER REFERENCES TO THIS GROUP
R3057                               ARE BY INTERPRETIVE INSTRUCTIONS.)

 3058                     E3,1500  E3,1553   DIFEQCNT ERASE  +430       B(1)TMP
R3059                               (UPSVFLAG...XKEP MUST BE KEPT IN ORDER)

 3060  REF   1              E3,1501          UPSVFLAG EQUALS DIFEQCNT +1   B(1)PRM UPDATE FLAG
 3061  REF   1              E3,1502          RRECT    EQUALS UPSVFLAG +1   B(6)TMP POS AT RECT              KM*2(-14)
 3062  REF   1              E3,1510          VRECT    EQUALS RRECT    +6   B(6)TMP VEL AT RECT          KM(-1/2)*2(6)
 3063  REF   1              E3,1516          TET      EQUALS VRECT    +6   B(2)TMP TIME OF STATE VECT  CSECS*2(-28)
 3064  REF   1              E3,1520          TDELTAV  EQUALS TET      +2   B(6)TMP POSITION DEVIATION      KM*2(14)
 3065  REF   1              E3,1526          TNUV     EQUALS TDELTAV  +6   B(6)TMP VEL DEVIATION      KM(-1/2)*2(14)
 3066  REF   1              E3,1534          RCV      EQUALS TNUV     +6   B(6)TMP CONIC POSITION          KM*2(-14)
 3068  REF   1              E3,1542          VCV      EQUALS RCV      +6   B(6)TMP CONIC VELOCITY      KM(-1/2)*2(6)
 3070  REF   1              E3,1550          TC       EQUALS VCV      +6   B(2)TMP TIME SINCE RECTIFICATION
 3071  REF   1              E3,1552          XKEP     EQUALS TC       +2   B(2)TMP ROOT OF KEPLER EQ KM(1/2.*2(-10)

R3072          **** TEMP - IN VAC AREA ****
 3073                          0022          RRECT1   EQUALS 18D
 3074                          0030          VRECT1   EQUALS 24D
 3075                          0036          TET1     EQUALS 30D
A3076


R3077          PERMANENT STATE VECTORS AND TIMES.                      (101D)

R3079          (DO NOT OVERLAY WITH ANYTHING AFTER BOOST)
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R3080           (RRECTCSM ...XKEPCSM MUST BE KEPT IN THIS ORDER)

 3081                       E3,1554  E3,1561  RRECTCSM ERASE  +5            B(6)PRM CSM VARIABLES.
 3082  REF   1              E3,1554           RRECTHIS =      RRECTCSM
 3083                       E3,1562  E3,1567  VRECTCSM ERASE  +5            B(6)PRM
 3084                       E3,1570  E3,1571  TETCSM   ERASE  +1            B(2)PRM
 3085  REF   1              E3,1570           TETTHIS  =      TETCSM
 3086                       E3,1572  E3,1577  DELTACSM ERASE  +5            B(6)PRM
 3087                       E3,1600  E3,1605  NUVCSM   ERASE  +5            B(6)PRM
 3088                       E3,1606  E3,1613  RCVCSM   ERASE  +5            B(6)PRM
 3089                       E3,1614  E3,1621  VCVCSM   ERASE  +5            B(6)PRM
 3090                       E3,1622  E3,1623  TCCSM    ERASE  +1            B(2)PRM
 3091                       E3,1624  E3,1625  XKEPCSM  ERASE  +1            B(2)PRM

R3092           (RRECTLEM ...XKEPLEM MUST BE KEPT IN THIS ORDER)

 3093                       E3,1626  E3,1633  RRECTLEM ERASE  +5            B(6)PRM LEM VARIABLES
 3094  REF   1              E3,1626           RRECTOTH =      RRECTLEM
 3095                       E3,1634  E3,1641  VRECTLEM ERASE  +5            B(6)PRM
 3096                       E3,1642  E3,1643  TETLEM   ERASE  +1            B(2)PRM
 3097  REF   1              E3,1642           TETOTHER =      TETLEM
 3098                       E3,1644  E3,1651  DELTALEM ERASE  +5            B(6)PRM
 3099                       E3,1652  E3,1657  NUVLEM   ERASE  +5            B(6)PRM
 3100                       E3,1660  E3,1665  RCVLEM   ERASE  +5            B(6)PRM
 3101                       E3,1666  E3,1673  VCVLEM   ERASE  +5            B(6)PRM
 3102                       E3,1674  E3,1675  TCLEM    ERASE  +1            B(2)PRM
 3103                       E3,1676  E3,1677  XKEPLEM  ERASE  +1            B(2)PRM

 3104                       E3,1700  E3,1705  X789     ERASE  +5
 3105                       E3,1706  E3,1710  TEPHEM   ERASE        +2
 3106                       E3,1711  E3,1712  AZO      ERASE        +1
 3107                       E3,1713  E3,1720  UNITW    ERASE        +5
 3108  REF   1              E3,1713           -AYO     EQUALS UNITW          (2)
 3109  REF   2  LAST  86    E3,1715           AXO      EQUALS UNITW  +2      (2)
A31095

R3110           STATE VECTORS FOR DOWNLINK.                                 (12D)

 3112                       E3,1721  E3,1726  R-OTHER  ERASE  +5            B(6)PRM POS VECT (OTHER VECH) FOR DNLINK
 3113                       E3,1727  E3,1734  V-OTHER  ERASE  +5            B(6)PRM VEL VECT (OTHER VECH) FOR DNLINK

 3114  REF   2  LAST  86    E3,1642           T-OTHER  =      TETLEM                TIME (OTHER VECH) FOR DNLINK

R3115           REFSMMAT.                                                   (18D)

 3117                       E3,1735  E3,1756  REFSMMAT ERASE  +170           1(18D)PRM
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R3118           AVERAGEG INTEGRATOR STORAGE.                                (8D)

 3120                       E3,1757  E3,1764   UNITR    ERASE  +5
 3121                       E3,1765  E3,1766   RMAG     ERASE  +1


R3122           P40 PAD LOADS                                               (6D)

 3124                       E3,1767  E3,1770   EK1VAL   ERASE        +1     I(2)PL 1-SEC SPS IMPULSE NEWTSEC/100/B23
 31241                      E3,1771  E3,1772   EK2VAL   ERASE  +1           I(2)PL  B+23 NEWTON-SEC/E+2
 31242                      E3,1773  E3,1773   EK3VAL   ERASE               I(1)PL  B+09 NEWTONS/E+4
 3125                       E3,1774  E3,1774   FANG     ERASE               I(1)PL SPS THRUST USED BY IMPULSIVE BURN
A31251


R31255 **********LUNAR MODULE CHANGE  ***********

R31255*9 (2D)
 31256 *REF   1             E3,1776           E3J22R2M EQUALS FANG     +2
 31257 *REF   1             E3,1777           E32C31RM EQUALS E3J22R2M +1
R3126          **** CONICSEX (PLANETARY INERT. ORIEN.) ****

 3127  REF   1             E3,1706           TIMSUBO  EQUALS TEPHEM       CSEC B-42 (TRIPLE PREC)
 3128 *REF   1             E3,1777           END-E3   =      E32C31RM     LAST USED E3 ADDRESS
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P4000                   EBANK=4 ASSIGNMENTS

 4001                       E4,1400                    SETLOC 2000


R4002           P20 STORAGE.            -PAD LOADED-                        (40)

 4004                       E4,1400  E4,1400   WRENDPOS ERASE                B(1)PL                    M B-14
 4005                       E4,1401  E4,1401   WRENDVEL ERASE                B(1)PL                    M/CSECBO
 4006                       E4,1402  E4,1402   RMAX     ERASE                B(1)PL                    METERS*2(-19)
 4007                       E4,1403  E4,1403   VMAX     ERASE                B(1)PL                    M/CSEC*2(-7)


R4008           P22 STORAGE.            -PAD LOADED-                        (50)

 4010                       E4,1404  E4,1404   WORBPOS  ERASE                B(1)PL                    M B-14
 4011                       E4,1405  E4,1405   WORBVEL  ERASE                B(1)PL                    M/CSECBO
 4012                       E4,1406  E4,1406   S22WSUBL ERASE                B(1)PL                    M B-14
 40125                      E4,1407  E4,1410   RPVAR    ERASE          +1    B(2)PL


R4013           CONISEX STORAGE.        -PAD LOADED-                        (60)

 4015                       E4,1411  E4,1416   504LM    ERASE          +5    I(6)MOON LIBRATION VECTOR
A4016


R4017           ENTRY STORAGE.          -PAD LOADED-                        (20)

 4019                       E4,1417  E4,1420   EMSALT   ERASE  +1           I(2)PL


R4020           P35 CONSTANTS.          -PAD LOADED-                        (40)

 4022                       E4,1421  E4,1422   ATIGINC  ERASE  +1           B(2)PL
 4023                       E4,1423  E4,1424   PTIGINC  ERASE  +1           B(2)PL


R40341          LUNAR LANDING SIGHT DATA. -PAD LOADED-                      (60)
R40342          (USED BY INTEGRATION INITIALIZATION,LAT-LONG SUBROUTINES, P30'S)

 40343                      E4,1425  E4,1432   RLS      ERASE          +5    I(6) PL  LUNAR LANDING SIGHT VECTOR
A40345


R4035   CONISEX (LUNAR AND SOLAR EPHEM)STORAGE. -PAD LOADED-               (77D)

 4037                       E4,1433  E4,1547   TIMEMO   ERASE          +760
 4038   REF   1             E4,1436            VECOEM   EQUALS TIMEMO +3
 4039   REF   1             E4,1532            RESD     EQUALS VECOEM +60D
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 4040   REF   1                E4,1540              VESO      EQUALS RESO +6
 4041   REF   1                E4,1546              OMEGAES   EQUALS VESO +6

R4043             FULL INTEGRATION STORAGE.                                  (95D)

 4045                          E4,1550  E4,1550     PBODY     ERASE                 I(1)
 4046   REF   1                E4,1551              ALPHAV    EQUALS PBODY    +1    I(6)TMP
 4047   REF   1                E4,1557              BETAV     EQUALS ALPHAV   +6    I(6)TMP
 4048   REF   1                E4,1565              PHIV      EQUALS BETAV    +6    I(6)TMP
 4049   REF   1                E4,1573              PSIV      EQUALS PHIV     +6    I(6)TMP
 4050   REF   1                E4,1601              FV        EQUALS PSIV     +6    I(6)TMP
 4051   REF   1                E4,1607              BETAM     EQUALS FV       +6    I(6)TMP
 4052   REF   1                E4,1611              H         EQUALS BETAM    +2    I(2)TMP
 4053   REF   1                E4,1613              GMODE     EQUALS H        +2    I(1)TMP
 4054   REF   1                E4,1614              IRETURN   EQUALS GMODE    +1    I(1)TMP
 4055   REF   1                E4,1615              NORMGAM   EQUALS IRETURN  +1    I(1)TMP
 4056   REF   1                E4,1616              VECTAB    EQUALS NORMGAM  +1    I(36)TMP
 4057   REF   1                E4,1662              RPQV      EQUALS VECTAB   +36D   (6)TMP  VECTOR PRIMARY TO SECONDARY BODY
 4058   REF   1                E4,1670              ORIGEX    EQUALS RPQV     +6    B(1)TMP  QSAVE FOR COORD. SWITCH. ROUTINE
 4059   REF   1                E4,1670              KEPRTN    EQUALS ORIGEX               QSAVE FOR KEPLER
 4060   REF   2  LAST   89     E4,1671              RQVV      EQUALS ORIGEX   +1    (6)   SEC.BODY TO VEH.VETOR(USED P23)
 4061   REF   1                E4,1677              RPSV      EQUALS RQVV     +6    (6)TMP  SUN TO PRIMARY BODY VECTOR
 4062   REF   1                E4,1705              XKEPNEW   EQUALS RPSV     +6    (2)TMP  ROOT OF KEPLERS EQU FOR TIME TAU

R4064             THESE PROBABLY CAN SHARE INTEGRATION VARIABLES.             (90)

 4066   REF   2  LAST   89     E4,1624              VACX      EQUALS VECTAB   +6    I(2)TMP
 4067   REF   1                E4,1626              VACY      EQUALS VACX     +2    I(2)TMP
 4068   REF   1                E4,1630              VACZ      EQUALS VACY     +2    I(2)TMP

 4069   REF   3  LAST   89     E4,1640              ERADM     EQUALS VECTAB   +18D   I(2)TMP
 4070   REF   1                E4,1642              INCORPEX  EQUALS ERADM    +2    I(1)TMP

R4071             R31(V83) STORAGE. -SHARES WITH INTEGRATION STORAGE-          (24D)
A4074

 4075   REF   4  LAST   89     E4,1624              BASEOTP   EQUALS VECTAB   +6    I(6)   BASE POS VECTOR OTHER VEH
 4076   REF   5  LAST   89     E4,1640              BASEOTV   EQUALS VECTAB   +18D   I(6)   BASE VEL VECTOR OTHER VEH
 4077   REF   6  LAST   89     E4,1654              BASETHP   EQUALS VECTAB   +30D   I(6)   BASE POS VECTOR THIS VEH
 4078   REF   2  LAST   89     E4,1662              BASETHV   EQUALS RPQV            I(6)   BASE VEL VECTOR THIS VEH
R4081

R4082             CONIC INTEGRATION STORAGE.      -MAY NOT SHARE WITH SERVICER-  (6D)

 4085   REF   1                E4,1707              ALPHAM    EQUALS XKEPNEW  +2    I(2)TMP
 4086   REF   1                E4,1711              TAU.      EQUALS ALPHAM   +2    I(2)TMP
 4088   REF   1                E4,1713              DT/2      EQUALS TAU.     +2    I(2)TMP
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R4089           P21, R61 STORAGE                                                (2D)

 4091  REF  1           E4,1715          P21TIME  EQUALS DT/2     +2     B(2) TMP
A4092

R4093           INTEGRATION STORAGE                                             (1D)
 4095  REF  1           E4,1717          EGRESS   EQUALS P21TIME  +2     I(1)TMP SAVES RETURNS.

R4096           VERB 83 STORAGE                                                 (20D)
 4098  REF  1           E4,1720          RANGE    EQUALS EGRESS   +1     I(2)DSP NOUN 54 DISTANCE TO OPTICAL SUBJ
 4099  REF  1           E4,1722          RRATE    EQUALS RANGE    +2     I(2)DSP NOUN 54 RATE OF APPROACH
 4100  REF  1           E4,1724          RTHETA   EQUALS RRATE    +2     I(2)DSP NOUN 54
 4101  REF  1           E4,1726          RONE     EQUALS RTHETA   +2     I(6)TMP VECTOR STORAGE. (SCRATCH)
 4102  REF  1           E4,1734          VONE     EQUALS RONE     +6     I(6)TMP VECTOR STORAGE (SCRATCH)
 4103  REF  1           E4,1742          BASETIME EQUALS VONE     +6     I(2)    BASE TIME  ASSOC WITH BASE VECS
A4104

R4117           S-BAND ANTENNA GIMBAL ANGLES.  DISPLAYED BY R05 (EXT.VB.64)     (4D)
R4119                 OPERATION DURING P00 ONLY.
 4120  REF  2 LAST  90  E4,1720          RHOSB    EQUALS RANGE            B(2)DSP NOUN 51.  PITCH ANGLE
 4121  REF  1           E4,1722          GAMMASB  EQUALS RHOSB    +2     B(2)DSP NOUN 51.  YAW ANGLE

R4122           R 36 SCRATCHPAD STORAGE                                         (13D)
 4124  REF  2 LAST  90  E4,1726          RPASS36  EQUALS RONE             I (6)S-S
 4125  REF  1           E4,1734          UNP36    EQUALS RPASS36  +6      I (6)S-S
 41255 REF  1           E4,1742          OPTIONY  EQUALS UNP36    +6     I(1)TMP  VEHICLE CODE
A4126

R4127           EXTENDED VERB 82 STORAGE.                                       (6D)
 4130  REF  3 LAST  90  E4,1720          HPERMIN  EQUALS RANGE            I(2) SET TO 300KFT OR 35KFT FOR SR30.1
 4131  REF  1           E4,1722          RPADTEM  EQUALS HPERMIN  +2      I(2) PAD OR LANDING RADIUS FOR SR30.1
 4132  REF  1           E4,1724          TSTART82 EQUALS RPADTEM  +2      I(2) TEMP TIME STORAGE FOR V82.
A4133

R4134           MORE VERB 82 NOT SHARING WITH VERB 83                           (9D)
 4136  REF  2 LAST  90  E4,1742          V82FLAGS EQUALS VONE     +6       (1) FOR V 82 BITS
 4137  REF  1           E4,1743          TFF      EQUALS V82FLAGS +1      I(2)  DSP NOUN 50,44
 4138  REF  1           E4,1745          -TPER    EQUALS TFF      +2      I(2)DSP NOUN 32
 4139  REF  1           E4,1747          THETA(1) EQUALS -TPER    +2      I(2) TMP SET AT END OF V82
```

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 4140   REF   1              E4,1755          RSP-RREC EQUALS AOPTIME          DSP NOUN 50 FOR V82 DURING P00 AND P11
A41405

R4141            REENTRY CONICS                                                (6D)

 4143   REF   2  LAST   90   E4,1742          URONE    EQUALS V82FLAGS         I(6) SAVE ACTUAL FOR CALCULATIONS
A4144

R4145            V 82 DISPLAY                                                  (4D)

 4147   REF   1              E4,1751          HAPOX    EQUALS THETA(1) +2      I(2) DSP NOUN 44
 4148   REF   1              E4,1753          HPERX    EQUALS HAPOX    +2      I(2) DSP NOUN 44
A4149

R4154            P22 DISPLAY REGISTERS                                         (06D)

 4156   REF   1              E4,1755          AOPTIME  EQUALS HPERX    +2      I(2)TMP FOR SR52.1,ADVTRACK
 4157   REF   2  LAST   91   E4,1757          LANDLONG EQUALS AOPTIME  +2      I(2) DSP NOUN 89 FOR P22
 4158   REF   1              E4,1761          LANDALT  EQUALS LANDLONG +2      I(2)DSP NOUN 89 FOR P22.
R4159

R4160            S34/35.5,P34-P35 STORAGE.                                     (6D)

 4162   REF   1              E4,1763          KT       EQUALS LANDALT  +2      B(2)
 4163   REF   1              E4,1765          VERBNOUN EQUALS KT       +2      B(1)TMP
 4164   REF   1              E4,1766          QSAVED   EQUALS VERBNOUN +1      B(1)TMP HOLDS RETURN
 4165   REF   1              E4,1767          RTRN     EQUALS QSAVED   +1      B(1) RETURN
 4166   REF   1              E4,1770          SUBEXIT  EQUALS RTRN     +1      B(1) TMP
A4167                                                                          RGEXIT CANT SHARE WITH HPER,HAPO
 4168   REF   1              E4,1770          RGEXIT   EQUALS SUBEXIT          I(1)TMP Q SAVE MODE 1 AND 2 TO RTRN MAIN

R4169            P 30 DISPLAY                                                  (4D)

 4171   REF   2  LAST   91   E4,1763          HAPO     EQUALS KT               I(2) DSP NOUN 42, FOR P30.
 4172   REF   1              E4,1765          HPER     EQUALS HAPO     +2      I(2) DSP NOUN 42, FOR P30.
A4173

R4174            SOME P34 STORAGE.       (OVERLAYS P35.1 STORAGE)              (2D)

 4176   REF   3  LAST   91   E4,1763          NOMTPI   EQUALS KT               I(2)TMP NOMINAL TPI TIME FOR RECYCLE

R4177   THE FOLLOWING ARE ERASABLES USED BY THE SYSTEM TESTS. 205 USES TRANSMI  GS ARE NOT USED IN 205 NOR ARE THEY
R4179   WHILE 504 USES TRANSMI AND ALFOK .
```

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```
 4180                    E4,1400          TRANSM1  EQUALS 2000            (18) INITIALIZATION FOR IMU TESTS
 4181  REF  1            E4,1422          ALFDK    =      TRANSM1 +18D    (144) ERASABLE LOAD IN 504
R4182  END OF PERF. TEST ERASABLE IN BANK 4

R4183       *-*-* V82 *-*-*                                               (6D)

 4185  REF  1            E4,1771          VONE'    EQUALS RGEXIT   +1    I(6)TMP NORMAL VELOCITY VONE/ SQ PT MU
A4186

R4187          PAD LOAD INTEGRATION ERROR INCLUDED IN VARIANCE BY P20      (10)

 4188  REF  1            E4,1777          INTVAR   EQUALS VONE'    +6    I(1)PL  SQUARE OF EXPECTED INTEGRATION
A4189                                                                             POSITION EXTRAPOLATION ERROR.
A4190                                                                             SCALED  METERS(2) 2(15)

 4191  REF  1            E4,1777          END-E4   EQUALS INTVAR         LAST USED ERASABLE IN E4
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L ERASABLE ASSIGNMENTS

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P5000   EBANK-5 ASSIGNMENTS
 5001                       E5,1400                    SETLOC 2400

R5002            *-*-*-*-  OVERLAY 1 IN EBANK 5 -*-*-*-*

R5003            W-MATRIX STORAGE.                                          (162D)

 5005                       E5,1400          W         EQUALS 2400          B(162)

 50051                      E5,1444          9X9LOC1   EQUALS 2444
 50052                      E5,1532          9X9LOC2   EQUALS 2532

 5006   REF   1             E5,1570          EMATRIX   =      W       +120D  B(42E   USED TO CONVERT W TO  6X6
 5007   REF   2 LAST   93   E5,1642          END-W     EQUALS W       +162D  **NEXT AVAILABLE LOC AFTER W MATRIX**

R5008            AUTO-OPTICS STORAGE -R52-

R5009   DO NOT MOVE FROM E5,1554. A DELICATE BALANCE EXISTS BETWEEN THIS AND P03
 5010   REF   3 LAST   93   E5,1554          XNB1      EQUALS W       +108D  B(6D) TMP
 5011   REF   1             E5,1562          YNB1      EQUALS XNB1    +6     B(6)TMP
 5012   REF   1             E5,1570          ZNB1      EQUALS YNB1    +6     B(6)TMP
 5013   REF   1             E5,1576          SAVQR52   EQUALS ZNB1    +6     I(2)TMP

 5014   REF   1             E5,1600          PLANVEC   EQUALS SAVQR52  +2     B(6) S-S SIGHTING VECTOR IN REF. COOR.
 5015   REF   1             E5,1606          TSIGHT    EQUALS PLANVEC  +6     B(2) S-S TIME OF SIGHTING
A5016

R50165           RENDEZVOUS -P34-35                                         (26D)

 5018   REF   1             E5,1610          DVLOS     EQUALS TSIGHT   +2     I(6) S-S DELTA VELOCITY,LOS COORD-DISPLI
 5019   REF   1             E5,1610          DELTAR    EQUALS DVLOS           I(2)
 5020   REF   1             E5,1610          TINTSOI   EQUALS DELTAR          I(2) INTERCEPT TIME FOR  SOI MANEUVER
 50205  REF   2 LAST   93   E5,1612          DELTTIME  EQUALS DVLOS   +2     I(2)
 5021   REF   3 LAST   93   E5,1614          TARGTIME  EQUALS DVLOS   +4     I(2)
 5022   REF   4 LAST   93   E5,1616          UNRM      EQUALS DVLOS   +6     I(6) S-S
 5023   REF   1             E5,1624          ULOS      EQUALS UNRM    +6     I(6) S-S UNIT LINE OF SIGHT VECTOR
 5024   REF   1             E5,1632          ACTCENT   EQUALS ULOS    +6     I(2) S-S CENTRAL ANGLE BETWEEN ACTIVE
A5025                                                                           VEH AT TPI IGNITION TIME AND
A5026                                                                           TARGET VECTOR.
 5027   REF   1             E5,1634          DELVTPI   EQUALS ACTCENT  +2     I(2)    NOUN 58 FOR P34.
 5028   REF   1             E5,1636          DELVTPF   EQUALS DELVTPI  +2     I(2)    NOUN 58,59 FOR P34,35.
 5029   REF   1             E5,1640          POSTTPI   EQUALS DELVTPF  +2     I(2)    NOUN 58 FOR P34.
 5030   REF   2 LAST   93   E5,1634          TDEC2     EQUALS DELVTPI         (2)

R5031            ALIGNMENT                                                  (12D)
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 5033   REF   5  LAST   93   E5,1610          STARSAV1 EQUALS DVLOS          I(6)TMP RESTART STAR SAVE.
 5034   REF   1               E5,1616          STARSAV2 EQUALS STARSAV1 +6    I(6)TMP RESTART STAR SAVE.
 5035   REF   1               E5,1616          US       =      STARSAV2              (CISLUNAR TAG FOR STARSAV2).
A5036
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R5037 TPI SEARCH (26D)

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 5039   REF   6  LAST   94   E5,1610          IT       EQUALS DVLOS           (6)
 5040   REF   1               E5,1616          THETZERO EQUALS IT       +6    (2)
 5041   REF   1               E5,1620          TFI      EQUALS THETZERO +2    (2)
 5042   REF   1               E5,1622          DELVEE   EQUALS TFI +2         (2)
 5043   REF   1               E5,1624          HP       EQUALS DELVEE +2      (2)
 5044   REF   1               E5,1626          TFO      EQUALS HP +2          (2)
 5045   REF   1               E5,1630          HPO      EQUALS TFO +2         (2)
 5046   REF   1               E5,1632          DELVEO   EQUALS HPO +2         (2)
 5047   REF   1               E5,1634          MAGVTPI  EQUALS DELVEO   +2    I(2) TMP MAG OF DELTAVTPI OR VMID
 5048   REF   1               E5,1636          RELDELV  EQUALS MAGVTPI  +2    I(2) TMP MAG OF DELTAVTPF
 5049   REF   1               E5,1640          T3TOT4   EQUALS RELDELV  +2    I(2) DSP NOUN 39 FOR P34, 35. TPI TO TIN
A5049 1                                                                       T (CAN NOT SHARE WITH RETURN TO EARTH)
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P5050           ALIGNMENT/SYSTEST/CALCSMSC/CRS61.1 COMMON STORAGE.          (36D)
R5052           (CALCSMSC IS A SUBSET OF S41.1 AT LEAST)
R5053           (CRS61.1  IS A SUBSET OF P20)

 5054   REF  1            E5,1671          XSM     EQUALS END-W  +23D   B(6)
 5055   REF  1            E5,1677          YSM     EQUALS XSM     +6   B(6)TMP
 5056   REF  1            E5,1705          ZSM     EQUALS YSM     +6   B(6)TMP

 5057   REF  1            E5,1713          XDC     EQUALS ZSM     +6   B(6)TMP
 5058   REF  1            E5,1721          YDC     EQUALS XDC     +6   B(6)TMP
 5059   REF  1            E5,1727          ZDC     EQUALS YDC     +6   B(6)TMP

 5060   REF  2 LAST  95   E5,1713          XNB     =      XDC
 5061   REF  2 LAST  95   E5,1721          YNB     =      YDC
 5062   REF  1            E5,1727          ZNB     =      ZDC


R5063           OVERLAYS WITHIN ALIGNMENT/SYSTEST/CALCSMSC COMMON STORAGE.

 5064   REF  2 LAST  95   E5,1673          -COSB   EQUALS XSM     +2     (2)TMP
 5065   REF  1            E5,1675          SINB    EQUALS -COSB   +2     (2)TMP


R5066           ALIGNMENT/SYSTEST COMMON STORAGE.                           (18D)

 5068   REF  2 LAST  95   E5,1735          STARAD  EQUALS ZDC     +6   I(18D)TMP


R5069           ALIGNMENT/SYSTEST/AUTO OPTICS COMMON STORAGE.               (17D)

 5071   REF  1            E5,1757          OGC     EQUALS STARAD  +18D  I(2)TMP
 5072   REF  1            E5,1761          IGC     EQUALS OGC     +2    I(2)TMP
 5073   REF  1            E5,1763          MGC     EQUALS IGC     +2    I(2)TMP
 5074   REF  1            E5,1765          STAR    EQUALS MGC     +2    I(6)TMP
 5075   REF  1            E5,1773          SAC     EQUALS STAR    +6    I(2)TMP
 5076   REF  1            E5,1775          PAC     EQUALS SAC     +2    I(2)TMP
 5077   REF  1            E5,1777          QMIN    EQUALS PAC     +2    B(1)TMP
R5078

R5079           **** COLPSOS ****                                           (1D)

 5081   REF  1            E5,1735          CULTRIX EQUALS VEARTH          VEARTH, VSUN, VMOON


R5082           OVERLAYS WITHIN ALIGNMENT/SYSTEST COMMON STORAGE.           (24D)

 5084   REF  2 LAST  95   E5,1735          VEARTH  EQUALS STARAD           (6)TMP
 5085   REF  2 LAST  95   E5,1743          VSUN    EQUALS VEARTH  +6     (6)TMP
 5086   REF  1            E5,1751          VMOON   EQUALS VSUN    +6     (6)TMP
 5087   REF  1            E5,1757          SAX     EQUALS VMOON   +6     (6)TMP
```

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P5088 *-*-*-*- OVERLAY 2 IN EBANK 5 -*-*-*-*

R5089 CONIC ROUTINES STORAGE. (370)

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 5091   REF   2  LAST   95   E5,1642          DELX      EQUALS END-W          I(2)TMP
 5092   REF   1               E5,1644          DELT      EQUALS DELX     +2    I(2)TMP
 5093   REF   1               E5,1646          URRECT    EQUALS DELT     +2    I(6)TMP
 5094   REF   1               E5,1654          RCNORM    EQUALS URRECT   +6    I(2)TMP
 5095   REF   1               E3,1552          XPREV     EQUALS XKEP           I(2)TMP
 5096   REF   1               E5,1656          R1VEC     EQUALS RCNORM   +2    I(6)TMP
 5097   REF   1               E5,1664          R2VEC     EQUALS R1VEC    +6    I(6)TMP
 5098   REF   1               E5,1672          TDESIRED  EQUALS R2VEC    +6    I(2)TMP
 5099   REF   1               E5,1674          GEOMSGN   EQUALS TDESIRED +2    I(1)TMP
 5100   REF   1               E5,1675          UN        EQUALS GEOMSGN  +1    I(6)TMP
 5101   REF   1               E5,1703          VTARGTAG  EQUALS UN       +6    I(1)TMP
 5102   REF   1               E5,1704          VTARGET   EQUALS VTARGTAG +1    I(6)TMP
 5103   REF   1               E5,1712          RTNLAMB   EQUALS VTARGET  +6    I(1)TMP
 5104   REF   1               E5,1713          U2        EQUALS RTNLAMB  +1    I(6)TMP
 5105   REF   1               E5,1721          MAGVEC2   EQUALS U2       +6    I(2)TMP
 5106   REF   1               E5,1723          UR1       EQUALS MAGVEC2  +2    I(6)TMP
 5107   REF   1               E5,1731          SNTH      EQUALS UR1      +6    I(2)TMP
 5108   REF   1               E5,1733          CSTH      EQUALS SNTH     +2    I(2)TMP
 5109   REF   1               E5,1735          1-CSTH    EQUALS CSTH     +2    I(2)TMP
 5110   REF   1               E5,1737          CSTH-RHO  EQUALS 1-CSTH   +2    I(2)TMP
 5111   REF   1               E5,1741          P         EQUALS CSTH-RHO +2    I(2)TMP
 5112   REF   1               E5,1743          R1A       EQUALS P        +2    I(2)TMP
 5113   REF   2  LAST   96   E5,1656          RVEC      EQUALS R1VEC          I(6)TMP
 5114   REF   1               E5,1745          VVEC      EQUALS R1A      +2    I(6)TMP
 5115   REF   2  LAST   96   E5,1712          RTNTT     EQUALS RTNLAMB        I(1)TMP
 5116   REF   1               E5,1753          ECC       EQUALS VVEC     +6    I(2)TMP
 5117   REF   3  LAST   96   E5,1712          RTNTR     EQUALS RTNLAMB        I(1)TMP
 5118   REF   4  LAST   96   E5,1712          RTNAPSE   EQUALS RTNLAMB        I(1)TMP
 5119   REF   2  LAST   96   E5,1721          R2        EQUALS MAGVEC2        I(2)TMP
 5120   REF   1               E5,1755          RTNPRM    EQUALS ECC      +2    I(1)TMP
 5121   REF   1               E5,1756          SGNRDOT   EQUALS RTNPRM   +1    I(1)TMP
 5122   REF   1               E5,1757          RDESIRED  EQUALS SGNRDOT  +1    I(2)TMP
 5123   REF   1               E5,1761          DELDEP    EQUALS RDESIRED +2    I(2)TMP
 5124   REF   1               E5,1763          DEPREV    EQUALS DELDEP   +2    I(2)TMP
 5125   REF   2  LAST   96   E5,1761          TERRLAMB  EQUALS DELDEP         I(2)TMP
 5126   REF   1               E5,1763          TPREV     EQUALS DEPREV         I(2)TMP
A5127
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P5128           *-*-*-*-  OVERLAY 3 IN EBANK 5 -*-*-*-*

R5129           MEASUREMENT INCORPORATION STORAGE.                          (66D)
R5131           (CALLED BY P20, P22, P23)

 5132   REF  3  LAST  96   E5,1642          OMEGAM1  EQUALS END-W          I(6)TMP
 5133   REF  1             E5,1650          OMEGAM2  EQUALS OMEGAM1  +6    I(6)TMP
 5134   REF  1             E5,1656          OMEGAM3  EQUALS OMEGAM2  +6    I(6)TMP
 5135   REF  1             E5,1664          HOLDW    EQUALS OMEGAM3  +6    I(18)TMP
 5136   REF  1             E5,1706          TDPOS    EQUALS HOLDW    +18D  I(6)TMP
 5137   REF  1             E5,1714          TDVEL    EQUALS TDPOS    +6    I(6)TMP

 5138   REF  1             E5,1722          ZI       EQUALS TDVEL    +6    I(18)

R5140           P22-P23 STORAGE.                                            (8D)

 5143   REF  1             E5,1744          22SUBSCL EQUALS ZI       +18D  DE OF ABCDE LANDMARK ID NO.
 5144   REF  1             E5,1745          CXOFF    EQUALS 22SUBSCL +1    B OF ABCDE OFFSET INDICATOR
 5145   REF  1             E5,1746          BKK      EQUALS CXOFF    +1    B(1)TMP INDEX OF PRESENT MARK.
 5146   REF  1             E5,1747          BNN      EQUALS BKK      +1    B(1)TMP
 5147   REF  1             E5,1750          S22LOC   EQUALS BNN      +1    I(1)TMP MARK DATA LOC
 5148   REF  1             E5,1751          LANDMARK EQUALS S22LOC   +1    B(1)DSP NOUN 70 FOR P22,51, R52,53.
 5149   REF  1             E5,1752          HORIZON  EQUALS LANDMARK +1    B(1)DSP NOUN 70 FOR P22,51, R52,53.
 5150   REF  1             E5,1753          IDOFLMK  EQUALS HORIZON  +1    B(1)
R5151

R5152           ******P23***                                                (1D)
 5155   REF  1             E5,1754          TRUNION  EQUALS IDOFLMK  +1    B(1)
A5156
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P5157           *-*-*-*-  OVERLAY 0 IN EBANK 5 -*-*-*-*

R5158           SYSTEM TEST STORAGE.                                    (174)

 5160                       E5,1400  E5,1401   AZIMUTH  ERASE  +1
 5161                       E5,1402  E5,1403   LATITUDE ERASE  +1

 5162  REF   1                1160             TRUNA    EQUALS DESOPTT
 5163  REF   1                1161             SHAFTA   EQUALS DESOPTS

 5164                       E5,1404  E5,1411   ERVECTOR ERASE  +5
 5165                       E5,1412  E5,1412   LENGTHOT ERASE
 5166                       E5,1413  E5,1420   LOSVEC   ERASE  +5

 5167  REF   1              E5,1413            SXTOPTN  =      LOSVEC
 5168                       E5,1421  E5,1421   NDXCTR   ERASE
 5169                       E5,1422  E5,1422   PIPINDEX ERASE
 5170                       E5,1423  E5,1423   POSITON  ERASE
 5171                       E5,1424  E5,1424   QPLAC    ERASE
 5172                       E5,1425  E5,1425   QPLACE   ERASE
 5173                       E5,1426  E5,1426   QPLACES  ERASE
 5174                       E5,1427  E5,1427   RUN      ERASE
 5175                       E5,1430  E5,1430   STOREPL  ERASE
 5176                       E5,1431  E5,1431   SOUTHDR  ERASE
 5177  REF   1              E5,1431            TARG1/2  =      SOUTHDR
 5178                       E5,1432  E5,1437   TAZEL1   ERASE  +5
 5179                       E5,1440  E5,1441   TEMPTIME ERASE  +1
 5180                       E5,1442  E5,1443   TMARK    ERASE  +1
 5181                       E5,1444  E5,1652   GENPL    ERASE  +1340
 5182  REF   1              E5,1444            CDUTIMEI =      GENPL
 5183  REF   2  LAST  98    E5,1446            CDUTIMEF =      GENPL +2
 5184  REF   3  LAST  98    E5,1450            IMU/OPT  =      GENPL +4
 5185  REF   4  LAST  98    E5,1451            COUREADF =      GENPL +5
 5186  REF   5  LAST  98    E5,1452            COUREADI =      GENPL +6
 5187  REF   6  LAST  98    E5,1453            CDULIMIT =      GENPL +7

 5188  REF   7  LAST  98    E5,1450            TEMPADD  =      GENPL +4
 5189  REF   8  LAST  98    E5,1451            TEMP     =      GENPL +5
 5190  REF   9  LAST  98    E5,1452            NOBITS   =      GENPL +6
 5191  REF  10  LAST  98    E5,1453            CHAN     =      GENPL +7

 5192  REF  11  LAST  98    E5,1454            LOS1     =      GENPL +8D
 5193  REF  12  LAST  98    E5,1462            LOS2     =      GENPL +14D

 5194  REF  13  LAST  98    E5,1470            CALCDIR  EQUALS GENPL +20D
 5195  REF  14  LAST  98    E5,1471            CDUFLAG  EQUALS GENPL +21D
 5196  REF  15  LAST  98    E5,1472            GYTOBETO EQUALS GENPL +22D
 5197  REF  16  LAST  98    E5,1473            OPTNREG  EQUALS GENPL +23D
 5198  REF  17  LAST  98    E5,1474            SAVE     EQUALS GENPL +24D      THREE CONSEC LOC
 5199  REF  18  LAST  98    E5,1477            SFCONST1 EQUALS GENPL +27D
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5200   REF  19  LAST  98   E5,1500          TIMER    EQUALS GENPL +28D

5201   REF  20  LAST  99   E5,1502          DATAPL   EQUALS GENPL +30D
5202   REF  21  LAST  99   E5,1444          RDSP     EQUALS GENPL          FIX LATER   POSSIBLY KEEP1
5203   REF  22  LAST  99   E5,1544          MASKREG  EQUALS GENPL +64D
5204   REF  23  LAST  99   E5,1546          CDUNDX   EQUALS GENPL +66D
5205   REF  24  LAST  99   E5,1547          RESULTCT EQUALS GENPL +67D
5206   REF  25  LAST  99   E5,1552          COUNTPL  EQUALS GENPL +70D

5207   REF  26  LAST  99   E5,1553          CDUANG   EQUALS GENPL +71D
5208   REF  27  LAST  99   E5,1444          AINLA    =      GENPL          OPTIMUM CALIB. AND ALIGNMENT

5209   REF   1              E5,1444          WANGO    EQUALS AINLA
5210   REF   2  LAST  99   E5,1446          WANGI    EQUALS AINLA +2D
5211   REF   3  LAST  99   E5,1450          WANGT    EQUALS AINLA +4D
5212   REF   1              E5,1450          TORQNDX  =      WANGT
5213   REF   4  LAST  99   E5,1452          DRIFTT   EQUALS AINLA +6D
5214   REF   5  LAST  99   E5,1454          ALXIS    EQUALS AINLA +8D
5215   REF   6  LAST  99   E5,1455          CMPX1    EQUALS AINLA +9D
5216   REF   7  LAST  99   E5,1456          ALK      EQUALS AINLA +10D
5217   REF   8  LAST  99   E5,1472          VLAUNS   EQUALS AINLA +22D
5218   REF   1              E5,1460          THETAX   =      ALK +2
5219   REF   9  LAST  99   E5,1474          WPLATO   EQUALS AINLA +24D
5220   REF  10  LAST  99   E5,1500          INTY     EQUALS AINLA +28D
5221   REF   1              E5,1466          THETAN   =      THETAX +6
5222   REF  11  LAST  99   E5,1502          ANGZ     EQUALS AINLA +30D
5223   REF  12  LAST  99   E5,1504          INTZ     EQUALS AINLA +32D
5224   REF  13  LAST  99   E5,1506          ANGY     EQUALS AINLA +34D
5225   REF  14  LAST  99   E5,1510          ANGX     EQUALS AINLA +36D
5226   REF  15  LAST  99   E5,1512          DRIFTO   EQUALS AINLA +38D
5227   REF  16  LAST  99   E5,1514          DRIFTI   EQUALS AINLA +40D
5228   REF  17  LAST  99   E5,1520          VLAUN    EQUALS AINLA +44D
5229   REF   1              E5,1474          FILDELV  =      THETAN +6
5230   REF  18  LAST  99   E5,1522          ACCWD    EQUALS AINLA +46D
5231   REF   1              E5,1476          INTVEC   =      FILDELV +2
5232   REF  19  LAST  99   E5,1530          POSNV    EQUALS AINLA +52D
5233   REF  20  LAST  99   E5,1532          DPIPAY   EQUALS AINLA +54D
5234   REF  21  LAST  99   E5,1536          DPIPAZ   EQUALS AINLA +58D
5235   REF  22  LAST  99   E5,1540          ALTIM    EQUALS AINLA +60D
5236   REF  23  LAST  99   E5,1541          ALTIMS   EQUALS AINLA +61D
5237   REF  24  LAST  99   E5,1542          ALDK     EQUALS AINLA +62D
5238   REF  25  LAST  99   E5,1560          DELM     EQUALS AINLA +76D
5239   REF  26  LAST  99   E5,1570          WPLATI   EQUALS AINLA +84D
5240   REF  27  LAST  99   E5,1577          RESTARPT =      AINLA + 91D
5241   REF  28  LAST  99   E5,1631          GEOSAVED =      AINLA +117D
5242   REF  29  LAST  99   E5,1632          PREMTRXC =      AINLA +118D
5243   REF  30  LAST  99   E5,1633          LAUNCHAZ =      AINLA +119D
5244   REF  31  LAST  99   E5,1635          NEWAZMTH =      AINLA +121D
5245   REF  32  LAST  99   E5,1637          OLDAZMTH =      AINLA +123D
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L ERASABLE ASSIGNMENTS USER'S PAGE NO. 65 EO 53

P5273 *-*-*-*- OVERLAY 4 IN EBANK 5 -*-*-*-*

R5274 P32 -- P33 (26D)

5276	REF	7	LAST	94	E5,1610	UP1	EQUALS	DVLOS	I(6)
5277	REF	1			E5,1616	VPASS2	EQUALS	UP1 +6	I(6)
5278	REF	1			E5,1624	RPASS2	EQUALS	VPASS2 +6	I(6)
5279	REF	1			E5,1632	DIFFALT	EQUALS	RPASS2 +6	I(2)
5280	REF	1			E5,1634	TCDH	EQUALS	DIFFALT +2	I(2)
5281	REF	1			E5,1636	TCSI	EQUALS	TCDH +2	I(2)
5282	REF	1			E5,1640	TTPIO	EQUALS	TCSI +2	I(2)

A5283

R5284 P32,P33 STORAGE OVERLAYING 9X9 W-MATRIX LOCATIONS (26D)

5286	REF	1			E5,1444	DELVEET1	EQUALS	9X9LOC1	I(6) DELV FOR CSI
5287	REF	1			E5,1452	RACT2	EQUALS	DELVEET1 +6	I(6) POS. ACTIVE VEH. AT COH TIME
5288	REF	1			E5,1532	VACT2	EQUALS	9X9LOC2	I(6) VEL. ACTIVE VEH. AT COH TIME
5289	REF	1			E5,1540	RACT1	EQUALS	VACT2 +6	I(6) POS. ACTIVE VEH. AT CSI TIME
5290	REF	1			E5,1546	T1TOT2	EQUALS	RACT1 +6	I(2) TCDH - TCSI
5291	REF	1			E5,1777	END-E5	EQUALS	QMIN	LAST USED E5 ADDRESS

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P6000                    EBANK=6 ASSIGNMENTS
 6001                        E6,1400                    SETLOC 3000

R6002            P23   PAD LOADS***                                        (20).

 6004                        E6,1400  E6,1400   WMIDPOS  ERASE             I(1) PL  INITIAL VALUES FOR W-MATRIX IN
 6005                        E6,1401  E6,1401   WMIDVEL  ERASE             I(1) PL  CISLUNAR (P23) NAVIGATION
A6006

R6007            R22 PAD LOADS                                             ( 5D ).

 6009                        E6,1402  E6,1403   RVAR     ERASE       +1    I(2) PL  VHF RADAR
 6010                        E6,1404  E6,1406   RVARMIN  ERASE       +2    I(3) PL  VHF RADAR
A6011

R6012   ******** PAD LOADED ENTRY DAP STEERING VARIABLES ********           (3D)

 6014                        E6,1407  E6,1407   LADPAD   ERASE             I(1) PL  FOR ENTRY.HOLDS CM  NOMINAL L/D
 6015                        E6,1410  E6,1410   LODPAD   ERASE             I(1) PL  FOR ENTRY.HOLDS CM  NOMINAL LOD
 6016                        E6,1411  E6,1411   ALFAPAD  ERASE             B(1) PL  ALFA TRIM / 180
A6017

R6018   ******** PAD LOADED TVC DAP VARIABLES.**********************************(26D)

 6020                        E6,1412  E6,1412   ETDECAY  ERASE                      I(1)PL
 6021                        E6,1413  E6,1413   ESTROKER ERASE                      B(1)PL
 6022                        E6,1414  E6,1415   EKPRIME  ERASE             +1       B(2)PL
 6023                        E6,1416  E6,1420   EKTLX/I  ERASE  +2                  B(3)PL
 6024                        E6,1421  E6,1422   EREPFRAC ERASE  +1                  B(2)PL

 6025                        E6,1423  E6,1423   PACTOFF  ERASE                      B(1)PL, DSP N48 R01 = PTRIM, R02 = YTRIM
 6026                        E6,1424  E6,1424   YACTOFF  ERASE                      B(1)PL, CONSECUTIVE WITH PACTOFF

 6027                        E6,1425  E6,1425   HBN10    ERASE                      B(1)
 6028                        E6,1426  E6,1426   HBN11/2  ERASE                      B(1)
 6029                        E6,1427  E6,1427   HBN12    ERASE                      B(1)
 6030                        E6,1430  E6,1430   HBD11/2  ERASE                      B(1)
 6031                        E6,1431  E6,1431   HBD12    ERASE                      B(1)

 6032                        E6,1432  E6,1432   HBN20    ERASE                      B(1)
 6033                        E6,1433  E6,1433   HBN21/2  ERASE                      B(1)
 6034                        E6,1434  E6,1434   HBN22    ERASE                      B(1)
 6035                        E6,1435  E6,1435   HBD21/2  ERASE                      B(1)
 6036                        E6,1436  E6,1436   HBD22    ERASE                      B(1)

 6037                        E6,1437  E6,1437   HBN30    ERASE                      B(1)
 6038                        E6,1440  E6,1440   HBN31/2  ERASE                      B(1)
 6039                        E6,1441  E6,1441   HBN32    ERASE                      B(1)
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 6040                        E6,1442  E6,1442   HBD31/2  ERASE                  B(1)
 6041                        E6,1443  E6,1443   HBD32    ERASE                  B(1)

R6042  ******** EXCLUSIVE TVC DAP VARIABLES. ************************************(5D)

 6044                        E6,1444  E6,1444   V97VCNTR ERASE                  B(1)
 6045                        E6,1445  E6,1446   TEMPDAP  ERASE  +1              B(2)
 6046  REF   1               E6,1445            MRKRTMP  =      TEMPDAP              ((B(1)))
 6047                        E6,1447  E6,1447   CNTR     ERASE                  B(1)
 6048                        E6,1450  E6,1450   OGAD     ERASE                  B(1)
A6049

R6050  ******** EXCLUSIVE RCS DAP VARIABLES.  ************************************(13D)

 6052                        E6,1451  E6,1465   RWORD1   ERASE          +12D    B(1)
 6053  REF   1               E6,1452            RWORD2   EQUALS RWORD1  +1      B(1)
 6054  REF   1               E6,1453            PWORD1   EQUALS RWORD2  +1      B(1)
 6055  REF   1               E6,1454            PWORD2   EQUALS PWORD1  +1      B(1)
 6056  REF   1               E6,1455            YWORD1   EQUALS PWORD2  +1      B(1)
 6057  REF   1               E6,1456            YWORD2   EQUALS YWORD1  +1      B(1)
 6058  REF   1               E6,1457            BLAST    EQUALS YWORD2  +1      B(2)
 6059  REF   1               E6,1461            BLAST1   EQUALS BLAST   +2      B(2)
 6060  REF   1               E6,1463            BLAST2   EQUALS BLAST1  +2      B(2)
 6061  REF   1               E6,1465            TSPHASE  EQUALS BLAST2  +2      B(1)
A6062

R6063  ******** RCS/TVC DAP COMMON STORAGE.*************************************(16D)

 6065                        E6,1466  E6,1466   DAPDATR1 ERASE                  B(1)DSP NOUN 46(R1)
 6066                        E6,1467  E6,1467   DAPDATR2 ERASE                  B(1)DSP NOUN 46(R2)

 6067                        E6,1470  E6,1470   IXX      ERASE                  B(1) CONSECUTIVE WITH IAVG, IAVG/TLX FOR
 6068                        E6,1471  E6,1471   IAVG     ERASE                  B(1)                                    MASSPROP
 6069                        E6,1472  E6,1472   IAVG/TLX ERASE                  B(1)

 6070                        E6,1473  E6,1473   LEMMASS  ERASE                  B(1)DSP NOUN 47(R2)
 6071                        E6,1474  E6,1474   CSMMASS  ERASE                  B(1)DSP NOUN 47(R1)
 6072                        E6,1475  E6,1475   WEIGHT/G ERASE
 6073  REF   1               E6,1475            MASS     =      WEIGHT/G

 6074                        E6,1476  E6,1476   AK       ERASE
 6075                        E6,1477  E6,1477   AK1      ERASE
 6076                        E6,1500  E6,1500   AK2      ERASE

 6077                        E6,1501  E6,1501   RCSFLAGS ERASE                  B(1) CONSECUTIVE WITHAK2 DOWNLINK
 6078                        E6,1502  E6,1502   TSTEMP   ERASE                  B(1)
 6079                        E6,1503  E6,1503   EDRIVEX  ERASE
 6080                        E6,1504  E6,1504   EDRIVEY  ERASE
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 6081                    E6,1505  E6,1505   EDRIVEZ  ERASE

R6082           INTEMP THRU INTEMP+14D  ARE RESERVED FOR OVERLAYED TVC/RCS INTERUP TRUE TEMPORIES
 6084                    E6,1506  E6,1524   INTTEMP  ERASE          +14D    (15)

R6085           TVC/RCS THRU TVCRCS +11D RESERVED FOR DOWNLINKED VARIABLES

 6086                    E6,1525  E6,1540   TVCRCS   ERASE          +11D    (12)
A6087                                                                RCS (WBODYS,ADOTS)
A6088                                                                TVC(OMEGACS,OMEGABS)

R6089           TVC DAP TEMPORARY VARIABLES************************************

R6090           TVC DAP INTERUPT TRUE TEMPORARIES******************************

 6091   REF   1             E6,1506          PHI333   EQUALS INTTEMP          B(1)     COUNTING REGISTER
 6092   REF   1             E6,1507          PSI333   EQUALS PHI333   +1      B(1)     COUNTING REGISTER
 6093   REF   1             E6,1510          TEMP333  EQUALS PSI333   +1      B(1)     MASS TEMPORARY
 6094   REF   1             E6,1511          VARSTO   EQUALS TEMP333  +1      B(8)     BREAKPOINTS AND SLOPES
 6095   REF   1             E6,1516          VARST5   =      VARSTO   +5
 6096   REF   2  LAST  104  E6,1522          LASTMASP EQUALS VARSTO +9D       LAST VARSTO WORD

 6097   REF   1             E6,1523          TVCTMP1  EQUALS LASTMASP +1      B(1)
A6098

R6099           *******REGULAR TVC TEMPORARIES*************

R6100           TVC ZEROING LOOP STARTS HERE

 6101   REF   1             E6,1525          OMEGAC   EQUALS TVCRCS           I(6)
 6102   REF   1             E6,1525          OMEGAXC  =      OMEGAC
 6103   REF   2  LAST  104  E6,1527          OMEGAYC  =      OMEGAC   +2
 6104   REF   3  LAST  104  E6,1531          OMEGAZC  =      OMEGAC   +4

 6105   REF   2  LAST  104  E6,1533          OMEGAB   EQUALS TVCRCS   +6      B(6)
 6106   REF   1             E6,1533          OMEGAXB  =      OMEGAB
 6107   REF   2  LAST  104  E6,1535          OMEGAYB  =      OMEGAB +2
 6108   REF   3  LAST  104  E6,1537          OMEGAZB  =      OMEGAB +4

 6109   REF   4  LAST  104  E6,1541          PTMP1    EQUALS OMEGAC +12D      B(2)
 6110   REF   1             E6,1543          PTMP2    EQUALS PTMP1  +2        B(2)
 6111   REF   1             E6,1545          PTMP3    EQUALS PTMP2  +2        B(2)
 6112   REF   1             E6,1547          PTMP4    EQUALS PTMP3  +2        B(2)
 6113   REF   1             E6,1551          PTMP5    EQUALS PTMP4  +2        B(2)
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6114   REF   1          E6,1553      PTMP6    EQUALS PTMP5 +2        B(2)

6115   REF   1          E6,1555      YTMP1    EQUALS PTMP6 +2        B(2)
6116   REF   1          E6,1557      YTMP2    EQUALS YTMP1 +2        B(2)
6117   REF   1          E6,1561      YTMP3    EQUALS YTMP2 +2        B(2)
6118   REF   1          E6,1563      YTMP4    EQUALS YTMP3 +2        B(2)
6119   REF   1          E6,1565      YTMP5    EQUALS YTMP4 +2        B(2)
6120   REF   1          E6,1567      YTMP6    EQUALS YTMP5 +2        B(2)

6121   REF   1          E6,1571      ROLLFIRE EQUALS YTMP6 +2        B(1)
6122   REF   1          E6,1572      ROLLWORD EQUALS ROLLFIRE +1     B(1)
6123   REF   1          E6,1573      TEMREG   EQUALS ROLLWORD +1     B(1)

6124   REF   1          E6,1574      STROKER  EQUALS TEMREG +1       B(1)

6125   REF   1          E6,1575      PERRB    EQUALS STROKER +1      B(2)
6126   REF   1          E6,1577      YERRB    EQUALS PERRB    +2     B(2)

6127   REF   1          E6,1601      DELPBAR  EQUALS YERRB    +2     B(2)
6128   REF   1          E6,1603      DELYBAR  EQUALS DELPBAR +2      B(2)

6129   REF   1          E6,1605      PDELOFF  EQUALS DELYBAR  +2     B(2)
6130   REF   1          E6,1607      YDELOFF  EQUALS PDELOFF  +2     B(2)

R6131                 TVC ZEROING LOOP ENDS HERE

6132   REF   1          E6,1611      TTMP1    EQUALS YDELOFF +2      B(2)
6133   REF   1          E6,1613      TTMP2    EQUALS TTMP1 +2        B(2)

6134   REF   1          E6,1615      DAP1     EQUALS TTMP2 +2        B(2)
6135   REF   1          E6,1617      DAP2     EQUALS DAP1 +2         B(2)
6136   REF   1          E6,1621      DAP3     EQUALS DAP2 +2         B(2)

6137   REF   1          E6,1623      PCMD     EQUALS DAP3 +2         B(1)
6138   REF   1          E5,1624      YCMD     EQUALS PCMD     +1     B(1),  CONSECUTIVE WITH PCMD
6139   REF   1          E6,1625      T5TVCDT  EQUALS YCMD     +1     B(1)
6140   REF   1          E6,1626      MDT      EQUALS T5TVCDT  +1     I(6)
6141   REF   1          E6,1634      KPRIMEDT EQUALS MDT      +6     I(2)
6142   REF   1          E6,1636      KTLX/I   EQUALS KPRIMEDT +2     B(1)
6143   REF   1          E6,1637      TENMDOT  EQUALS KTLX/I   +1     B(1)
6144   REF   1          E6,1640      1/CONACC EQUALS TENMDOT  +1     B(1)
6145   REF   1          E6,1641      VARK     EQUALS 1/CONACC +1     B(1)
6146   REF   1          E6,1642      REPFRAC  EQUALS VARK     +1     B(1)
6147   REF   1          E6,1643      VCNTR    EQUALS REPFRAC  +1     B(1)
6148   REF   1          E6,1644      TVCPHASE EQUALS VCNTR +1        B(1)
6149   REF   1          E6,1645      PCDUYPST EQUALS TVCPHASE +1     B(1)
6150   REF   1          E6,1646      PCDUZPST EQUALS PCDUYPST +1     B(1)
6151   REF   1          E6,1647      MCDUYDOT EQUALS PCDUZPST +1     B(1)
6152   REF   1          E6,1650      MCDUZDOT EQUALS MCDUYDOT +1     B(1)
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 6153   REF   1              E6,1651          TVCEXPHS EQUALS MCDUZDOT +1     B(1)
 6154   REF   1              E6,1652          MASSTMP  EQUALS TVCEXPHS +1     B(1)     PROTECT
 6155   REF   1              E6,1653          VCNTRTMP EQUALS MASSTMP  +1     B(1)       *PROTECT***

R6156           STROKE TEST VARIABLES

R6157   (6D)
 6158   REF   1              E6,1654          STRKTIME EQUALS VCNTRTMP +1     B(1)
 6159   REF   1              E6,1655          CADDY    EQUALS STRKTIME +1     B(1)
 6160   REF   1              E6,1656          N        EQUALS CADDY    +1     B(1)
 6161   REF   1              E6,1657          BUNKER   EQUALS N        +1     B(1)
 6162   REF   1              E6,1660          REVS     EQUALS BUNKER   +1     B(1)
 6163   REF   1              E6,1661          CARD     EQUALS REVS     +1     B(1)

R6164           TVC ROLL DAP VARIABLES

R6165   (8D)
 6166   REF   1              E6,1662          OGANOW   EQUALS CARD     +1     B(1)
 6167   REF   1              E6,1663          OGAPAST  EQUALS OGANOW   +1     B(1)
 6168   REF   1              E6,1664          OGA      EQUALS OGAPAST  +1     B(1)TMP
 6169   REF   1              E6,1664          OGAERR   =      OGA              (ROLL DAP USES OGA, MEANS OGAERROR)
 6170   REF   2  LAST  106   E6,1665          DELOGART EQUALS OGA      +1     B(1)TMP
 6171   REF   1              E6,1666          SGNRT    EQUALS DELOGART +1     SIGN OF OGA RATE
 6172   REF   1              E6,1667          DELOGA   EQUALS SGNRT    +1     USED IN ROLL LOGIC
 6173   REF   1              E6,1670          I        EQUALS DELOGA   +1     USED IN ROLL LOGIC
 6174   REF   1              E6,1671          IOGARATE EQUALS I        +1     USED IN ROLL LOGIC

R6175           TVC DAP RESTART TEMPORARIES.

 6176   REF   1              E6,1672          PACTTMP  EQUALS IOGARATE +1     B(2)
 6177   REF   1              E6,1674          YACTTMP  EQUALS PACTTMP  +2     B(2)
 6178   REF   1              E6,1676          CNTRTMP  EQUALS YACTTMP  +2     B(1)
 6179   REF   1              E6,1677          STRKTTMP EQUALS CNTRTMP  +1     B(1)
 6180   REF   1              E6,1700          DELBRTMP EQUALS STRKTTMP +1     B(2)
 6181   REF   1              E6,1702          ERRBTMP  EQUALS DELBRTMP +2     B(2)
 6182   REF   1              E6,1704          CMDTMP   EQUALS ERRBTMP  +2     B(2)

 6183   REF   1              E6,1706          TMP1     EQUALS CMDTMP   +2     B(2)
 6184   REF   1              E6,1710          TMP2     EQUALS TMP1     +2     B(2)
 6185   REF   1              E6,1712          TMP3     EQUALS TMP2     +2     B(2)
 6186   REF   1              E6,1714          TMP4     EQUALS TMP3     +2     B(2)
 6187   REF   1              E6,1716          TMP5     EQUALS TMP4     +2     B(2)
 6188   REF   1              E6,1720          TMP6     EQUALS TMP5     +2     B(2)

R6189           TVC DAP FILTER COEFFICIENTS TEMPORARIES

 6190   REF   1              E6,1722          COEFFADR EQUALS TMP6 +2         B(1)
 6191   REF   1              E6,1723          NIO      EQUALS COEFFADR +1     I(15)
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R6192           OVERLAYS WITHIN TVC DAP

 6193   REF   4  LAST  104   E6,1533          OGARATE  =     OMEGAB          B(2)

 6194   REF   2  LAST  105   E6,1611          PHASETMP =     TTMP1           B(1) RESTART FOR CSM/LM V46 SWITCH-OVER
 6195   REF   2  LAST  105   E6,1613          RTRNLOC  =     TTMP2           B(1) RESTART FOR CSM/LM V46 SWITCH-OVER
 6196   REF   2  LAST  106   E6,1702          BZERO    =     ERRBTMP
 6197   REF   3  LAST  107   E6,1702          CZERO    =     ERRBTMP
 6198   REF   2  LAST  106   E6,1704          JZERO    =     CMDTMP
 6199   REF   3  LAST  107   E6,1704          YZERO    =     CMDTMP

R6200

R6201           S40.9 STORAGE.....

 6202   REF   1               E6,1742          NBRCYCLS EQUALS N10      +15D   B(1) COUNTER FOR P40,41 STEERING
 6203   REF   1               E6,1743          NBRCYCLP EQUALS NBRCYCLS +1     B(1) MAINTAIN ORDER
 6204   REF   1               E6,1744          DELVSUM  EQUALS NBRCYCLP +1     I(6)  P40,P41
 6205   REF   1               E6,1752          DELVSUMP EQUALS DELVSUM +6      I(6)  P40,P41
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P6206   ******** RCS DAP TEMPORARY VARIABLES.**************************************(950)

R6208           **RCS INTERUPT TRUE TEMPS*************************                 15D

 6210   REF   2  LAST  104   E6,1506          SPNDX     EQUALS INTTEMP          B(1)
 6211   REF   1               E6,1507          DPNDX     EQUALS SPNDX    +1      B(1)TMP
 6212   REF   1               E6,1510          KMPAC     EQUALS DPNDX    +1      B(2)TMP
 6213   REF   1               E6,1512          KMPTEMP   EQUALS KMPAC    +2      B(1)TMP

 6214   REF   1               E6,1513          XNDX1     EQUALS KMPTEMP  +1      B(1)TMP  XNDX1 THRU NYJETS ARE OVERLAYED
 6215   REF   1               E6,1514          XNDX2     EQUALS XNDX1    +1      B(1)TMP  BY OTHER DAP ERASABLES SO
 6216   REF   1               E6,1515          YNDX      EQUALS XNDX2    +1      B(1)TMP  SHOULD ALWAYS BE DEFINED IN
 6217   REF   1               E6,1516          ZNDX      EQUALS YNDX     +1      B(1)TMP  A BLOCK
 6218   REF   1               E6,1517          RINDEX    EQUALS ZNDX     +1      B(1)TMP
 6219   REF   1               E6,1520          PINDEX    EQUALS RINDEX   +1      B(1)TMP
 6220   REF   1               E6,1521          YINDEX    EQUALS PINDEX   +1      B(1)TMP
 6221   REF   1               E6,1522          NRJETS    EQUALS YINDEX   +1      B(1)TMP
 6222   REF   1               E6,1523          NPJETS    EQUALS NRJETS   +1      B(1)TMP
 6223   REF   1               E6,1524          NYJETS    EQUALS NPJETS   +1      B(1)TMP

 6224   REF   2  LAST  108   E6,1513          WTEMP     EQUALS XNDX1            B(2)TMP  WTEMP THRU DELTEMPZ OVERLAY
 6225   REF   1               E6,1515          DELTEMPX  EQUALS WTEMP    +2      B(2)TMP  XNDX1 THRU NRJETS AND EDOT THRU
 6226   REF   1               E6,1517          DELTEMPY  EQUALS DELTEMPX +2      B(2)TMP  ADBVEL
 6227   REF   1               E6,1521          DELTEMPZ  EQUALS DELTEMPY +2      B(2)TMP

 6228   REF   2  LAST  108   E6,1515          EDOT      EQUALS YNDX             B(2)TMP  EDOT THRU ADBVEL OVERLAY
 6229   REF   1               E6,1517          AERR      EQUALS EDOT     +2      B(1)TMP  YNDX THRU NPJETS AND DELTEMPX
 6230   REF   1               E6,1520          EDOTVEL   EQUALS AERR     +1      B(2)TMP   THRU DELTEMPZ
 6231   REF   1               E6,1522          AERRVEL   EQUALS EDOTVEL  +2      B(1)TMP
 6232   REF   1               E6,1523          ADBVEL    EQUALS AERRVEL  +1      B(1)TMP

R6233           *** REGULAR RCS TEMPS*****************************                 (   ).

R6235            RCS ZEROING LOOP STARTS HERE****  ** **  **  ***   *** * *      (37)

 6237   REF   3  LAST  104   E6,1525          WBODY     EQUALS TVCRCS           B(2)TMP
 6238   REF   1               E6,1527          WBODY1    EQUALS WBODY    +2      B(2)TMP
 6239   REF   2  LAST  108   E6,1531          WBODY2    EQUALS WBODY    +4      B(2)TMP
 6240   REF   1               E6,1533          ADOT      EQUALS WBODY2   +2      B(2)TMP
 6241   REF   1               E6,1535          ADOT1     EQUALS ADOT     +2      B(2)TMP
 6242   REF   1               E6,1537          ADOT2     EQUALS ADOT1    +2      B(2)TMP

 6243   REF   1               E6,1541          MERRORX   EQUALS ADOT2    +2       (2)
 6244   REF   1               E6,1543          MERRORY   EQUALS MERRORX  +2       (2)
 6245   REF   1               E6,1545          MERRORZ   EQUALS MERRORY  +2       (2)
 6246   REF   1               E6,1547          DFT       EQUALS MERRORZ +2                B(1)TMP
 6247   REF   1               E6,1550          DFT1      EQUALS DFT      +1      B(1)TMP
 6248   REF   1               E6,1551          DFT2      EQUALS DFT1     +1      B(1)TMP
 6249   REF   1               E6,1552          DRHO      EQUALS DFT2     +1      B(2)TMP
 6250   REF   1               E6,1554          DRHO1     EQUALS DRHO     +2      B(2)TMP
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L ERASABLE ASSIGNMENTS

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 6251   REF   1          E6,1556      ORHO2    EQUALS ORHO1    +2    B(2)TMP
 6252   REF   1          E6,1560      ATTSEC   EQUALS ORHO2    +2    B(1)TMP
 6253   REF   1          E6,1561      TAU      EQUALS ATTSEC   +1    B(1)TMP
 6254   REF   1          E6,1562      TAU1     EQUALS TAU      +1    B(1)TMP
 6255   REF   1          E6,1563      TAU2     EQUALS TAU1     +1    B(1)TMP
 6256   REF   1          E6,1564      BIAS     EQUALS TAU2     +1    B(1)TMP
 6257   REF   1          E6,1565      BIAS1    EQUALS BIAS     +1    B(1)TMP
 6258   REF   1          E6,1566      BIAS2    EQUALS BIAS1    +1    B(1)TMP
 6259   REF   1          E6,1567      ERRORX   EQUALS BIAS2    +1    B(1)TMP
 6260   REF   1          E6,1570      ERRORY   EQUALS ERRORX   +1    B(1)TMP
 6261   REF   1          E6,1571      ERRORZ   EQUALS ERRORY   +1    B(1)TMP
A6262

R6263                RCS ZERO LOOP ENDS HERE

R6264                    MORE RCS                                    (69D)

 6266   REF   1          E6,1572      THETADX  EQUALS ERRORZ   +1    B(1)TMP  MUST BE CONSECUTIVE WITH ERRORZ
 6267   REF   1          E6,1573      THETADY  EQUALS THETADX  +1    B(1)TMP
 6268   REF   1          E6,1574      THETADZ  EQUALS THETADY  +1    B(1)TMP

 6269   REF   1          E6,1575      DELCDUX  EQUALS THETADZ  +1    B(2)TMP
 6270   REF   1          E6,1577      DELCDUY  EQUALS DELCDUX  +2    B(2)TMP
 6271   REF   1          E6,1601      DELCDUZ  EQUALS DELCDUY  +2    B(2)TMP

 6272   REF   1          E6,1603      DCDU     EQUALS DELCDUZ  +2    B(6)TMP USED DURING P20
 6273   REF   1          E6,1611      DTHETASM EQUALS DCDU     +6    B(6)TMP STEER LOW OUTPUT.

 6274   REF   1          E6,1617      ATTKALMN EQUALS DTHETASM +6    B(1)TMP
 6275   REF   1          E6,1620      KMJ      EQUALS ATTKALMN +1    B(1)TMP
 6276   REF   1          E6,1621      KMJ1     EQUALS KMJ      +1    B(1)TMP
 6277   REF   1          E6,1622      KMJ2     EQUALS KMJ1     +1    B(1)TMP
 6278   REF   1          E6,1623      J/M      EQUALS KMJ2     +1    B(1)TMP
 6279   REF   1          E6,1624      J/M1     EQUALS J/M      +1    B(1)TMP
 6280   REF   1          E6,1625      J/M2     EQUALS J/M1     +1    B(1)TMP
 6281   REF   1          E6,1626      RACFAIL  EQUALS J/M2     +1    B(1)TMP
 6282   REF   1          E6,1627      RBDFAIL  EQUALS RACFAIL  +1    B(1)TMP
 6283   REF   1          E6,1630      ACORBD   EQUALS RBDFAIL  +1    B(1)TMP
 6284   REF   1          E6,1631      XTRANS   EQUALS ACORBD   +1    B(1)TMP
 6285   REF   1          E6,1632      CH31TEMP EQUALS XTRANS   +1    B(1)TMP
 6286   REF   1          E6,1633      CHANTEMP EQUALS CH31TEMP +1    B(1)TMP
 6287   REF   1          E6,1634      T5TIME   EQUALS CHANTEMP +1    B(1)TMP
 6288   REF   1          E6,1635      RHO      EQUALS T5TIME   +1    B(1)TMP
 6289   REF   1          E6,1636      RHO1     EQUALS RHO      +1    B(1)TMP
 6290   REF   1          E6,1637      RHO2     EQUALS RHO1     +1    B(1)TMP
 6291   REF   1          E6,1640      AMGB1    EQUALS RHO2     +1    B(1)TMP
 6292   REF   1          E6,1641      AMGB4    EQUALS AMGB1    +1    B(1)TMP
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L ERASABLE ASSIGNMENTS USER'S PAGE NO. 74 E0 S3

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6293  REF  1        E6,1642    AMGB5    EQUALS AMGB4    +1    B(1)TMP
6294  REF  1        E6,1643    AMGB7    EQUALS AMGB5    +1    B(1)TMP
6295  REF  1        E6,1644    AMGB8    EQUALS AMGB7    +1    B(1)TMP
6296  REF  1        E6,1645    CAPSI    EQUALS AMGB8    +1    B(1)TMP
6297  REF  1        E6,1646    CDUXD    EQUALS CAPSI    +1    B(2)TMP
6298  REF  1        E6,1650    CDUYD    EQUALS CDUXD    +2    B(2)TMP
6299  REF  1        E6,1652    CDUZD    EQUALS CDUYD    +2    B(2)TMP
6300  REF  1        E6,1654    SLOPE    EQUALS CDUZD    +2    B(1)TMP
6301  REF  1        E6,1655    ADB      EQUALS SLOPE    +1    B(1)TMP
6302  REF  1        E6,1656    RMANNDX  EQUALS ADB      +1    B(1)TMP
6303  REF  1        E6,1657    PMANNDX  EQUALS RMANNDX  +1    B(1)TMP
6304  REF  1        E6,1660    YMANNDX  EQUALS PMANNDX  +1    B(1)TMP  MUST BE LAST VARIABLE IN RCS
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P6305   ******** ENTRY DAP TEMPORARY VARIABLES.**********************************(69D)

R6307    ANGLE REGISTERS FOR ENTRY DAPS

 6308   REF   1              E6,1661          AOG      EQUALS BCDU             1P
 6309   REF   1              E6,1662          AIG      EQUALS AOG +1           1P
 6310   REF   1              E6,1663          AMG      EQUALS AIG +1           1P
 6311   REF   1              E6,1664          ROLL/180 EQUALS AMG      +1     1P
 6312   REF   1              E6,1665          ALFA/180 EQUALS ROLL/180 +1     1P
 6313   REF   1              E6,1666          BETA/180 EQUALS ALFA/180 +1     1P
 6314   REF   1              E6,1667          AOG/PIP  EQUALS BETA/180 +1     1P
 6315   REF   1              E6,1670          AIG/PIP  EQUALS AOG/PIP  +1     1P
 6316   REF   1              E6,1671          AMG/PIP  EQUALS AIG/PIP  +1     1P
 6317   REF   1              E6,1672          ROLL/PIP EQUALS AMG/PIP  +1     1P
 6318   REF   1              E6,1673          ALFA/PIP EQUALS ROLL/PIP +1     1P
 6319   REF   1              E6,1674          BETA/PIP EQUALS ALFA/PIP +1     1P

R6320   GYMBAL DIFFERENCES OVER INTERVAL TCDU = .1 SEC.

 6321   REF   1              E6,1675          -DELAOG  EQUALS BETA/PIP +1     1P
 6322   REF   1              E6,1676          -DELAIG  EQUALS -DELAOG +1      1P
 6323   REF   1              E6,1677          -DELAMG  EQUALS -DELAIG +1      1P

R6324   ESTIMATED BODY RATES

 6325   REF   1              E6,1700          CMDAPMOD EQUALS -DELAMG +1      1P  GOES BEFORE PREL FOR TM.

 6326   REF   1              E6,1701          PREL     EQUALS CMDAPMOD +1     1P   P TCDU/180      (ROLLDOT)
 6327   REF   1              E6,1702          QREL     EQUALS PREL +1         1P   Q TCDU/180     (PITCHDOT)
 6328   REF   1              E6,1703          RREL     EQUALS QREL +1         1P   R TCDU/180     (YAWDOT)

 6329   REF   1              E6,1704          BETADOT  EQUALS RREL     +1     1P  MUST FOLLOW RREL. BETADOT TCDU/180
 6330   REF   1              E6,1705          PHIDOT   EQUALS BETADOT  +1     1P

R6331   OLD (UNAVERAGED) BODY RATE MEASURE

 6332   REF   1              E6,1706          OLDELP   EQUALS PHIDOT   +1     1P
 6333   REF   1              E6,1707          OLDELQ   EQUALS OLDELP +1       1P
 6334   REF   1              E6,1710          OLDELR   EQUALS OLDELQ +1       1P

 6335   REF   1              E6,1711          JETAG    EQUALS OLDELR  +1      1P
 6336   REF   1              E6,1712          TUSED    EQUALS JETAG +1        1P   ELAPSED TIME SINCE NOMINAL UPDATE.
A6337

R6338            FOLLOWING 3 SP WORDS IN DOWNLINK.  ROLLTM SENT EACH 1 SEC.

 6339   REF   1              E6,1713          PAXERR1  EQUALS TUSED    +1     1P   INTEGRATED ROLL ERROR/360.
 6340   REF   1              E6,1714          ROLLTM   EQUALS PAXERR1  +1     1P   ROLL/180 FOR TM.
 6341   REF   1              E6,1715          ROLLC    EQUALS ROLLTM   +1     2P   ROLLCOM/360 FROM ENTRY (FOR TM)
A6342                                                                          >> KEEP ROLLC & ROLLHOLD ADJACENT FOR TP
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 6343   REF   1              E6,1717          ROLLHOLD EQUALS ROLLC    +2     1P FOR ATTITUDE HOLD IN CMDAPMOD = +1
A6344

R6345            ENTRY DAP QUANTITIES THAT SHARE WITH RCS DAP.

 6346   REF   2  LAST  109   E6,1603          ALFACOM  EQUALS DCDU             1P  KEEP ADJACENT TO BETACOM.  <<
 6347   REF   1              E6,1604          BETACOM  EQUALS ALFACOM +1       1P

R6348   JET LIST:    DT, JETBITS  IN THIS ORDER.

 6349   REF   1              E6,1605          TOFF     EQUALS BETACOM +1       1P   DP PAIR
 6350   REF   1              E6,1606          TBITS    EQUALS TOFF +1          1P
 6351   REF   1              E6,1607          TON2     EQUALS TBITS +1         1P   DP PAIR
 6352   REF   1              E6,1610          T2BITS   EQUALS TON2 +1          1P

R6353    MISCELLANEOUS PERMANENT ERASEABLE.

 6354   REF   1              E6,1611          OUTTAG   EQUALS T2BITS  +1       1P
 6355   REF   1              E6,1612          NUJET    EQUALS OUTTAG +1        1P
R6356      MORE  ENTRY DAP QUANTITIES THAT  DO NOT SHARE WITH RCS DAP.

 6357   REF   1              E6,1720          JETEM    EQUALS ROLLHOLD +1      2P  THIS DP USED IN RATEAVG.
 6358   REF   1              E6,1722          GAMA     EQUALS JETEM   +2       1P
 6359   REF   1              E6,1723          GAMDOT   EQUALS GAMA     +1      1P
 6360   REF   1              E6,1724          POSEXIT  EQUALS GAMDOT   +1      1P
 6361   REF   1              E6,1725          CM/GYMDT EQUALS POSEXIT  +1      1P
 6362   REF   1              E6,1726          HEADSUP  EQUALS CM/GYMDT +1      1P  DSP NOUN 61 FOR P62,63,64,67.
 6363   REF   1              E6,1727          P63FLAG  EQUALS HEADSUP  +1      1P  INTERLOCK FOR WAKEP62
A6364

A6365                                                          >> SHARE BELOW WITH RCS RUPT TEMPS (< 15D) <<<
 6366   REF   2  LAST  108   E6,1506          CALFA    EQUALS SPNOX            1P
 6367   REF   1              E6,1507          SALFA    EQUALS CALFA +1         1P

 6368   REF   1              E6,1510          SINM     EQUALS SALFA +1         1P
 6369   REF   1              E6,1511          COSM     EQUALS SINM +1          1P
 6370   REF   1              E6,1512          SINO     EQUALS COSM +1          1P
 6371   REF   1              E6,1513          COSO     EQUALS SINO +1          1P
 6372   REF   1              E6,1514          SINOCOSM EQUALS COSO +1          1P
 6373   REF   1              E6,1515          COSOCOSM EQUALS SINOCOSM +1      1P
A6374                                                          >> SHARE ABOVE WITH RCS RUPT TEMPS          <<<
A6375
R6376            THE FOLLOWING FEW REGISTERS USED ONCE EACH 2 SEC.

 6377   REF   1              E6,1613          -VT/180  EQUALS NUJET   +1      1P
 6378   REF   1              E6,1614          LCX/360  EQUALS -VT/180 +1      1P
 6379   REF   1              E6,1615          XD/360   EQUALS LCX/360 +1      1P
 6380   REF   1              E6,1616          VSQ/4API EQUALS XD/360 +1        1P
 6381   REF   1              E6,1617          JNDX     EQUALS VSQ/4API +1      1P
 6382   REF   1              E6,1620          JNDX1    EQUALS JNDX +1          1P
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 6383   REF   1              E6,1621          TON1     EQUALS JNDX1 +1        1P   DP PAIR
 6384   REF   1              E6,1622          T1BITS   EQUALS TON1     +1    1P

R6385           MISCELLANEOUS REGISTERS USED EACH UPDATE.

 6386   REF   1              E6,1623          CM/SAVE  EQUALS T1BITS   +1    1P
 6387   REF   1              E6,1624          JETEM2   EQUALS CM/SAVE +1    1P   TEMPORARY STORAGE
A6388
R6389           DAP   QUANTITIES SHARED WITH RCS DAP FOR TM & FLIGHT RECORDER.

 6390   REF   2 LAST 109     E6,1567          VDT/180  =       ERRORX         1P   (EDIT)
 6391   REF   2 LAST 109     E6,1570          -VT/180E =       ERRORY         1P   (EDIT)

 6392   REF   1              E6,1476          PAXERR   EQUALS AK             1P   ROLL ERROR FOR NEEDLES
 6393   REF   2 LAST 109     E6,1572          QAXERR   =       THETADX        1P   SINCE AK1 IS ZEROED IN ATM DAP.
 6394   REF   1              E6,1573          RAXERR   =       QAXERR   +1    1P   SINCE AK2 IS ZEROED IN TM DAP.
A6395

R6396           **** COLMANU (R60,R62) ****

 6397   REF   1              E6,1710          VECQTEMP EQUALS COFSKEW
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P6398   ******** KALCMANU VARIABLES. (71D) ************************************
 6399   REF   1              E6,1661          BCDU     EQUALS YMANNDX  +1     B(3) TMP
 6400   REF   2  LAST  111   E6,1664          KSPNDX   EQUALS BCDU +3        B(1)TMP
 6401   REF   1              E6,1665          KDPNDX   EQUALS KSPNDX   +1     B(1)TMP

 6402   REF   1              E6,1666          TMIS     EQUALS KDPNDX   +1     I(18) MUST BE IN SAME BANK AS RCS DAP
 6403   REF   1              E6,1710          COFSKEW  EQUALS TMIS     +18D   I(6)  MUST BE IN SAME BANK AS RCS DAP
 6404   REF   2  LAST  113   E6,1716          CAM      EQUALS COFSKEW  +6     I(2)  MUST BE IN SAME BANK AS RCS DAP

 6405   REF   1              E6,1720          MIS      EQUALS CAM      +2     I(18)  (THE REST MAY GO ANYWHERE)
 6406   REF   1              E6,1742          COF      EQUALS MIS      +18D   I(6)TMP
 6407   REF   1              E6,1750          SCAXIS   EQUALS COF      +6     I(6)TMP
 6408   REF   1              E6,1756          POINTVSM EQUALS SCAXIS   +6     I(6)TMP
 6409   REF   1              E6,1764          AM       EQUALS POINTVSM +6     I(2)TMP
 6410   REF   1              E6,1766          RAD      EQUALS AM       +2     I(2)TMP

R6411   FIRST-ORDER OVERLAYS IN KALCMANU

 6412   REF   2  LAST  114   E6,1666          KV1      EQUALS TMIS            I(6)TMP
 6413   REF   3  LAST  114   E6,1666          MFISYM   EQUALS TMIS            I   TMP
 6414   REF   4  LAST  114   E6,1666          TMFI     EQUALS TMIS            I   TMP
 6415   REF   5  LAST  114   E6,1666          NCDU     EQUALS TMIS            B   TMP
 6416   REF   6  LAST  114   E6,1671          NEXTIME  EQUALS TMIS     +3     B   TMP
 6417   REF   7  LAST  114   E6,1672          TTEMP    EQUALS TMIS     +4     B   TMP
 6418   REF   8  LAST  114   E6,1674          KV2      EQUALS TMIS     +6     I(6)TMP
 6419   REF   9  LAST  114   E6,1674          BIASTEMP EQUALS TMIS     +6     B   TMP
 6420   REF  10  LAST  114   E6,1702          KV3      EQUALS TMIS     +12D   I(6)TMP
 6421   REF  11  LAST  114   E6,1702          OGF      EQUALS TMIS     +12D   I   TMP

 6422   REF   3  LAST  114   E6,1710          BRATE    EQUALS COFSKEW         B   TMP
 6423   REF   2  LAST  114   E6,1716          TM       EQUALS CAM             B   TMP

R6424   SECOND-ORDER OVERLAYS IN KALCMANU

 6425   REF   1              E6,1666          P21      EQUALS KV1             I(2)TMP
 6426   REF   2  LAST  114   E6,1670          D21      EQUALS KV1      +2     I(2)TMP
 6427   REF   3  LAST  114   E6,1672          G21      EQUALS KV1      +4     I(2)TMP
A6428

R6429           SATURN BOOST STORAGE. SAVE TILL RCS DAP OPERATION.             (17D)

 6431   REF   3  LAST  114   E6,1661          POLYNUM  EQUALS BCDU            B(15) PAD LOADED
 6432   REF   1              E6,1673          POLYLOC  =      POLYNUM  +100
 6433   REF   2  LAST  114   E6,1700          SATRLRT  EQUALS POLYNUM  +15D   B(2)  PAD LOADED
A6434

R6435           MORE P11 STORAGE -PAD LOADED-                                  (2D)
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R6437           (NOTE: THIS PAD LOAD WILL NOT BE PRESERVED THROUGHOUT THE MISSION AS IT SHARES STORAGE WITH KALCMANU,
R6439            ENTRY DAP AND TVC DAP)

 6440   REF  1            E6,1702          RPSTART  EQUALS SATRLRT  +2     B(1) PITCH ROLL START TIME
 6441   REF  1            E6,1703          POLYSTOP EQUALS RPSTART  +1     B(1) POLY CUTOFF MINUS RPSTART SEC
A6442

R6443           STORAGE FOR VHHDOT AND ATTDSP

 6444   REF  1            E6,1704          BODY3    EQUALS POLYSTOP +1     B(1)OUT
 6445   REF  1            E6,1705          BODY2    EQUALS BODY3    +1     B(1)OUT
 6446   REF  1            E6,1706          BODY1    EQUALS BODY2    +1     B(1)OUT
 6447   REF  1            E6,1707          SPOLYARG EQUALS BODY1    +1     B(1)TMP  ARGUEMENT FOR POLLY

 6448   REF  1            E6,1503          OLDBODY1 =      EDRIVEX                 1 PULSE = 0.0432 DEGREES
 6449   REF  1            E6,1504          OLDBODY2 =      EDRIVEY
 6450   REF  1            E6,1505          OLDBODY3 =      EDRIVEZ

R6451           STORAGE FOR S11.1

 6452   REF  1            E6,1710          VDISP    EQUALS SPOLYARG +1     I(2)OUT   2(7)  M/CS
 6453   REF  1            E6,1712          HDISP    EQUALS VDISP    +2     I(2)OUT   2(29) M
 6454   REF  1            E6,1714          HDOTOISP EQUALS HDISP +2        I(2) OUT    2(7) M/CS
 6455   REF  1            E6,1716          BOOSTEMP EQUALS HDOTDISP +2     B(3)TEMP

R64551          P11 SATURN I/F                                             (9D)
 64553  REF  1            E6,1721          SATRATE  EQUALS BOOSTEMP +3     B(4)PL MANEUVER RATES FOR SATURN STICK
 64554  REF  1            E6,1725          SATSW    EQUALS SATRATE  +4     B(1)TEM STATUS SW FOR BOOST TAKEOVER
 64555  REF  1            E6,1726          BIASAK   EQUALS SATSW    +1     B(3)TEM STORE AKBIAS FOR BOOST TAKEOVER
 64556  REF  1            E6,1731          SATSCALE EQUALS BIASAK   +3     B(1) SCALE FACTOR FOR SATURN STEERING
R6456           P21 STORAGE.                                               (1D)

 6458   REF  1            E6,1770          GENRET   EQUALS RAD      +2     B(1)TMP

R6459           R61CSM STORAGE.                                            (1D)

 6461   REF  1            E6,1771          SAVBNK   EQUALS GENRET   +1     B(1) S-S SAVE EBANK FOR R61 SUBROUTINE

R6462           CRS61.1 STORAGE FOR AUTOPILOT BANK.                        (3D)

 6464   REF  1            E6,1772          SAVEDCDU EQUALS SAVBNK   +1     B(3) TMP
A6465

R6466           R61 STORAGE.                                               (1D)
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 6468   REF   1              E6,1775          R61CNTR  EQUALS SAVEDCDU +3      (1)TMP

R6469           ENTRY RESTART PROTECTION STORAGE. -KEEP TEMPS IN ORDER-        (12D)

 6471   REF   2  LAST  115   E6,1770          TEMPROLL EQUALS GENRET           B(1)TMP COPY CYCLE REGISTER
 6472   REF   1              E6,1771          TEMPALFA EQUALS TEMPROLL +1      B(1)TMP COPY CYCLE REGISTER
 6473   REF   1              E6,1772          TEMPBETA EQUALS TEMPALFA +1      B(1)TMP COPY CYCLE REGISTER
 6474   REF   1              E6,1773          60GENRET EQUALS TEMPBETA +1      B(1)TMP QSAVE FOR S61.1 AND ENTRY.
 6475   REF   1              E6,1774          S61DT    EQUALS 60GENRET +1      B(1)TMP VARIABLE DT FOR S61.1 RESTART.
A6476

R6477           ENTRY TM SHARING FOR ACCELERATION PROFILE.

 6478   REF   2  LAST  108   E6,1533          XPIPBUF  EQUALS ADOT             B(1) P1PA BUFFER FOR TM DURING ENTRY.
 6479   REF   1              E6,1534          YPIPBUF  EQUALS XPIPBUF  +1      B(1) P1PS FILED HERE EACH .5 SEC APPEAR
 6480   REF   1              E6,1535          ZPIPBUF  EQUALS YPIPBUF  +1      B(1) ON DOWNLIST ONCE PER SECOND DURING
 6481   REF   1              E6,1536          XOLDBUF  EQUALS ZPIPBUF  +1      B(1) ENTRY AFTER RCS DAP HAS BEEN DIS-
 6482   REF   1              E6,1537          YOLDBUF  EQUALS XOLDBUF  +1      B(1) ABLED. NEWEST PIP VALUE REPLACES
 6483   REF   1              E6,1540          ZOLDBUF  EQUALS YOLDBUF  +1      B(1) PIPBUF,WHICH IS MOVED INTO OLDBUF.
R6484

R6485           REENTRY VARIABLES SHARED WITH RCS DAP FOR TM & FLIGHT RECORDER.

 6486   REF   2  LAST  109   E6,1574          Q7       =       THETADZ         I(2)   HI-WORD ONLY ON DNLIST.

 6487   REF   3  LAST  108   E6,1525          ASPS(TM) =       WBODY           I(6) DWN
A6488                                                                  ASKEP,ASP1,ASPUP,ASPDN,ASP3,ASP3+1

R64885          P37  P40 LOADS                                                 (1)

 64887  REF   1              E6,1776          P37RANGE EQUALS R61CNTR +1       I(1)PL     *****
A6489

 6490   REF   1              E6,1777          END-E6   =       P37RANGE  +1    FIRST UNUSED ERASABLE LOCATION IN E6
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 5246   REF  33  LAST   99   E5,1641          TOLDAZMT =      AINLA +125D
 5247   REF  34  LAST  100   E5,1643          GEOCOMPS =      AINLA +127D
 5248   REF  35  LAST  100   E5,1644          ISECXT   =      AINLA +128D
 5249   REF  36  LAST  100   E5,1645          GTSWTLST =      AINLA +129D
 5250   REF  37  LAST  100   E5,1646          ERECTIME =      AINLA +130D
 5251   REF  38  LAST  100   E5,1647          ERCOMP   =      AINLA +131D
 5252   REF  39  LAST  100   E5,1655          ZERONDX  =      AINLA +137D
 5253   REF   1              E5,1655          GTSOPNDZ =      ZERONDX

R5254   THE FOLLOWING TAGS ARE USED BY THE 504 IMU CALIBRATION AND ALIGNMENT PROGRAM ONLY.

 5256   REF   2  LAST   99   E5,1460          THETAX1  EQUALS ALK      +2
 5257   REF   1              E5,1466          THETAN1  EQUALS THETAX1  +6
 5258   REF   1              E5,1474          FILDELV1 EQUALS THETAN1  +6
 5259   REF   1              E5,1476          INTVEC1  EQUALS FILDELV1 +2
 5260   REF  40  LAST  100   E5,1631          GEOSAVE1 EQUALS AINLA    +117D
 5261   REF  41  LAST  100   E5,1632          PREMTRX1 EQUALS AINLA    +118D
 5262   REF  42  LAST  100   E5,1633          LUNCHAZ1 EQUALS AINLA    +119D
 5263   REF   1              E5,1635          NEWAZ1   EQUALS LUNCHAZ1 +2
 5264   REF   2  LAST  100   E5,1637          OLDAZ1   EQUALS LUNCHAZ1 +4
 5265   REF   3  LAST  100   E5,1641          TOLDAZ1  EQUALS LUNCHAZ1 +6
 5266   REF  43  LAST  100   E5,1643          GEOCOMP1 EQUALS AINLA    +127D
 5267   REF  44  LAST  100   E5,1644          ISECXT1  EQUALS AINLA    +128D
 5268   REF  45  LAST  100   E5,1645          GTSWTLT1 EQUALS AINLA    +129D
 5269   REF  46  LAST  100   E5,1646          ERECTIM1 EQUALS AINLA    +130D
 5270   REF  47  LAST  100   E5,1647          ERCOMP1  EQUALS AINLA    +131D  I(6)
 5271   REF  48  LAST  100   E5,1655          ZERONDX1 EQUALS AINLA    +137D
 52715  REF  49  LAST  100   E5,1656          PERFDLAY EQUALS AINLA    +138D  B(2).........
R5272   END OF 504 CAL + ALIGN ERASE.
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P7000                    EBANK-7 ASSIGNMENTS

 7001                        E7,1400                     SETLOC 3400


R7002              *-*-*-*-  OVERLAY 0 IN EBANK 7 -*-*-*-*

R7003              EXTERNAL DELTA-V UPDATE.                                    (21D)

R7005              (MUST BE IN ORDER FOR UPDATE PROGRAM. ALSO ENTRY PROGRAMS PICK UP 'LAT(SPL)' WITH A VLOAD.)

 7007                        E7,1400  E7,1424   LAT(SPL) ERASE          +20D   I(2)      DSP NOUN 61 FOR P62,63,64,67
 7008   REF   1              E7,1402            LNG(SPL) EQUALS LAT(SPL) +2     I(2)DSP NOUN 61 FOR P62,63,64,67.

 7009   REF   1              E7,1404            DELVSLV  EQUALS LNG(SPL) +2     I(6)TMP DELTA VEL VECT, LOC VER COORDS
 7010   REF   1              E7,1412            TIG      EQUALS DELVSLV  +6     B(2)DSP NOUN 33 FOR X-V84(R32),P30,40.
 7011   REF   1              E7,1414            RTARG    EQUALS TIG      +2     I(6)IN  DESIRED VEHICHE RADIUS VECTOR
 7012   REF   1              E7,1422            DELLT4   EQUALS RTARG    +6     I(2)IN  TIME DIFFERENCE FOR INITVEL
 7013   REF   1              E7,1424            ECSTEER  EQUALS DELLT4   +2     I(1)PL   FOR P40 S
 7014   REF   2  LAST  117   E7,1404            DELVLVC  =      DELVSLV
 7015                        E7,1425  E7,1425   END-DELV ERASE                  *NEXT AVAIL LOC AFTER UNSHARED E7*
R7016              SERVICER STORAGE.                                           (13D)

 7018   REF   1              E7,1425            DVTOTAL  EQUALS END-DELV        B(2) DSP NOUN 40,99 FOR P30,34,35,40
 7019   REF   1              E7,1427            TGO      EQUALS DVTOTAL  +2     B(2)
 7020   REF   1              E7,1431            DVCNTR   EQUALS TGO      +2     B(1)TMP
 7021   REF   5  LAST   35   E7,1432            DELVREF  EQUALS DVCNTR   +1     I(6)TMP

 7022   REF   1              E7,1447            NOMTIG   EQUALS END-KALC        I(2) (CAN NOT SHARE WITH KALCMANU
A7023                                                                           OR DELVREF)
 7024   REF   1              E7,1451            END-SVCR EQUALS NOMTIG   +2     ***NEXT AVAILABLE AFTER SERVICER
A7025


R7026                ALIGNMENT STORAGE.                                        (25D)

 7028   REF   1              E7,1451            XSCD     EQUALS END-SVCR        I(6)TMP
 7029   REF   1              E7,1457            YSCD     EQUALS XSCD     +5     I(6)TMP
 7030   REF   1              E7,1465            ZSCD     EQUALS YSCD     +6     I(6)TMP
 7031   REF   1              E7,1473            VEL/C    EQUALS ZSCD     +6     I(6)TMP
 7032   REF   1              E7,1501            R53EXIT  EQUALS VEL/C    +6     I(1)TMP


R7033                ALIGNMENT  MARKDATA  (DOWNLNK)******                      (7D)
 7035   REF   1              E7,1502            MARK2DWN EQUALS R53EXIT  +1     (7)  USED BY ALLIGNMENT P50S
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P7036 *-*-*-*- OVERLAY 1 IN EBANK 7 -*-*-*-*

R7037 REENTRY ERASABLES (206D)

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 7039   REF   2  LAST  117   E7,1451          RTINIT   EQUALS END-SVCR        6P
 7040   REF   1               E7,1457          RTEAST   EQUALS RTINIT +6      6P
 7041   REF   1               E7,1465          RTNORM   EQUALS RTEAST +6      6P
 7042   REF   1               E7,1473          RT       EQUALS RTNORM +6      6P
 7043   REF   1               E7,1501          UNI      EQUALS RT +6          6P
 7044   REF   1               E7,1507          UNITV    EQUALS UNI +6         6P
 7045   REF   1               E7,1515          VEL      EQUALS UNITV +6       6P

 7046   REF   1               E7,1523          TIME/RTO EQUALS VEL      +6    2P  TIME OF INITIAL TARGET, RTO.
 7047   REF   1               E7,1525          -VREL    EQUALS TIME/RTO +2    6P
 7048   REF   1               E7,1533          OLDUYA   EQUALS -VREL +6       6P  USED BY CM/POSE    (ENTRY DAP)
 7049   REF   1               E7,1541          UXA/2    EQUALS OLDUYA +6      6P  USED BY CM/POSE  (ENTRY DAP)  -UVA
 7050   REF   1               E7,1541          URH      =      UXA/2                P61 DISPLAY NOUN
 7051   REF   2  LAST  118   E7,1547          UYA/2    EQUALS UXA/2 +6       6P  USED BY CM/POSE  (ENTRY DAP)   UYA
 7052   REF   1               E7,1555          UZA/2    EQUALS UYA/2 +6       6P  USED BY CM/POSE  (ENTRY DAP)   UNA
 7053   REF   1               E7,1563          UBX/2    EQUALS UZA/2 +6       6P  USED BY CM/POSE  (ENTRY DAP)
 7054   REF   1               E7,1571          UBY/2    EQUALS UBX/2 +6       6P  USED BY CM/POSE  (ENTRY DAP)
 7055   REF   1               E7,1577          UBZ/2    EQUALS UBY/2 +6       6P  USED BY CM/POSE  (ENTRY DAP)

 7056   REF   1               E7,1605          DTEAROT  EQUALS UBZ/2 +6       2P
 7057   REF   1               E7,1607          DIFF     EQUALS DTEAROT +2     2P
 7058   REF   1               E7,1611          DIFFOLD  EQUALS DIFF +2        2P
 7059   REF   1               E7,1613          FACTOR   EQUALS DIFFOLD +2     2P
 7060   REF   1               E7,1615          FACT1    EQUALS FACTOR  +2     2P
 7061   REF   1               E7,1617          FACT2    EQUALS FACT1   +2     2P
A7062                                          Q7       =      THETADZ        2P  SHARED FOR TM.   P64-P66
 7063   REF   1               E7,1621          VSQUARE  EQUALS FACT2 +2       2P
 7064   REF   1               E7,1623          LAD      EQUALS VSQUARE +2     2P
 7065   REF   1               E7,1625          LOD      EQUALS LAD     +2     2P
 7066   REF   1               E7,1627          L/DCMINR EQUALS LOD     +2     2P
 7067   REF   1               E7,1631          KLAT     EQUALS L/DCMINR +2    2P
 7068   REF   1               E7,1633          L/D      EQUALS KLAT +2        2P
 7069   REF   1               E7,1635          L/D1     EQUALS L/D +2         2P
 7070   REF   1               E7,1724          LEWD     =      VIO            2P  SHARED FOR TM.  P64-P65
 7071   REF   1               E7,1637          D        EQUALS L/D1    +2     2P  DSP NOUN 64,66,68 FOR P63,64,67
A7072                                          V1       =      ENDBUF +1      2P  SHARED FOR TM.  P64-P65
 7073   REF   1               E7,1641          DLEWD    EQUALS D       +2     2P
 7074   REF   1               E7,1643          K2ROLL   EQUALS DLEWD    +2    2 P
 7075   REF   1               E7,1645          GOTOADDR EQUALS K2ROLL +2      1P
 7076   REF   1               E7,1646          TEM1B    EQUALS GOTOADDR +1    2 P
 7077   REF   1               E7,1650          MM       EQUALS TEM1B    +2    2 P
 7078   REF   1               E7,1651          GRAD     EQUALS MM +1          1P
 7079   REF   1               E7,1652          FX       EQUALS GRAD     +1    1P  OVERWRITES NEXT 5 LOCS IN P67.
 7080   REF   1               E7,1653          LEQ      EQUALS FX +1          2P
 7081   REF   1               E7,1655          DHOOK    EQUALS LEQ +2         2P
 7082   REF   1               E7,1657          AHOOKOV  EQUALS DHOOK +2       2P
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 7083   REF   1                E7,1661          DVL      EQUALS AHOOKDV +2      2P
A7084                                          AO       =      ENDBUF +3       2P    SHARED FOR TM.(HI-WD ) P64-P65
 7085   REF   1                E7,1663          A1       EQUALS DVL      +2     2P
 7086   REF   1                E7,1665          VBARS    EQUALS A1 +2           2P
 7087   REF   1                E7,1667          COSG/2   EQUALS VBARS +2        2P
A7088                                          GAMMAL   =      GAMMAEI         2P    SHARED FOR TM  P64
 7089                             0026          GAMMAL1  =      22D             2P
 7090   REF   1                E7,1671          VS1      EQUALS COSG/2  +2      2P
 7091   REF   1                E7,1766          VL       =      VPRED           2P   SHARED FOR TM   P64-P65
 7092   REF   1                E7,1673          V        EQUALS VS1     +2      2P
A7093                                          VREF     =      THETAD   +2     2P   SHARED FOR TM    P65
 7094   REF   1                E7,1675          LATANG   EQUALS V       +2     2P   ADJACENT FOR TM.
 7095   REF   1                E7,1677          RDOT     EQUALS LATANG  +2      2P   ADJACENT FOR TM.
 7096   REF   1                E7,1701          THETAH   EQUALS RDOT    +2     2P   DSP NOUN 64,67 FOR P63,64,67
A7097                                          RDOTREF  =      THETAD          2P   SHARED FOR TM     P65
 7098   REF   1                E7,1703          ALP      EQUALS THETAH  +2      2P

 7099   REF   1                E7,1730          ASKEP    =      ASPS            2P)                THESE ARE STORED IN
 7100   REF   2  LAST  119     E7,1731          ASP1     =      ASPS    +1      2P)                SEQUENCE,OVERLAPPING
 7101   REF   3  LAST  119     E7,1732          ASPUP    =      ASPS    +2      2P)>HI-WD OF EACH<  HI-WORD ONLY APPEARS
 7102   REF   4  LAST  119     E7,1733          ASPDWN   =      ASPS    +3      2P)                ON DOWNLIST, EXCEPT
 7103   REF   5  LAST  119     E7,1734          ASP3     =      ASPS    +4      2P)                ASP3 IS COMPLETE.

 7104   REF   1                E7,1705          C/DO     EQUALS ALP     +2      2P   -1/DO
 7105   REF   1                E7,1707          DO       EQUALS C/DO    +2      I(2)    CONSTANT DRAG
 7106   REF   1                E7,1711          Q2       EQUALS DO      +2      2P
A7107
R7108                 ROLLC IS LOCATED IN EBANK= AOG TO AID ENTRY DAP.
 7109   REF   1                E7,1713          RTGO     EQUALS Q2      +2      2P   DSP NOUN 66 FOR P64,P67.
 7110   REF   1                E7,1715          DNRNGERR EQUALS RTGO    +2      2P DSP NOUN 66 FOR P64,67.
 7111   REF   2  LAST  119     E7,1675          XRNGERR  =      LATANG          FOR DISKY DISPLAY
 7112   REF   1                E7,1717          KAT      EQUALS DNRNGERR +2     2P
 7113   REF   1                E7,1721          GMAX     EQUALS KAT     +2      1P  DSP NOUN 60 FOR P61,62,63.
A7114                                                                          GMAX IS LOADED IN  DOUBLE PRECISION
 7115   REF   1                E7,1726          L/DCALC  =      TTE             2P  CALCULATED L/D FOR TM:  P64 - P67.
 7116   REF   1                E7,1770          GAMMAL   =      GAMMAEI         2P  SHARED FOR TM   P64
 7117   REF   2  LAST  119     E7,1770          PREDANG  =      GAMMAEI              FOR TM IN P67.
 7118   REF   1                E7,1771          JJ       =      PREDANG +1           FOR TM IN P67.
 7119   REF   1                E7,1722          VMAGI    EQUALS GMAX    +1      2P DSP NOUN 62,64,68 FOR P11,63,64.
 7120   REF   1                E7,1724          VIO      EQUALS VMAGI   +2      2P  DSP NOUN 63 FOR P61.
 7121   REF   2  LAST  118     E7,1726          TTE      EQUALS VIO     +2      2P  DSP NOUN 63 FOR P61.

 7122   REF   2  LAST  119     E7,1730          ASPS     EQUALS TTE      +2     I(2)     HI-WORD ONLY ON DNLIST FOR TEMP
 7123   REF   6  LAST  119     E7,1732          TTE1     EQUALS ASPS     +2     I(2ETMP HOLDS UNDECREMENTED TTE VALUE

R7124                 **** P60S ****

 7125   REF   2  LAST  119     E7,1713          RTGON64  EQUALS RTGO            RANGE ERRORS NEGATIVE IF FALLS SHORT
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 7126  REF   3  LAST  119   E7,1713          RTGON67  EQUALS RTGO              DSP NOUN 67
A7127


R7128           REENTRY, RETURN TO EARTH COMMOM DISPLAY.                       (4D)

 7130  REF   1              E7,1766          VPRED    EQUALS BETA12   +2      DSP NOUN 60 FOR P61,   ,62,63.
 7131  REF   2  LAST  119   E7,1770          GAMMAEI  EQUALS VPRED    +2      DSP NOUN 60 FOR P61,   ,62,63.
A7132


R71323          DISPLAY REGISTER FOR VG                                        (2D)

 71325 REF   3  LAST  119   E7,1772          VGDISP   EQUALS GAMMAEI  +2      B(2)DSP N.40,42,99 FOR P30,34,35,37,40,
A71326                                                                                41 VG DISPLAY


R7133           SOME P11 DISPLAY REGISTERS.                                    (6D)

 7135  REF   1              E7,1734          ALTI     EQUALS TTE1     +2      2P DSP NOUN 62 FOR P11.
 7136  REF   1              E7,1736          HDOT     EQUALS ALTI     +2      2P DSP NOUN 62 FOR P11.
A7137
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P7138           *-*-*-*-  OVERLAY 2 IN EBANK 7 -*-*-*-*

R7139           KALCMANU STORAGE.                                                   (18D)

 7141   REF  2  LAST  117   E7,1425          MFS      EQUALS END-DELV          I(18)
 7142   REF  1               E7,1425          MFI      EQUALS MFS               I   TMP
 7143   REF  2  LAST  121   E7,1425          DEL      EQUALS MFS               I   TMP
 7144   REF  3  LAST  121   E7,1447          END-KALC EQUALS MFS      +18D     **NEXT AVAIL LOC AFTER KALCMANU **

R7145           MEASUREMENT INCORPORATION STORAGE(R22) STORAGE.                     (56D)

 7147   REF  2  LAST  117   E7,1447          TX789    EQUALS END-KALC          I(6)TMP
 7148   REF  1               E7,1455          GAMMA    EQUALS TX789    +6       I(2)TMP
 7149   REF  1               E7,1457          OMEGA    EQUALS GAMMA    +2       I(18)TMP
 7150   REF  1               E7,1501          BVECTOR  EQUALS OMEGA    +18D     I(18)TMP
 7151   REF  1               E7,1523          DELTAQ   EQUALS BVECTOR  +18D     I(2)TMP
 7152   REF  1               E7,1525          VARIANCE EQUALS DELTAQ +2         I(3)TMP
 7153   REF  1               E7,1530          RCLP     EQUALS VARIANCE +3       I(6)TMP
 7154   REF  1               E7,1536          GRP2SVQ  EQUALS RCLP     +6       I(1)TMP QSAVE FOR RESTARTS

R7155           P20, P22, P23 DSP NOUN                                              (5D)

 7157   REF  2  LAST  121   E7,1501          N49DISP  EQUALS BVECTOR           B(5)TMP

R7158           S22.1 STORAGE.                                                      (36D)

 7160   REF  1               E7,1537          SVMRKDAT EQUALS GRP2SVQ  +1       I(36)TMP 5 SETS OF MARK DATA +PAD OF ONE

R7161           **** CISLUNAR NAV. ERAS. (P20S) ****                                (45D)

 7163   REF  1               E7,1603          TRUNX    EQUALS SVMRKDAT +36D
 7164   REF  1               E7,1603          DATATEST EQUALS TRUNX              (1)
 7165   REF  2  LAST  121   E7,1604          UBAR0    EQUALS TRUNX +1
 7166   REF  1               E7,1612          UBAR1    EQUALS UBAR0 +6
 7167   REF  1               E7,1620          UBAR2    EQUALS UBAR1 +6
 7168   REF  1               E7,1626          RZC      EQUALS UBAR2 +6
 7169   REF  1               E7,1634          VZC      EQUALS RZC +6
 7170   REF  1               E7,1642          UCLSTAR  EQUALS VZC +6
 7171   REF  1               E7,1650          USSTAR   EQUALS UCLSTAR +6
 7174   REF  1               E7,1656          SRRETURN EQUALS USSTAR   +6
A7175
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P7176           *-*-*-*-  OVERLAY 3 IN EBANK 7 -*-*-*-*

R7177           RENDEZVOUS GUIDANCE STORAGE.  - P32...P35 -                (8D)

 7179   REF  3  LAST  121   E7,1447          DELTEEO  EQUALS END-KALC        I(2) S-S BACK VALUES OF DELTA TIME
 7180   REF  1               E7,1451          DELEL    EQUALS DELTEEO  +2     I(2) S-S
 7181   REF  1               E7,1453          SECMAX   EQUALS DELEL    +2     I(2) S-S MAX STOP SIZE FOR ROUTINE
 7182   REF  1               E7,1455          XXXALT   EQUALS SECMAX   +2     I(2)
A7183

R7184           S40.9 STORAGE.                                             (16D)

 7186   REF  1               E7,1457          VG       EQUALS XXXALT   +2     I(6)TMP
 7187   REF  1               E7,1465          VRPREV   EQUALS VG       +6     I(6)
 7188   REF  1               E7,1473          TNIT     EQUALS VRPREV   +6     I(2)
 7189   REF  1               E7,1475          TNITPREV EQUALS TNIT     +2     I(2)

R7190           S40.2,3 STORAGE.                                           (1D)

 7192   REF  1               E7,1477          AXISCODE EQUALS TNITPREV +2     I(1)IN

R7193           P30'S-P17 COMMON STORAGE.                                  (24D)

 7195   REF  2  LAST  121   E7,1537          RACT3    EQUALS GRP2SVQ  +1     I(6)TMP POSITION OF ACTIVE AT TPI TIME.
 7196   REF  1               E7,1545          VACT3    EQUALS RACT3    +6     I(6)TMP VELOCITY OF ACTIVE AT  TPI TIME.
 7197   REF  1               E7,1553          RPASS3   EQUALS VACT3    +6     I(6)TMP POSITION OF PASSIVE AT TPI TIME.
 7198   REF  1               E7,1561          VPASS3   EQUALS RPASS3   +6     I(6)TMP VELOCITY OF PASSIVE AT TPI TIME.

R7199           P76, NB4 DISPLAY                                           (6D)

 7201   REF  2  LAST  122   E7,1537          DELVOV   EQUALS RACT3           I(6)DSP NOUN 84 FOR X-V84, P34-35
A7202

R7203           INITVEL/MIDGIM STORAGE.                                    (34D)
R7205                 (CALLED BY S34.1,2,  S35.1,2, AND S40.9)
R7206                 (CALLS LAMBERT, CONIC SUBROUTINES)

 7207   REF  1               E7,1567          RINIT    EQUALS VPASS3   +6     I(6)IN  ACTIVE VEHICLE RADIUS VECTOR
 7208   REF  1               E7,1575          VINIT    EQUALS RINIT    +6     I(6)IN  ACTIVE VEHICLE VELOCITY VECTOR
 7209   REF  1               E7,1603          RTARG1   EQUALS VINIT    +6     I(6)TMP SHIFTED RTARG
 7210   REF  1               E7,1611          VIPRIME  EQUALS RTARG1   +6     I(6)OUT   NEW VEL REQ AT INITIAL RADIUS
 7211   REF  1               E7,1617          VTPRIME  EQUALS VIPRIME  +6     I(6)OUT TOTAL VELOCITY AT DESIRED RADIUS
 7212   REF  1               E7,1625          +MGA     EQUALS VTPRIME  +6     I(2)DSP NOUN 45 FOR P30,34,35. +MID GIM.
 7213   REF  1               E7,1627          COZY4    EQUALS +MGA     +2     I(2)TMP COSINE OF ANGLE WHEN ROT STARTS

R7214   (THE FOLLOWING OVERLAYS MEASUREMENT INCORP AND CAN NOT SHARE WITH TPI
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 7215   REF   1              E7,1502          INTIME   EQUALS AXISCODE +3
 7216   REF   1              E7,1504          ITCTR    EQUALS INTIME   +2     I(1) TMP ITERATION COUNTER
 7217   REF   1              E7,1631          END-IN/M EQUALS COZY4    +2     **NEXT AVAIL LOC AFTER INITVEL/MIDGIM**

R7218           P34 AND P33 STORAGE.  (OVERLAYS INITVEL/MIDGIM)              (24D)

 7220   REF   2 LAST  122    E7,1567          VAPREC   EQUALS RINIT           I(6) S-S PREC VEC FOR NOM TPI TIME(ACT V
 7221   REF   2 LAST  122    E7,1575          RAPREC   EQUALS VINIT           I(6) S-S PREC VEC FOR NOM TPI TIME(ACT V
 7222   REF   2 LAST  122    E7,1611          VPPREC   EQUALS VIPRIME         I(6) S-S PREC VEC FOR NOM TPI TIME(PASS
 7223   REF   2 LAST  122    E7,1617          RPPREC   EQUALS VTPRIME         I(6) S-S PREC VEC FOR NOM TPI TIME(PASS
R7224

R7225           P30, P40 INTERFACE.                                          (20D)

 7227   REF   1              E7,1631          RTIG     EQUALS END-IN/M        I(6)TMP
 7228   REF   1              E7,1637          VTIG     EQUALS RTIG     +6     I(6)TMP
 7229   REF   1              E7,1645          DELVSIN  EQUALS VTIG     +6     I(6)TMP
 7230   REF   1              E7,1645          DELVEET3 EQUALS DELVSIN              TMP DELTA VEL VECT INERTIAL COORDS.
 7231   REF   1              E7,1645          VGTEMP   EQUALS DELVEET3
 7232   REF   2 LAST  123    E7,1653          DELVSAB  EQUALS DELVSIN +6     I(2)TMP
A7233

R7234           P35-P40 INTERFACE STORAGE. (OVERLAYS P30-P40 I/F STORAGE)     (12D)

 7236   REF   2 LAST  123    E7,1631          RPASS4   EQUALS RTIG           I(6)TMP POSITION OF PASSIVE AT INTERCEPT
 7237   REF   1              E7,1637          VPASS4   EQUALS RPASS4   +6     I(6)TMP VELOCITY OF PASSIVE AT INTERCEPT

R7238           TPI SEARCH (P17)                                             (6D)

 7240   REF   1              E7,1645          E2       EQUALS VPASS4   +6     I(6)TMP
A7241

R7242           P30-P40 COMMON STORAGE.                                      (3D)

 7244   REF   1              E7,1655          TPASS4   EQUALS DELVSAB  +2     I(2)TMP
 7245   REF   1              E7,1655          TINT     =       TPASS4         I(2)
 7246   REF   2 LAST  123    E7,1657          QTEMP    EQUALS TPASS4   +2     I(1) TMP
A7247

R7248           P30-P40 STORAGE.                                             (4D)

 7250   REF   1              E7,1660          TTOGO    EQUALS QTEMP    +1     B(2)DSP NOUN 35,40,45,59,99
A7251                                                                                FOR P30,34,35,40,41,47,  R30.
 7252   REF   1              E7,1662          TTPI     EQUALS TTOGO    +2     B(2)DSP NOUN 37 FOR P34 TPI TIME, CSECS.
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L ERASABLE ASSIGNMENTS

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 7253   REF   1              E7,1664          END-P30S EQUALS TTPI     +2     **NEXT AVAIL LOC AFTER P30-40 STORAGE.**

R7254           P40 STORAGE.                                                  (8D)

 7256   REF   1              E7,1664          VGBODY   EQUALS END-P30S       B(6)DSP NOUN 85 FOR P40,41,42 VG-SC COOR
 7257   REF   1              E7,1664          DELVCTL  =      VGBODY
 7258   REF   2  LAST  124   E7,1672          P40TMP   EQUALS VGBODY   +6     B(2)TMP

R7259           P47 STORAGE.

 7260   REF   2  LAST  122   E7,1457          DV47TEMP EQUALS VG
 7261   REF   3  LAST   35   E7,1674          DELVIMU  EQUALS P40TMP   +2     I(6)  DSP  NOUN 83 FOR P47 DELTAV(IMU)
A7262

R7263           S40.1 STORAGE.                                                (23D)

 7265   REF   1              E7,1702          CSTEER   EQUALS DELVIMU  +6     I(2)IN
 7266   REF   1              E7,1704          BDT      EQUALS CSTEER   +2     I(6)IN
 7267   REF   1              E7,1712          UT       EQUALS BDT      +6     I(6)OUT THRUST DIRECTION
 7268   REF   1              E7,1720          VGTIG    EQUALS UT       +6     I(6)OUT
 7269   REF   1              E7,1720          VGPREV   =      VGTIG
 7270   REF   2  LAST  124   E7,1726          F        EQUALS VGTIG    +6     I(2)OUT S40.3 NEEDS THIS

 7271   REF   1              E7,1730          QTEMP1   EQUALS F        +2     I(1)TMP HOLDS RETURN

A7272

R7273           R41                                                           (2D)

 7275   REF   1              E7,1731          T-TO-ADD EQUALS QTEMP1   +1     I(10)   FOR MIDTOAVE
A7276
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P7277           *-*-*-*-  OVERLAY 4 IN EBANK 7 -*-*-*-*

R7278           S35.1 STORAGE.                                          (2D)

 7280  REF  2 LAST  124  E7,1664          TSTRT    EQUALS END-P30S      I(2)IN  MIDCOURSE START TIME

R7281           S34.1 STORAGE.        (OVERLAYS S35.1 STORAGE)          (1D)

 7283  REF  1            E7,1664          TITER    EQUALS TSTRT         I(1)TMP ITERATION COUNTER

R7284           (P30-31 O-SAVES)                                        (1)

 7286  REF  1            E7,1664          P30/31RT EQUALS TITER         B(1)  RETURN POINT
A7287

R7288           P22 STORAGE.                                            (6D)
 7290  REF  2 LAST  125  E7,1666          S22WUNL  EQUALS TSTRT    +2   1     WUNL W8 UNKNOWN INIT VALUE
 7291  REF  1            E7,1667          S22TOFF  EQUALS S22WUNL  +1   2   T SUB OFF
A7291                                                                  *USED IN SUBROUTINE COMMON TO P22 & P23.
 7292  REF  1            E7,1671          S22TPRIM EQUALS S22TOFF +2    2     SAVE TF
 7293  REF  1            E7,1673          S22EORM  EQUALS S22TPRIM +2   0 = EARTH -- NON-ZERO = MOON
A7294

R7295           DOWNLINK ERASABLES FOR P22,P20 MARK DATA.               (8D)

 7297  REF  1            E7,1674          MARKDOWN EQUALS S22EORM  +1   B(1)
 7298  REF  1            E7,1703          RM       EQUALS S22RTNEX      DOWNLINK OF VHF RANGE
A7299

R7300           S22.1                                                   (1D)

 7302  REF  3 LAST   35  E7,1703          S22RTNEX EQUALS MARKDOWN +7   B(1)
A7303

R73031          P22 STORAGE                                             (6D)

 73033 REF  2 LAST  125  E7,1704          STARSAV3 EQUALS S22RTNEX +1   I(6)TMP

R7304           CRS61.1 STORAGE.        -A SUBSET OF P20-               (14D)

 7306  REF  1            E7,1704          Q611     EQUALS RM       +1   I(1) TMP QSAVE
 7307  REF  1            E7,1705          Q6111    EQUALS Q611     +1   I(1)TMP QSAVE
 7308  REF  1            E7,1706          SAVEPOS  EQUALS Q6111    +1   I(6)TMP LEM POSITION VECTOR-
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L ERASABLE ASSIGNMENTS

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 7309   REF   1                E7,1714            SAVEVEL  EQUALS SAVEPOS  +6     I(6)TMP LEM VELOCITY VECTOR-

R7310             ATTITUDE MANEUVER -CALLED BY P20,R61,R63,CRS61.1                 (3D)

 7312   REF   1                E7,1722            PRAXIS   EQUALS SAVEVEL  +6     B(3) S-S DISP RES FOR PREF AXIS N95

R7313             MARK ROUTINE (R21) STORAGE.          -IS SUBSET OF R22-         (14D)

 7315   REF   1                E7,1725            MRKBUF1  EQUALS PRAXIS   +3     B(7)TMP R21 MARK BUFFER
 7316   REF   3  LAST   35     E7,1734            MRKBUF2  EQUALS MRKBUF1  +7     B(7)TMP R21 MARK BUFFER

R7317             MORE CONICS STORAGE.                                            (4)
 7319                          E7,1774            COGA     EQUALS 3774            I(2) COTAN OF INITIAL FLIGHT PATH ANGLE
 7320   REF   1                E7,1774            INDEP    EQUALS COGA            I(1) USED BY SUBROUTINE:ITERATOR:
 7321   REF   2  LAST  126     E7,1776            EPSILONL EQUALS COGA     +2     I(2) TMP
A7322

R7323             RENDEZVOUS GUIDANCE STORAGE.  - P32...P35 -                     (10D)

 7325   REF   1                E7,1743            ELEV     EQUALS MRKBUF2  +7     I(2)TMP
 7326   REF   1                E7,1745            RTX1     EQUALS ELEV     +2     (1)
 7327   REF   1                E7,1746            RTX2     EQUALS RTX1     +1     (1)
 7328   REF   1                E7,1747            RTMU     EQUALS RTX2     +1     (2)
 7329   REF   1                E7,1751            RTSR1/MU EQUALS RTMU     +2     (2)
 7330   REF   1                E7,1753            CENTANG  EQUALS RTSR1/MU +2     I(2) S-S CENTRAL ANGLE COVERED(TPI-TPF)
A7331

R7332             TPI SEARCH(S17.1,S17.2) P17 STORAGE.                            (10D)

 7334   REF   2  LAST  126     E7,1743            DELTEE   EQUALS MRKBUF2  +7     I(2)
 7335   REF   1                E7,1745            XRS      EQUALS DELTEE   +2     I(2)
 7336   REF   1                E7,1747            THETL    EQUALS XRS      +2     I(2)
 7337   REF   1                E7,1751            TF       EQUALS THETL    +2     I(2)
 7338   REF   1                E7,1753            DELHITE  EQUALS TF       +2      (2)
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P7339           *-*-*-*-  OVERLAY 5 IN EBANK 7 -*-*-*-*

R7340           P17,P34                                                 (2D)

 7342   REF  1             E7,1765          NN1     =     NN            I(2) DSP NOUN 55, R1

R7343    ************ THE FOLLOWING ARE FOR FLIGHT 504 ONLY *********************

R7344           RETURN-TO-EARTH STORAGE.                                (93D)

 7346   REF  2  LAST  123  E7,1631          RTEDVD  EQUALS END-IN/M       I(2)IN  DELTA VELOCITY DESIRED  M/CS B7
 7347   REF  1             E7,1633          RTEGAM2D EQUALS RTEDVD  +2    I(2)IN  REENTRY ANGLE DESIRED   REVS B0
 7348   REF  1             E7,1635          RCON    EQUALS RTEGAM2D +2    I(2)TMP CONIC R2 RADIUS           M B29
 7349   REF  1             E7,1637          R(T1)/  EQUALS RCON     +2    I(6)TMP POSITION VECTOR AT TIG M B29/B27
 7350   REF  1             E7,1645          R(T1)   EQUALS R(T1)/   +6    I(2)TMP MAGNITUDE OF R(T1)/    M B29/B27
 7351   REF  1             E7,1647          DT21PR  EQUALS R(T1)    +2    I(2) TMP PREVOUS DT21           CS B30
 7352   REF  1             E7,1651          MAMAX1  EQUALS DT21PR   +2    I(2) TMP MAJ AXIS LOW BOUND LMT    M B30
 7353   REF  1             E7,1653          MAMAX2  EQUALS MAMAX1   +2    I(2) TMP MAJ AXIS UP BOUND LMT     M B30
 7354   REF  1             E7,1655          R(T2)/  EQUALS MAMAX2   +2    I(6)TMP FINAL POSITION VECTOR  M B29/B27
 7355   REF  1             E7,1663          RD      EQUALS R(T2)/   +6    I(2)TMP FINAL R DESIRED        M B29/B27
 7356   REF  1             E7,1665          DRCON   EQUALS RD       +2    I(2)TMP RCON SLOPE ITERATOR    M B29/B27
 7357   REF  1             E7,1667          RPRE,   EQUALS DRCON    +2    I(2)TMP PREVISOUS RPRE         M B29/B27
 7358   REF  1             E7,1671          V(T1)/  EQUALS RPRE,    +2    I(6)TMP VEL VECTOR AT TIG      M/CS B7/B5
 7359   REF  1             E7,1677          V2(T1)/ EQUALS V(T1)/   +6    I(6)TMP POST IMP VEL AT TIG    M/CS B7/B5
 7360   REF  1             E7,1705          DV      EQUALS V2(T1)/  +6    I(2)TMP DELTA VELOCITY AT TIG M/CS B7/B5
 7361   REF  1             E7,1707          V(T2)/  EQUALS DV       +2    I(6)TMP FINAL VELOCITY VECTOR M/CS B7/B5
 7362   REF  1             E7,1715          T1      EQUALS V(T2)/   +6    I(2)TMP INITIAL VECTOR TIME       CS B28
 7363   REF  1             E7,1717          PCON    EQUALS T1       +2    I(2)TMP SEMI-LATUS RECTUM          M B29
 7364   REF  1             E7,1721          X(T1)   EQUALS PCON     +2    I(2)TMP COTANGENT GAMMA1             B5
 7365   REF  1             E7,1723          T12     EQUALS X(T1)    +2    I(2)TMP INIT TO FINL POSIT TIME   CS B28
 7366   REF  1             E7,1725          DELTAT  EQUALS T12      +2    I(2) TMP DELTA T IN SAFE PERILUNE CS B28
 7367   REF  1             E7,1727          NN1A    EQUALS DELTAT   +2    I(2) TMP ITERATION COUNTER 1
 7368   REF  1             E7,1731          NN2     EQUALS NN1A     +2    I(2) TMP ITERATION COUNTER 2
 7369   REF  1             E7,1733          RTENCKEX EQUALS NN2     +2    I(1)TMP RTENCK RETURN ADDRESS
 7370   REF  1             E7,1734          CONICX1 EQUALS RTENCKEX +1    I(1)TMP CONICS MU TABLE INDEX
 7371   REF  1             E7,1735          T2      EQUALS CONICX1  +1    I(2)TMP FINAL TIME                CS B28
 7372   REF  1             E7,1737          UR1/    EQUALS T2       +2    I(6)TMP UNIT R(T1)/                 B1
 7373   REF  1             E7,1745          UV1/    EQUALS UR1/     +6    I(6)TMP UNIT V(T1)/                 B1
 7374   REF  1             E7,1753          BETA1   EQUALS UV1/     +6    I(2)TMP 1+X(T2)**2                  B1
 7375   REF  1             E7,1755          P(T1)   EQUALS BETA1    +2    I(1)TMP PRIMARY BODY STATE TIME 1   B14
 7376   REF  1             E7,1756          CFPA    EQUALS P(T1)    +1    I(2) TMP COSINE FLIGHT PATH ANGLE   B1
 7377   REF  1             E7,1760          PHI2    EQUALS CFPA     +2    I(2) TMP PERI OR APO INDICATOR      B2
 7378   REF  1             E7,1762          SPRTEX  EQUALS PHI2     +2    I(1)TMP ROUTINE RETURN ADDRESS

 7379   REF  1             E7,1763          VNSTORE EQUALS SPRTEX   +1    I(1)TMP VERBNOUN STORAGE
 7380   REF  1             E7,1764          BETA12  EQUALS VNSTORE  +1    I(2)TMP SIGN FOR TIMERAD
R7381                OVERLAYS WITHIN RETURN-TO-EARTH STORAGE.
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L ERASABLE ASSIGNMENTS USER'S PAGE NO. 92 E0 S3

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 7382                                0030          RPRE      EQUALS 24D          I(2)TMP COMPUTED PREC RADIUS   M B29/B27
 7383                                0032          P/RPRE    EQUALS 26D          I(2)TMP P/R                      B4
 7384                                0034          R/APRE    EQUALS 28D          I(2)TMP R/A                      B6
 7385  REF   2  LAST  127   E7,1723               X(T2)PRE  EQUALS T12          I(2)TMP PREC COTAN GAMMA2        B0
 7386  REF   2  LAST  127   E7,1725               X(T2)     EQUALS DELTAT       I(2)TMP COTAN GAMMA2             B0
 7387  REF   2  LAST  127   E7,1745               UH/       EQUALS UV1/         I(2)TMP UNIT HORIZONTAL VECTOR.  B1
 7388  REF   2  LAST  117   E7,1412               SPRTETIG  EQUALS TIG          I(2)IN  TIME OF IGNITION       CS B28
R7389
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L ERASABLE ASSIGNMENTS USER'S PAGE NO. 93 EO S3

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P7390           *-*-*-*- OVERLAY 6 IN EBANK 7 -*-*-*-*

R7391           P32,P33


R7392               THE FOLLOWING OVERLAY MEAS. INCORP. AND ARE IN USE ONLY WHEN(32D)

 7394   REF   3  LAST  124   E7,1457          POSTCSI  EQUALS VG                 I(2)
 7395   REF   1               E7,1461          DELVCSI  EQUALS POSTCSI  +2      I(2)
 7396   REF   1               E7,1463          DELDV    EQUALS DELVCSI  +2      I(2)
 7397   REF   1               E7,1465          GAMPREV  EQUALS DELDV    +2      I(2)
 7398   REF   1               E7,1467          DVPREV   EQUALS GAMPREV  +2      I(2)
 7399   REF   1               E7,1471          POSTCDH  EQUALS DVPREV   +2      I(2)
 7400   REF   1               E7,1471          HAFPA1   EQUALS POSTCDH
 7401   REF   2  LAST  129   E7,1473          VACT4    EQUALS POSTCDH  +2      I(6)
 7402   REF   1               E7,1501          RDOTV    EQUALS VACT4    +6      I(2)
 7403   REF   1               E7,1503          VACT1    EQUALS RDOTV    +2      I(6)
 7405   REF   1               E7,1511          VPASS1   EQUALS VACT1    +6      I(6) VEL. PASSIVE VEH. AT CSI TIME


 7406   REF   2  LAST  122   E7,1545          UNVEC    EQUALS VACT3

 7407   REF   3  LAST  123   E7,1655          T2TOT3   EQUALS TPASS4           I(2) TPI - TCDH

 7408   REF   2  LAST  125   E7,1664          CSIALRM  EQUALS TITER            I(2) ALARM INDEX

 74085  REF   2  LAST  125   E7,1666          DELVEET2 EQUALS S22WUNL          I(6) VACT3 - VACT2 = DVCDH REF. COORD.

R7409           ADDITIONAL CSI - CDH STORAGE.                                 (10D)

 7411   REF   1               E7,1755          RPASS1   EQUALS CENTANG  +2      I(6) POS. PASSIVE VEH. AT CSI TIME.
 7412   REF   1               E7,1763          LOOPCT   EQUALS RPASS1   +6      I(2) ITERATION COUNTER
 7413   REF   1               E7,1765          NN       EQUALS LOOPCT   +2      I(2)

R7414           P21 STORAGE                                                   (19D)

 7416   REF   3  LAST  121   E7,1603          P21ORIG  EQUALS TRUNX            I(1)
 7417   REF   1               E7,1604          P21BASER EQUALS P21ORIG  +1      I(6)
 7418   REF   1               E7,1612          P21BASEV EQUALS P21BASER +6      I(6)
 74181  REF   1               E7,1620          P21ALT   EQUALS P21BASEV +6      I(2) NOUN 73 R1 ALTITUDE
 74182  REF   1               E7,1622          P21VEL   EQUALS P21ALT   +2      I(2) NOUN 73 R2 VELOCITY
 74183  REF   1               E7,1624          P21GAM   EQUALS P21VEL   +2      I(2) NOUN 73 R3 FLIGHT PATH ANGLE
A7419


 7420                          E7,1777          WHOCARES =      3777            A DUMMY FOR E-BANK INSENSITIVE 2CADRS.


 7421   REF   1               E7,1777          END-E7   EQUALS WHOCARES         ****** LAST LOCATION IN E7


*** END OF COMERASE.030 ***
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L ERASABLE ASSIGNMENTS

L INTERRUPT LEAD INS USER'S PAGE NO. 1 EO S3

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0001                            4000                    SETLOC 4000

0002   REF   1                                          COUNT  02/RUPTS

0003                            4000  0 0004 0          INHINT                 GO
0004   REF   1                  4001  3 4054 1          CAF    GOBB
0005   REF   1                  4002  56 006 1          XCH    BBANK
0006   REF   1                  4003  1 2526 0          TCF    GOPROG

0007   REF   1                  4004  52 011 0          DXCH   ARUPT           T6RUPT
0008                            4005  0 0006 1          EXTEND
0009   REF   1                  4006  3 1311 0          DCA    T6LOC
0010                            4007  52 006 0          DTCB

0011   REF   2  LAST  131       4010  52 011 0          DXCH   ARUPT           T5RUPT
0012   REF   1                  4011  4 0030 0          CS     TIME5
0013   REF   1                  4012  6 5036 1          AD     .5SEC
0014   REF   1                  4013  1 4065 1          TCF    T5RUPT

0015   REF   3  LAST  131       4014  52 011 0          DXCH   ARUPT           T3RUPT
0016   REF   1                  4015  3 4055 0          CAF    T3RPTBB
0017   REF   2  LAST  131       4016  56 006 1          XCH    BBANK
0018   REF   1                  4017  1 3416 0          TCF    T3RUPT

0019   REF   4  LAST  131       4020  52 011 0          DXCH   ARUPT           T4RUPT
0020   REF   1                  4021  3 4063 0          CAF    T4RPTBB
0021   REF   3  LAST  131       4022  56 006 1          XCH    BBANK
0022   REF   1                  4023  1 2000 1          TCF    T4RUPT

0023   REF   5  LAST  131       4024  52 011 0          DXCH   ARUPT           KEYRUPT1
0024   REF   1                  4025  3 4056 0          CAF    KEYRPTBB
0025   REF   4  LAST  131       4026  56 006 1          XCH    BBANK
0026   REF   1                  4027  1 3673 1          TCF    KEYRUPT1

0027   REF   6  LAST  131       4030  52 011 0          DXCH   ARUPT           KEYRUPT2
0028   REF   1                  4031  3 4057 1          CAF    MKRUPTBB
0029   REF   5  LAST  131       4032  56 006 1          XCH    BBANK
0030   REF   1                  4033  1 2104 1          TCF    MARKRUPT

0031   REF   7  LAST  131       4034  52 011 0          DXCH   ARUPT           UPRUPT
0032   REF   1                  4035  3 4056 0          CAF    UPRPTBB
0033   REF   6  LAST  131       4036  56 006 1          XCH    BBANK
0034   REF   1                  4037  1 3716 0          TCF    UPRUPT

0035   REF   8  LAST  131       4040  52 011 0          DXCH   ARUPT           DOWNRUPT
0036   REF   1                  4041  3 4060 0          CAF    DWNRPTBB
0037   REF   7  LAST  131       4042  56 006 1          XCH    BBANK
0038   REF   1                  4043  1 3521 0          TCF    DODOWNTM

0039   REF   9  LAST  131       4044  52 011 0          DXCH   ARUPT           RADAR RUPT
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0040   REF   1                    4045  3 4061 1           CAF    RDRPTBB
0041   REF   8  LAST  131         4046  56 006 1           XCH    BBANK
0042   REF   1                    4047  1 2504 0           TCF    VHFREAD

0043   REF  10  LAST  131         4050  52 011 0           DXCH   ARUPT          HAND CONTROL RUPT
0044   REF   1                    4051  3 4062 1           CAF    HCRUPTBB
0045   REF   9  LAST  132         4052  56 006 1           XCH    BBANK
0046   REF   1                    4053  1 5336 0           TCF    RESUME +3      NOT USED
0047   REF   1                E3,1400                      EBANK= LST1           RESTART USES E0, E3
0048   REF   2  LAST  131         4054   12063 1  GOBB      BBCON  GOPROG

0049   REF   2  LAST  132      E3,1400                      EBANK= LST1
0050   REF   2  LAST  131         4055   02063 0  T3RPTBB   BBCON  T3RUPT

0051   REF   1                    0073                      EBANK= KEYTEMP1
0052   REF   2  LAST  131         4056   16060 0  KEYRPTBB  BBCON  KEYRUPT1

0053   REF   4  LAST  126      E7,1725                      EBANK= MRKBUF1
0054   REF   2  LAST  131         4057   16067 1  MKRUPTBB  BBCON  MARKRUPT

0055   REF   2  LAST  131         4056            UPRPTBB   =      KEYRPTBB

0056   REF   1                    0340                      EBANK= DNTMBUFF
0057   REF   2  LAST  131         4060   12060 1  DWNRPTBB  BBCON  DODOWNTM

0058   REF   1                E7,1603                      EBANK= DATATEST
0059   REF   2  LAST  132         4051   56067 0  RDRPTBB   BBCON  VHFREAD
0060   REF   1                    0025                      EBANK= TIME1
0061   REF   2  LAST  132         4062   04060 0  HCRUPTBB  BBCON  RESUME         NOT USED
0062   REF   1                    1302                      EBANK= DSRUPTSW
0063   REF   2  LAST  131         4063   14062 0  T4RPTBB   BBCON  T4RUPT
0064   REF   2  LAST  132         0025                      EBANK= TIME1
0065   REF   2  LAST  131         4064   04060 0  T5RPTBB   BBCON  T5RUPT

0066                               4065  0 0006 1  T5RUPT    EXTEND
0067   REF   1                    4066  6 5337 0           BZMF   NOQBRSM
0068                               4067  0 0006 1           EXTEND
0069   REF   1                    4070  3 1313 1           DCA    T5LOC
0070                               4071  52 006 0           DTCB
```

L T4RUPT PROGRAM USER'S PAGE NO. 1 EO S3

```
0001                        12,2000                     BANK   12
0002  REF  1                06,2000                     SETLOC T4RUP
0003                        06,2000                     BANK

0004  REF  1                                            COUNT  06/T4RPT

0005  REF  1                06,2000  54 016 1  T4RUPT   TS     BANKRUPT
0006                        06,2001  0 0006 1           EXTEND
0007  REF  1                06,2002  22 012 1           QXCH   QRUPT

0008  REF  2 LAST  132      06,2003  11'302 0           CCS    DSRUPTSW      GOES 7(-1)0 AROUND AND AROUND
0009  REF  1                06,2004  1 2010 0           TCF    NORMT4 +1
0010  REF  2 LAST  133      06,2005  1 2007 0           TCF    NORMT4

0011  REF  1                06,2006  1 2136 0           TCF    QUIKDSP

0012  REF  1                06,2007  3 5023 0  NORMT4    CAF    SEVEN
0013  REF  1                06,2010  54 070 1           TS     RUPTREG1
0014  REF  3 LAST  133      06,2011  55'302 0           TS     DSRUPTSW

0015  REF  1                                            COUNT  02/T4RPT

0016  REF  1                   7711             74K     =      HIGH4
R0017   RELTAB IS A PACKED TABLE. RELAYWORD CODE IN UPPER 4 BITS, RELAY CODE
R0018   IN LOWER 5 BITS.

0019                        4072                        BLOCK  02
0020  REF  1                4000                        SETLOC FFTAG12
0021                        4072                        BANK
0022                        4072   04025 1  RELTAB      OCT    04025
0023                        4073   10003 0              OCT    10003
0024                        4074   14031 0              OCT    14031
0025                        4075   20033 0              OCT    20033
0026                        4076   24017 1              OCT    24017
0027                        4077   30036 1              OCT    30036
0028                        4100   34034 1              OCT    34034
0029                        4101   40023 1              OCT    40023
0030                        4102   44035 1              OCT    44035
0031                        4103   50037 0              OCT    50037
0032                        4104   54000 0              OCT    54000
0033                        4105   60000 1  RELTAB11    OCT    60000
```

```
P0034            SWITCHED-BANK PORTION.

0035                          12,2000                    BANK   12
0036   REF   2  LAST  133     06,2000                    SETLOC T4RUP
0037                          06,2012                    BANK

0038   REF   2 LAST  133 TO  133:    10    10*          COUNT  06/T4RPT

0039   REF   1               06,2012  11'036 1  CDRVE    CCS    DSPTAB +11D
0040   REF   1               06,2013  0 2063 0          TC     DSPOUT
0041   REF   2  LAST  134     06,2014  0 2063 0          TC     DSPOUT

0042   REF   2  LAST  134     06,2015  57'036 0          XCH    DSPTAB +11D
0043   REF   1               06,2016  7 4372 1          MASK   LOW11
0044   REF   3  LAST  134     06,2017  55'036 1          TS     DSPTAB +11D
0045   REF   1               06,2020  6 4105 1          AD     RELTAB11
0046                          06,2021  0 0006 1          EXTEND
0047   REF   1               06,2022  01 010 1          WRITE  OUTO
0048   REF   1               06,2023  0 2071 0          TC     HANG20
```

P0049 DSPOUT PROGRAM. PUTS OUT DISPLAYS.

```
0050  REF  1                  06,2024  55'016 0  DSPOUTSB TS     NOUT
0051  REF  1                  06,2025  4 5021 0           CS     ZERO
0052  REF  1                  06,2026  54 073 1           TS     DSRUPTEM        SET TO -0 FOR 1ST PASS THRU DSPTAB
0053  REF  1                  06,2027  56 776 1           XCH    DSPCNT
0054  REF  1                  06,2030  6 5020 0           AD     NEGO            TO PREVENT +0
0055  REF  2  LAST  135       06,2031  54 776 0           TS     DSPCNT
0056  REF  3  LAST  135       06,2032  50 776 1  DSPSCAN   INDEX  DSPCNT
0057  REF  4  LAST  134       06,2033  11'023 0           CCS    DSPTAB
0058  REF  4  LAST  135       06,2034  10 776 0           CCS    DSPCNT          IF DSPTAB ENTRY +, SKIP
0059  REF  1                  06,2035  1 2030 1           TCF    DSPSCAN -2      IF DSPCNT +, AGAIN
0060  REF  1                  06,2036  1 2047 1           TCF    DSPLAY          IF DSPTAB ENTRY -, DISPLAY
0061                          06,2037   00012 1  TABLNTH   OCT    12              DEC 10   LENGTH OF DSPTAB
0062  REF  2  LAST  135       06,2040  10 073 1           CCS    DSRUPTEM        IF DSRUPTEM=+0,2ND PASS THRU DSPTAB
0063                          06,2041   37764 0  12OMRUPT  DEC    16372           (DSPCNT = 0). +0 INTO NDUT.
0064  REF  2  LAST  135       06,2042  55'016 0           TS     NOUT
0065  REF  2  LAST   41       06,2043  0 0002 0           TC     Q
0066  REF  3  LAST  135       06,2044  54 073 1           TS     DSRUPTEM        IF DSRUPTEM=-0,1ST PASS THRU DSPTAB
0067  REF  1                  05,2045  3 2037 1           CAF    TABLNTH         (DSPCNT=0). +0 INTO DSRUPTEM. PASS AGAIN
0068  REF  2  LAST  135       06,2046  1 2031 0           TCF    DSPSCAN -1

0069  REF  1                  06,2047  6 5017 1  DSPLAY   AD     ONE
0070  REF  5  LAST  135       06,2050  50 776 1           INDEX  DSPCNT
0071  REF  5  LAST  135       06,2051  55'023 0           TS     DSPTAB          REPLACE POSITIVELY
0072  REF  2  LAST  134       06,2052  7 4372 1           MASK   LOW11           REMOVE BITS 12 TO 15
0073  REF  4  LAST  135       06,2053  54 073 1           TS     DSRUPTEM
0074  REF  1                  06,2054  3 4364 1           CAF    HI5
0075  REF  6  LAST  135       06,2055  50 776 1           INDEX  DSPCNT
0076  REF  1                  06,2056  7 4072 1           MASK   RELTAB          PICK UP BITS 12 TO 15 OF RELTAB ENTRY
0077  REF  5  LAST  135       06,2057  6 0073 0           AD     DSRUPTEM
0078                          06,2060  0 0006 1           EXTEND
0079  REF  2  LAST  134       06,2061  01 010 1           WRITE  OUTO            WRITE CHANNEL 10
0080  REF  1                  06,2062  1 6706 1           TCF    Q+1             ***NORMAL RETURN SKIPS ONE

0081  REF  1                  06,2063  10 101 0  DSPOUT    CCS    FLAGWRD5        DONT DISPLAY UNLESS DSKY FLAG ON
0082  REF  2  LAST  135       06,2064  3 5021 1           CAF    ZERO
0083  REF  1                  06,2065  1 2132 1           TCF    NODSPOUT
0084  REF  3  LAST  135       06,2066  11'016 0           CCS    NOUT
0085  REF  1                  06,2067  0 2024 0           TC     DSPOUTSB
0086  REF  2  LAST  135       06,2070  1 2132 1           TCF    NODSPOUT        NO DISPLAY REQUESTS
0087  REF  1                  06,2071  4 2173 1  HANG20    CS     11,14,9
0088  REF  4  LAST  133       06,2072  27'302 0           ADS    DSRUPTSW

0089  REF  1                  06,2073  3 7700 1           CAF    20MRUPT
0090  REF  1                  06,2074  54 027 0  SETTIME4  TS     TIME4
```

P0091 THE STATUS OF THE PROCEED PUSHBUTTON IS MONITORED EVERY 120 MILLISECONDS VIA THE CHANNEL 32 BIT 14 INBIT.
R0093 THE STATE OF THIS INBIT IS COMPARED WITH ITS STATE DURING THE PREVIOUS T4RUPT AND IS PROCESSED AS FOLLOWS.

R0095 IF PREV ON AND NOW ON - BYPASS
R0096 IF PREV ON AND NOW OFF - UPDATE IMODES33
R0097 IF PREV OFF AND NOW ON - UPDATE IMODES33 AND PROCESS VIA PINBALL
R0098 IF PREV OFF AND NOW OFF - BYPASS

R0099 THE LOGIC EMPLOYED REQUIRES ONLY 9 MCT (APPROX. 108 MICROSECONDS) OF COMPUTER TIME WHEN NO CHANGES OCCUR.

```
0101  REF   1              06,2075  3 1321 0  PROCEEDE CA     IMODES33        MONITIOR FOR PROCEED BUTTON
0102                       06,2076  0 0006 1           EXTEND
0103  REF   1              06,2077  06 032 0           RXOR   CHAN32          CHECK IF BIT 14 DIFFERENT
0104  REF  12  LAST   66    06,2100  7 5002 1           MASK   BIT14
0105                       06,2101  0 0006 1           EXTEND
0106  REF   1              06,2102  1 2116 1           BZF    T4JUMP          NO CHANGE

0107  REF   2  LAST  136    06,2103  23'321 0           LXCH   IMODES33
0108                       06,2104  0 0006 1           EXTEND
0109  REF   1              06,2105  06 001 0           RXOR   LCHAN
0110  REF   3  LAST  136    06,2106  55'321 1           TS     IMODES33        UPDATE IMODES33
0111  REF  13  LAST  136    06,2107  7 5002 1           MASK   BIT14
0112  REF   2  LAST   82    06,2110  10 000 0           CCS    A
0113  REF   2  LAST  136    06,2111  1 2116 1           TCF    T4JUMP          WAS ON - NOW OFF

0114  REF   1              06,2112  3 4371 0           CAF    CHRPRIO         WAS OFF - NOW ON
0115  REF   1              06,2113  0 5134 1           TC     NOVAC
0116  REF   1                 0777                     EBANK= DSPCOUNT
0117  REF   1              06,2114   03357 0           2CADR  PROCKEY
0117  REF   1              06,2115   60101 1
```

```
P0118           JUMP TO APPROPRIATE ONCE-PER SECOND (.96 SEC ACTUALLY) ACTIVITY

 0119   REF   2  LAST  133   06,2116  50 070 0  T4JUMP   INDEX  RUPTREG1
 0120                        06,2117  1 2120 1           TCF    +1

 0121   REF   1              06,2120  1 2130 0           TCF    OPTTEST
 0122   REF   1              06,2121  1 2765 0           TCF    OPTMON
 0123   REF   1              06,2122  1 2174 0           TCF    IMUMON
 0124   REF   3  LAST  132   06,2123  1 5333 0           TCF    RESUME
 0125   REF   2  LAST  137   06,2124  1 2130 0           TCF    OPTTEST
 0126   REF   2  LAST  137   06,2125  1 2765 0           TCF    OPTMON
 0127   REF   2  LAST  137   06,2126  1 2174 0           TCF    IMUMON
 0128   REF   4  LAST  137   06,2127  1 5333 0           TCF    RESUME

 0129   REF   1              06,2130  0 4740 0  OPTTEST  TC     IBNKCALL
 0130   REF   1              06,2131   20000 0           CADR   OPTDRIVE

 0131   REF   1                 7700           20MRUPT  =      OCT37776        (DEC 16382)
 0132                        06,2132  0 0006 1  NODSPOUT EXTEND                 TURN OFF RELAYS
 0133   REF   3  LAST  135   06,2133  01 010 1           WRITE  OUTO

 0134   REF   1              06,2134  3 2041 0           CAF    120MRUPT        SET FOR NEXT CORVE
 0135   REF   1              06,2135  1 2074 1           TCF    SETTIME4

 0136   REF  14  LAST  136   06,2136  3 5002 0  QUIKDSP  CAF    BIT14
 0137   REF   5  LAST  135   06,2137  7 1302 0           MASK   DSRUPTSW
 0138                        06,2140  0 0006 1           EXTEND
 0139   REF   1              06,2141  1 2167 1           BZF    QUIKOFF         WROTE LAST TIME, NOW TURN OFF RELAYS.

 01395  REF   4  LAST  135   06,2142  11'016 0           CCS    NOUT
 0140   REF   2  LAST  135   06,2143  0 2024 0           TC     DSPOUTSB
 0141   REF   1              06,2144  1 2154 1           TCF    NODSPY          NOUT=0 OR BAD RETURN FROM DSPOUTSB
 0142   REF  15  LAST  137   06,2145  4 5002 1           CS     BIT14           GOOD RETURN (WE DISPLAYED SOMETHING)
 0143   REF   6  LAST  137   06,2146  27'302 0  QUIKRUPT ADS    DSRUPTSW

 0144   REF   2  LAST  135   06,2147  3 7700 1           CAF    20MRUPT
 0145   REF   2  LAST  135   06,2150  54 027 0           TS     TIME4

 0146   REF  11  LAST   64   06,2151  3 5007 0           CAF    BIT9
 0147   REF   7  LAST  137   06,2152  27'302 0           ADS    DSRUPTSW

 0148   REF   5  LAST  137   06,2153  0 5333 1           TC     RESUME

 0149                        06,2154  0 0006 1  NODSPY   EXTEND
 0150   REF   4  LAST  137   06,2155  01 010 1           WRITE  OUTO

 0151   REF   3  LAST  137   06,2156  3 7700 1  SYNCT4   CAF    20MRUPT
 0152   REF   3  LAST  137   06,2157  26 027 0           ADS    TIME4

 0153   REF  12  LAST  137   06,2160  3 5007 0           CAF    BIT9
```

```
0154   REF   8  LAST  137   06,2161  27'302 0           ADS    DSRUPTSW
0155   REF   9  LAST  138   06,2162  11'302 0           CCS    DSRUPTSW
0156   REF   6  LAST  137   06,2163  0 5333 1           TC     RESUME
0157                        06,2164   37737 0  OCT37737 OCT    37737
0158   REF   1              06,2165  0 2156 1           TC     SYNCT4
0159   REF   7  LAST  138   06,2166  0 5333 1           TC     RESUME

0160                        06,2167  0 0006 1  QUIKOFF  EXTEND
0161   REF   5  LAST  137   06,2170  01 010 1           WRITE  OUTO
0162   REF  16  LAST  137   06,2171  3 5002 0           CAF    BIT14          RESET DSRUPTSW TO SEND DISPLAY NEXT PASS
0163   REF   1              06,2172  1 2146 1           TCF    QUIKRUPT

0164                        06,2173   22400 0  11,14,9  OCT    22400
```

```
P0165   PROGRAM NAME:  IMUMON

R0166   FUNCTIONAL DESCRIPTION:  THIS PROGRAM IS ENTERED EVERY 480 MS.  IT DETECTS CHANGES OF THE IMU STATUS BITS IN
R0169   CHANNEL 30 AND CALLS THE APPROPRIATE SUBROUTINES.  THE BITS PROCESSED AND THEIR RELEVANT SUBROUTINES ARE:

R0170           FUNCTION                BIT    SUBROUTINE CALLED
R0171           --------                ---    -----------------
R0172           TEMP IN LIMITS           15    TLIM
R0173           ISS TURN-ON REQUEST      14    ITURNON
R0174           IMU FAIL                 13    IMUFAIL (SETISSW)
R0175           IMU CDU FAIL             12    ICDUFAIL (SETISSW)
R0176           IMU CAGE                 11    IMUCAGE
R0177           IMU OPERATE               9    IMUOP

R0178           THE LAST SAMPLED STATE OF THESE BITS IS LEFT IN IMODES30.  ALSO, EACH SUBROUTINE CALLED FINDS THE NEW
R0180   VALUE OF THE BIT IN A, WITH Q SET TO THE PROPER RETURN LOCATION, NXTIFAIL.

R0182   CALLING SEQUENCE:  T4RUPT EVERY 480 MILLISECONDS.

R0183   JOBS OR TASKS INITIATED:  NONE.

R0184   SUBROUTINES CALLED:  TLIM, ITURNON, SETISSW, IMUCAGE, IMUOP.

R0185   ERASABLE INITIALIZATION:
R0186           FRESH START OR RESTART WITH NO GROUPS ACTIVE: C(IMODES30) = OCT 37411.
R0188           RESTART WITH ACTIVE GROUPS: C(IMODES30) = (B(IMODES30)AND(OCT 00035)) PLUS OCT 37400.
R0190                                       THIS LEAVES IMU FAIL BITS INTACT.

R0191   ALARMS:  NONE.

R0192   EXIT:  TNONTEST.

R0193   OUTPUT:  UPDATED IMODES30 WITH CHANGES PROCESSED BY APPROPRIATE SUBROUTINE.

 0195   REF  1              06,2174  3 1320 1  IMUMON   CA      IMODES30        SEE IF THERE HAS BEEN A CHANGE IN THE
 0196                       06,2175  0 0006 1           EXTEND                  RELEVANT BITS OF CHAN 30.
 0197   REF  1              06,2176  06 030 1           RXOR    CHAN30          CHECK IF BITS 9,11-15 CHANGED
 0198   REF  1              06,2177  7 2743 1           MASK    30RDMSK
 0199                       06,2200  0 0006 1           EXTEND
 0200   REF  1              06,2201  1 2231 1           BZF     TNONTEST        NO CHANGE IN STATUS.

 0201   REF  3 LAST 137     06,2202  54 070 1           TS      RUPTREG1        SAVE BITS WHICH HAVE CHANGED.
 0202   REF  2 LAST 139     06,2203  23'320 1           LXCH    IMODES30        UPDATE IMODES30.
 0203                       06,2204  0 0006 1           EXTEND
 0204   REF  2 LAST 136     06,2205  06 001 0           RXOR    LCHAN
 0205   REF  3 LAST 139     06,2206  55'320 0           TS      IMODES30

 0206   REF  2 LAST 135     06,2207  4 5017 0           CS      ONE
 0207   REF  4 LAST 139     06,2210  56 070 0           XCH     RUPTREG1
 0208                       06,2211  0 0006 1           EXTEND
```

```
0209   REF   1                 06,2212  6 2507 1            BZMF    TLIM            CHANGE IN IMU TEMP.
0210   REF   1                 06,2213  1 2215 1            TCF     NXTIFBIT        BEGIN BIT SCAN.

0211   REF   3  LAST  139      06,2214  6 5017 1   -1       AD      ONE             (RE-ENTERS HERE FROM NXTIFAIL.)
0212   REF   5  LAST  139      06,2215  24 070 0   NXTIFBIT INCR    RUPTREG1        ADVANCE BIT POSITION NUMBER.
0213                           06,2216  6 0000 1   +1       DOUBLE
0214   REF   3  LAST  136      06,2217  54 000 0            TS      A               SKIP IF OVERFLOW.
0215   REF   2  LAST  140      06,2220  1 2215 1            TCF     NXTIFBIT        LOOK FOR BIT.

0216   REF   1                 06,2221  56 071 1            XCH     RUPTREG2        SAVE OVERFLOW-CORRECTED DATA.
0217   REF   6  LAST  140      06,2222  50 070 0            INDEX   RUPTREG1        SELECT NEW VALUE OF THIS BIT.
0218   REF  17  LAST  138      06,2223  3 5002 0            CAF     BIT14
0219   REF   4  LAST  139      06,2224  7 1320 0            MASK    IMODES30
0220   REF   7  LAST  140      06,2225  50 070 0            INDEX   RUPTREG1
0221   REF   1                 06,2226  0 2737 0            TC      IFAILJMP

0222   REF   2  LAST  140      06,2227  10 071 0   NXTIFAIL CCS     RUPTREG2        PROCESS ANY ADDITIONAL CHANGES.
0223   REF   3  LAST  140      06,2230  1 2214 0            TCF     NXTIFBIT -1
```

```
P0224   PROGRAM NAME:  TNONTEST.

R0225   FUNCTIONAL DESCRIPTION:  THIS PROGRAM HONORS REQUESTS FOR ISS INITIALIZATION.  ISS TURN-ON (CHANNEL 30 BIT 14)
R0227   AND ISS OPERATE (CHANNEL 30 BIT 9) REQUESTS ARE TREATED AS A PAIR AND PROCESSING TAKES PLACE .480 SECONDS
R0229   AFTER EITHER ONE APPEARS.  THIS INITIALIZATION TAKES ON ONE OF THE FOLLOWING THREE FORMS:

R0231           1)  ISS TURN-ON:  IN THIS SITUATION THE COMPUTER IS OPERATING WHEN THE ISS IS TURNED ON.  NOMINALLY,
R0233           BOTH ISS TURN-ON AND ISS OPERATE APPEAR.  THE PLATFORM IS CAGED FOR 90 SECONDS AND THE ICDU'S ZEROED
R0235           SO THAT AT THE END OF THE PROCESS THE GIMBAL LOCK MONITOR WILL FUNCTION PROPERLY.

R0237           2)  ICDU INITIALIZATION:  IN THIS CASE THE COMPUTER WAS PROBABLY TURNED ON WITH THE ISS IN OPERATE OR
R0239           A FRESH START WAS DONE WITH THE ISS IN OPERATE.  IN THIS CASE ONLY ISS OPERATE IS ON.  THE ICDU'S ARE
R0241           ZEROED SO THE GIMBAL LOCK MONITOR WILL FUNCTION.  AN EXCEPTION IS IF THE ISS IS IN GIMBAL LOCK AFTER
R0243           A RESTART, THE ICDU'S WILL NOT BE ZEROED.

R0244           3)  RESTART WITH RESTARTABLE PROGRAM USING THE IMU:  IN THIS CASE, NO INITIALIZATION TAKES PLACE SINCE
R0246           IT IS ASSUMED THAT THE USING PROGRAM DID THE INITIALIZATION AND THEREFORE T4RUPT SHOULD NOT INTERFERE.

R0248   IMODES30 BIT 7 IS SET = 1 BY THE FIRST BIT (CHANNEL 30 BIT 14 OR 9) WHICH ARRIVES.  FOLLOWING THIS, TNONTEST IS
R0250   ENTERED, FINDS BIT 7 = 1 BUT BIT 8 = 0, SO IT SETS BIT 8 = 1 AND EXITS.  THE NEXT TIME IT FINDS BIT 8 = 1 AND
R0252   PROCEEDS, SETTING BITS 8 AND 7 = 0.  AT PROCTNON, IF ISS TURN-ON REQUEST IS PRESENT, THE ISS IS CAGED (ZERO +
R0254   COARSE).  IF ISS OPERATE IS NOT PRESENT PROGRAM ALARM 00213 IS ISSUED.  AT THE END OF A 90 SECOND CAGE, BIT 2
R0256   OF IMODES30 IS TESTED.  IF IT IS = 1, ISS TURN-ON WAS NOT PRESENT FOR THE ENTIRE 90 SECONDS.  IN THAT CASE, IF
R0258   THE ISS TURN-ON REQUEST IS PRESENT THE 90 SECOND WAIT IS REPEATED, OTHERWISE NO ACTION OCCURS UNLESS A PROGRAM
R0260   WAS WAITING FOR THE INITIALIZATION IN WHICH CASE THE PROGRAM IS GIVEN AN IMUSTALL ERROR RETURN.  IF THE DELAY
R0262   WENT PROPERLY, THE ISS DELAY OUTBIT IS SENT AND THE ICDU'S ZEROED.  A TASK IS INITIATED TO REMOVE THE PIPA FAIL
R0264   INHIBIT BIT IN 10.24 SECONDS.  IF A MISSION PROGRAM WAS WAITING IT IS INFORMED VIA ENDIMU.

R0266   AT PROCTNON, IF ONLY ISS OPERATE IS PRESENT (OPONLY), THE CDU'S ARE ZEROED UNLESS THE PLATFORM IS IN COARSE
R0268   ALIGN (= GIMBAL LOCK HERE) OR A MISSION PROGRAM IS USING THE IMU (IMUSEFLG = 1).

R0270   CALLING SEQUENCE:  T4RUPT EVERY 480 MILLISECONDS AFTER IMUMON.

R0271   JOBS OR TASKS INITIATED:  1) ENDTNON, 90 SECONDS AFTER CAGING STARTED.  2) ISSUP, 4 SECONDS AFTER CAGING DONE.
R0273           3) PFAILOK, 10.24 SECONDS AFTER INITIALIZATION COMPLETED.  4) UNZ2, 320 MILLISECONDS AFTER ZEROING
R0275           STARTED.

R0276   SUBROUTINES CALLED:  CAGESUB, CAGESUB2, ZEROICDU, ENDIMU, IMUBAD, NOATTOFF, SETISSW, VARDELAY.

R0278   ERASABLE INITIALIZATION:  SEE IMUMON.

R0279   ALARMS:  PROGRAM ALARM 00213 IF ISS TURN-ON REQUESTED WITHOUT ISS OPERATE.

R0281   EXIT:  ENDTNON EXITS TO C33TEST.  TASKS HAVING TO DO WITH INITIALIZATION EXIT AS FOLLOWS:  MISSION PROGRAM
R0283   WAITING AND INITIALIZATION COMPLETE, EXIT TO ENDIMU, MISSION PROGRAM WAITING AND INITIALIZATION FAILED, EXIT TO
R0285   IMUBAD, IMU NOT IN USE, EXIT TO TASKOVER.

R0286   OUTPUT:  ISS INITIALIZED.

 0287   REF   5  LAST  140   06,2231  4 1320 0  TNONTEST CS     IMODES30        AFTER PROCESSING ALL CHANGES, SEE IF IT
```

```
0288   REF  12  LAST   66   06,2232  7 5011 0          MASK   BIT7          IS TIME TO ACT ON A TURN-ON SEQUENCE.
0289   REF   4  LAST  140   06,2233  10 000 0          CCS    A
0290   REF   1              06,2234  1 2367 0          TCF    C33TEST       NO - EXAMINE CHANNEL 33.

0291   REF  12  LAST   64   06,2235  3 5010 0          CAF    BIT8          SEE IF FIRST SAMPLE OR SECOND.
0292   REF   6  LAST  141   06,2236  7 1320 0          MASK   IMODES30
0293   REF   5  LAST  142   06,2237  10 000 0          CCS    A
0294   REF   1              06,2240  1 2244 0          TCF    PROCTNON      REACT AFTER SECOND SAMPLE.

0295   REF  13  LAST  142   06,2241  3 5010 0          CAF    BIT8          IF FIRST SAMPLE, SET BIT TO REACT NEXT
0296   REF   7  LAST  142   06,2242  27'320 0          ADS    IMODES30      TIME.
0297   REF   2  LAST  142   06,2243  1 2367 0          TCF    C33TEST

R0298                PROCESS IMU TURN-ON REQUESTS AFTER WAITING 1 SAMPLE FOR ALL SIGNALS TO ARRIVE.

0300   REF   1              06,2244  4 2757 1  PROCTNON CS     BITS7&8
0301   REF   8  LAST  142   06,2245  7 1320 0          MASK   IMODES30
0302   REF   9  LAST  142   06,2246  55'320 0          TS     IMODES30
0303   REF  18  LAST  140   06,2247  7 5002 1          MASK   BIT14         SEE IF TURN-ON REQUEST.
0304   REF   6  LAST  142   06,2250  10 000 0          CCS    A
0305   REF   1              06,2251  1 2342 1          TCF    OPONLY        OPERATE ON ONLY.

0306   REF  10  LAST  142   06,2252  4 1320 0          CS     IMODES30      IF TURN-ON REQUEST, WE SHOULD HAVE IMU
0307   REF  13  LAST  137   06,2253  7 5007 1          MASK   BIT9          OPERATE.
0308   REF   7  LAST  142   06,2254  10 000 0          CCS    A
0309                        06,2255  1 2260 0          TCF    +3

0310   REF   1              06,2256  0 5650 1          TC     ALARM         ALARM IF NOT.
0311                        06,2257   00213 1          OCT    213

0312   REF   1              06,2260  0 2717 1  +3      TC     CAGESUB

0313   REF   1              06,2261  3 2764 0          CAF    90SECS
0314   REF   1              06,2262  0 5245 1          TC     WAITLIST
0315   REF   1              E3,1474                    EBANK= CDUIND
0316   REF   1              06,2263   02270 0          2CADR  ENDTNON
0316   REF   1              06,2264   14063 1

0317   REF   3  LAST  142   06,2265  1 2367 0          TCF    C33TEST

0318   REF   2  LAST  142   06,2266  3 2764 0  RETNON  CAF    90SECS
0319   REF   1              06,2267  0 5272 0          TC     VARDELAY

0320   REF   9  LAST   65   06,2270  4 5016 1  ENDTNON CS     BIT2          RESET TURN-ON REQUEST FAIL BIT.
0321   REF  11  LAST  142   06,2271  7 1320 0          MASK   IMODES30
0322   REF  12  LAST  142   06,2272  57'320 1          XCH    IMODES30
0323   REF  10  LAST  142   06,2273  7 5016 1          MASK   BIT2          IF IT WAS OFF, SEND ISS DELAY COMPLETE.
0324                        06,2274  0 0006 1          EXTEND
0325   REF   1              06,2275  1 2310 0          BZF    ENDTNON2
```

```
0326   REF  19  LAST  142   06,2276  3 5002 0          CAF    BIT14          IF IT WAS ON AND TURN-ON REQUEST NOW
0327   REF  13  LAST  142   06,2277  7 1320 0          MASK   IMODES30       PRESENT, RE-ENTER 90 SEC DELAY IN WL.
0328                        06,2300  0 0006 1          EXTEND
0329   REF   1              06,2301  1 2266 0          BZF    RETNON

0330   REF  14  LAST   66   06,2302  4 0074 0          CS     STATE          IF IT IS NOT ON NOW, SEE IF A PROG WAS
0331   REF   1              06,2303  7 5010 1          MASK   IMUSEFLG       WAITING.
0332   REF   8  LAST  142   06,2304  10 000 0          CCS    A
0333   REF   1              06,2305  1 5324 0          TCF    TASKOVER
0334   REF   1              06,2306  0 4701 0          TC     POSTJUMP
0335   REF   1              06,2307   17522 1          CADR   IMUBAD         UNSUCCESSFUL TURN-ON.

0336   REF  11  LAST   66   06,2310  3 5001 0 ENDTNON2 CAF    BIT15          SEND ISS DELAY COMPLETE.
0337                        06,2311  0 0006 1          EXTEND
0338   REF   1              06,2312  05 012 1          WOR    CHAN12         TURN OFF ISS DELAY COUNTER
0339   REF   2  LAST  137   06,2313  0 4740 0          TC     IBNKCALL       TURN OFF NO ATT LAMP.
0340   REF   1              06,2314   17151 1          CADR   NOATTOFF

0341   REF   1              06,2315  0 5521 1 UNZ2     TC     ZEROICOU

0342   REF   1              06,2316  4 5027 0          CS     BITS465        REMOVE ZERO AND COARSE.
0343                        06,2317  0 0006 1          EXTEND
0344   REF   2  LAST  143   06,2320  03 012 1          WAND   CHAN12

0345   REF  11  LAST   63   06,2321  3 5005 1          CAF    BIT11          WAIT 10 SECS FOR CTRS TO FIND GIMBALS
0346   REF   2  LAST  142   06,2322  0 5272 0          TC     VARDELAY

0347   REF   1              06,2323  4 2754 1 ISSUP    CS     OCT54          REMOVE CAGING, IMU FAIL INHIBIT, AND
0348   REF  14  LAST  143   06,2324  7 1320 0          MASK   IMODES30       ICDUFAIL INHIBIT FLAGS.
0349   REF  15  LAST  143   06,2325  55'320 0          TS     IMODES30

0350   REF  11  LAST   64   06,2326  4 5012 0          CS     BIT6           ENABLE DAP
0351   REF   4  LAST  136   06,2327  7 1321 1          MASK   IMODES33
0352   REF   5  LAST  143   06,2330  55'321 1          TS     IMODES33

0353   REF   1              06,2331  0 2665 0          TC     SETISSW        ISS WARNING MIGHT HAVE BEEN INHIBITED.

0354   REF  12  LAST  143   06,2332  4 5001 1          CS     BIT15          REMOVE IMU DELAY COMPLETE DISCRETE.
0355                        06,2333  0 0006 1          EXTEND
0356   REF   3  LAST  143   06,2334  03 012 1          WAND   CHAN12

0357   REF   1              06,2335  3 5045 0          CAF    4SECS          DONT ENABLE PROG ALARM ON PIP FAIL FOR
0358   REF   2  LAST  142   06,2336  0 5245 1          TC     WAITLIST       ANOTHER 4 SECS.
0359   REF   2  LAST  142   E3,1474                    EBANK= CDUINO
0360   REF   1              06,2337   03137 1          2CADR  PFAILOK
0360   REF   1              06,2340   16063 0

0364   REF   2  LAST  143   06,2341  1 5324 0          TCF    TASKOVER

0367   REF  11  LAST   64   06,2342  3 5014 1 OPONLY   CAF    BIT4
```

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0368                          06,2343  0 0006 1          EXTEND
0369  REF   4  LAST  143      06,2344  02 012 0          RAND    CHAN12          IF OPERATE ON ONLY AND WE ARE IN COARSE
0370  REF   9  LAST  143      06,2345  10 000 0          CCS     A               ALIGN, DONT ZERO THE COUS BECAUSE WE
0371  REF   4  LAST  142      06,2346  1 2367 0          TCF     C33TEST         MIGHT BE IN GIMBAL LOCK. USE V41N20 TO
                                                                                 RECOVER.
0372  REF   2  LAST  143      06,2347  3 5010 0          CAF     IMUSEFLG        OTHERWISE, ZERO THE COUNTERS
0373  REF  15  LAST  143      06,2350  7 0074 0          MASK    STATE           UNLESS SOMEONE IS USING THE IMU.
0374  REF  10  LAST  144      06,2351  10 000 0          CCS     A
0375  REF   5  LAST  144      06,2352  1 2367 0          TCF     C33TEST

0376  REF   1                  06,2353  0 2730 1          TC      CAGESUB2        SET TURNON FLAGS.

0377  REF   3  LAST  143      06,2354  0 4740 0 ISSZERO  TC      IBNKCALL        TURN OFF NO ATT LAMP
0378  REF   2  LAST  143      06,2355   17151 1          CADR    NOATTOFF            IMU CAGE OFF ENTRY

0379  REF  10  LAST   64      06,2356  3 5013 0          CAF     BIT5            ISS COU ZERO
0380                          06,2357  0 0006 1          EXTEND
0381  REF   5  LAST  144      06,2360  05 012 1          WOR     CHAN12

03811 REF   2  LAST  143      06,2361  0 5521 1          TC      ZEROICDU
0382  REF  12  LAST  143      06,2362  3 5012 1          CAF     BIT6            WAIT 300 MS FOR AGS TO RECEIVE SIGNAL.
0383  REF   3  LAST  143      06,2363  0 5245 1          TC      WAITLIST
0384  REF   1                     1331                   EBANK=  OPTMODES
0385  REF   1                  06,2364   02315 1          2CADR   UNZ2
0385  REF   1                  06,2365   14062 0

0386  REF   6  LAST  144      06,2366  1 2367 0          TCF     C33TEST
```

```
R0387   PROGRAM NAME:  C33TEST

R0388   FUNCTIONAL DESCRIPTION:  THIS PROGRAM MONITORS THREE FLIP-FLOP INBITS OF CHANNEL 33 AND CALLS THE APPROPRIATE
R0390   SUBROUTINE TO PROCESS A CHANGE.  IT IS ANALOGOUS TO IMUMON, WHICH MONITORS CHANNEL 30, EXCEPT THAT IT READS
R0392   CHANNEL 33 WITH A WAND INSTRUCTION BECAUSE A 'WRITE' PULSE IS REQUIRED TO RESET THE FLIP-FLOPS.  THE BITS
R0394   PROCESSED AND THE SUBROUTINES CALLED ARE:

R0395            BIT    FUNCTION              SUBROUTINE
R0396            ---    --------              ----------
R0397             13    PIPA FAIL             PIPFAIL
R0398             12    DOWNLINK TOO FAST     DNTMFAST
R0399             11    UPLINK TOO FAST       UPTMFAST

R0400   UPON ENTRY TO THE SUBROUTINE, THE NEW BIT STATE IS IN A.

R0401   CALLING SEQUENCE:  EVERY 480 MILLISECONDS AFTER TNONTEST.

R0402   JOBS OR TASKS INITIATED:  NONE.

R0403   SUBROUTINES CALLED:  PIPFAIL, DNTMFAST AND UPTMFAST ON BIT CHANGES.

R0404   ERASABLE INITIALIZATION:  C(IMODES33) = OCT 16000 ON A FRESH START OR RESTART, THEREFORE, THESE ALARMS WILL
R0406   REAPPEAR IF THE CONDITIONS PERSIST.

R0407   ALARMS:  NONE.

R0408   EXIT:  GLOCKMON.

R0409   OUTPUT:  UPDATED BITS 13, 12 AND 11 OF IMODES33 WITH CHANGES PROCESSED.

 0410   REF   6  LAST  143   06,2367  3 1321 0  C33TEST  CA     IMODES33      SEE IF RELEVANT CHAN 33 BITS HAVE
 0411   REF   1              06,2370  7 5070 1            MASK   33RDMSK
 0412   REF   2  LAST   41   06,2371  54 001 1            TS     L             CHANGED.
 0413   REF   2  LAST  145   06,2372  3 5070 0            CAF    33RDMSK
 0414                        06,2373  0 0006 1            EXTEND
 0415   REF   1              06,2374  03 033 1            WAND   CHAN33        RESETS FLIP-FLOP INPUTS.
 0416                        06,2375  0 0006 1            EXTEND
 0417   REF   3  LAST  139   06,2376  06 001 0            RXOR   LCHAN
 0418                        06,2377  0 0006 1            EXTEND
 0419   REF   1              06,2400  1 2427 0            BZF    GLOCKMON      ON NO CHANGE.

 0420   REF   8  LAST  140   06,2401  54 070 1            TS     RUPTREG1      SAVE BITS WHICH HAVE CHANGED.
 0421   REF   7  LAST  145   06,2402  23'321 0            LXCH   IMODES33
 0422                        06,2403  0 0006 1            EXTEND
 0423   REF   4  LAST  145   06,2404  06 001 0            RXOR   LCHAN
 0424   REF   8  LAST  145   06,2405  55'321 1            TS     IMODES33      UPDATED IMODES33.

 0425   REF   3  LAST  139   06,2406  3 5021 1            CAF    ZERO
 0426   REF   9  LAST  145   06,2407  56 070 0            XCH    RUPTREG1
 0427                        06,2410  6 0000 1            DOUBLE
```

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0428  REF   1                 06,2411  1 2414 0            TCF    NXTIBT +1       SCAN FOR BIT CHANGES.

0429  REF   4  LAST  140      06,2412  6 5017 1   -1       AD     ONE
0430  REF  10  LAST  145      06,2413  24 070 0   NXTIBT   INCR   RUPTREG1
0431                          06,2414  6 0000 1   +1       DOUBLE
0432  REF  11  LAST  144      06,2415  54 000 0            TS     A               (CODING IDENTICAL TO CHAN 30).
0433  REF   2  LAST  146      06,2416  1 2413 1            TCF    NXTIBT

0434  REF   3  LAST  140      06,2417  56 071 1            XCH    RUPTREG2
0435  REF  11  LAST  146      06,2420  50 070 0            INDEX  RUPTREG1        GET NEW VALUE OF BIT WHICH CHANGED.
0436  REF  13  LAST   66      06,2421  3 5003 1            CAF    BIT13
0437  REF   9  LAST  145      06,2422  7 1321 1            MASK   IMODES33
0438  REF  12  LAST  146      06,2423  50 070 0            INDEX  RUPTREG1
0439  REF   1                 06,2424  0 2745 0            TC     C33JMP

0440  REF   4  LAST  146      06,2425  10 071 0   NXTFL33  CCS    RUPTREG2        PROCESS POSSIBLE ADDITIONAL CHANGES.
0441  REF   3  LAST  146      06,2426  1 2412 0            TCF    NXTIBT -1
```

```
P0442   PROGRAM NAME:  GLOCKMON

R0443   FUNCTIONAL DESCRIPTION:  THIS PROGRAM MONITORS THE CDUZ COUNTER TO DETERMINE WHETHER THE ISS IS IN GIMBAL LOCK
R0445   AND TAKES ACTION IF IT IS.  THREE REGIONS OF MIDDLE GIMBAL ANGLE (MGA) ARE USED:

R0447           1) ABS(MGA) LESS THAN OR EQUAL TO 70 DEGREES - NORMAL MODE.
R0448           2) ABS(MGA) GREATER THAN 70 DEGREES AND LESS THAN OR EQUAL TO 85 DEGREES - GIMBAL LOCK LAMP TURNED ON.
R0450           3) ABS(MGA) GREATER THAN 85 DEGREES - ISS PUT IN COARSE ALIGN AND NO ATT LAMP TURNED ON.

R0452   CALLING SEQUENCE:  EVERY 480 MILLISECONDS AFTER C33TEST.

R0453   JOBS OR TASKS INITIATED:  NONE.

R0454   SUBROUTINES CALLED:  1) SETCOARS WHEN ABS(MGA) GREATER THAN 85 DEGREES AND ISS NOT IN COARSE ALIGN.
R0455                        2) LAMPTEST BEFORE TURNING OFF GIMBAL LOCK LAMP.

R0457   ERASABLE INITIALIZATION:
R0458           1) FRESH START OR RESTART WITH NO GROUPS ACTIVE:  C(CDUZ) = 0, IMODES30 BIT 6 = 0, IMODES33 BIT 1 = 0.
R0460           2) RESTART WITH GROUPS ACTIVE:  SAME AS FRESH START EXCEPT C(CDUZ) NOT CHANGED SO GIMBAL MONITOR
R0462                                           PROCEEDS AS BEFORE.

R0463   ALARMS:  1) MGA REGION (2) CAUSES GIMBAL LOCK LAMP TO BE LIT.
R0464           2) MGA REGION (3) CAUSES THE ISS TO BE PUT IN COARSE ALIGN AND THE NO ATT LAMP TO BE LIT IF EITHER NOT
R0465              SO ALREADY.

0467   REF   1                  06,2427  10 034 1  GLOCKMON CCS     CDUZ
0468   REF   1                  06,2430  1 2434 1            TCF     GLOCKCHK        SEE IF MAGNITUDE OF MGA IS GREATER THAN
0469   REF   1                  06,2431  1 2460 0            TCF     SETGLOCK        70 DEGREES.
0470   REF   2  LAST  147       06,2432  1 2434 1            TCF     GLOCKCHK
0471   REF   2  LAST  147       06,2433  1 2460 0            TCF     SETGLOCK

0472   REF   1                  06,2434  6 2503 0  GLOCKCHK  AD      -70DEGS
0473                            06,2435  0 0006 1            EXTEND
0474   REF   3  LAST  147       06,2436  6 2457 0            BZMF    SETGLOCK -1     NO LOCK.

0475   REF   1                  06,2437  6 2506 0            AD      -15DEGS         SEE IF ABS(MGA) GREATER THAN 85 DEGS.
0476                            06,2440  0 0006 1            EXTEND
0477   REF   1                  06,2441  6 2455 1            BZMF    NOGIMRUN

0478   REF  12  LAST  143       06,2442  3 5014 1            CAF     BIT4            IF SO, SYSTEM SHOULD BE IN COARSE ALIGN
0479                            06,2443  0 0006 1            EXTEND                  TO PREVENT GIMBAL RUN-AWAY.
0480   REF   6  LAST  144       06,2444  02 012 0            RAND    CHAN12
0481   REF  12  LAST  146       06,2445  10 000 0            CCS     A
0482   REF   2  LAST  147       06,2446  1 2455 0            TCF     NOGIMRUN

0483   REF   4  LAST  144       06,2447  0 4740 0            TC      IBNKCALL        GO INTO COARSE ALIGN.
0484   REF   1                  06,2450   17027 1            CADR    SETCOARS

0485   REF   1                  06,2451  3 6211 0            CAF     SIX             ENABLE ISS ERROR COUNTERS IN 60 MS
0486   REF   4  LAST  144       06,2452  0 5245 1            TC      WAITLIST
```

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0487   REF   3  LAST  143   E3,1474                        EBANK= CDUIND
0488   REF   1              06,2453   03023 0              2CADR  CA+ECE
0488   REF   1              06,2454   16063 0
0489   REF  13  LAST  144   06,2455   3 5012 1  NOGIMRUN   CAF    BIT6          TURN ON GIMBAL LOCK LAMP.
0490   REF   4  LAST  147   06,2456   1 2460 0             TCF    SETGLOCK

0491   REF   4  LAST  145   06,2457   3 5021 1    -1       CAF    ZERO
0492   REF   6  LAST  135   06,2460   6 1036 0  SETGLOCK   AD     DSPTAB +11D   SEE IF PRESENT STATE OF GIMBAL LOCK LAMP
0493   REF  14  LAST  148   06,2461   7 5012 0             MASK   BIT6          AGREES WITH DESIRED STATE BY HALF ADDING
0494                        06,2462   0 0006 1             EXTEND               THE TWO.
0495   REF   1              06,2463   1 5333 0             BZF    GLOCKOK       OK AS IS.

0496   REF   7  LAST  148   06,2464   7 1036 1             MASK   DSPTAB +11D   IF OFF, DONT TURN ON IF IMU BEING CAGED.
0497   REF  13  LAST  147   06,2465   10 000 0             CCS    A
0498   REF   1              06,2466   1 2502 0             TCF    GLAMPTST      TURN OFF UNLESS LAMP TEST IN PROGRESS.

0499   REF  15  LAST  148   06,2467   3 5012 1             CAF    BIT6
0500   REF  16  LAST  143   06,2470   7 1320 0             MASK   IMODES30
0501   REF  14  LAST  148   06,2471   10 000 0             CCS    A
0502   REF   2  LAST  148   06,2472   1 5333 0             TCF    GLOCKOK

0503   REF   8  LAST  148   06,2473   4 1036 1  GLINVERT   CS     DSPTAB +11D   INVERT GIMBAL LOCK LAMP.
0504   REF  16  LAST  148   06,2474   7 5012 0             MASK   BIT6
0505   REF  13  LAST  143   06,2475   6 5001 0             AD     BIT15         TO INDICATE CHANGE IN DSPTAB +11D.
0506   REF   9  LAST  148   06,2476   57'036 0             XCH    DSPTAB +11D
0507   REF   1              06,2477   7 2164 1             MASK   OCT37737
0508   REF  10  LAST  148   06,2500   27'036 1             ADS    DSPTAB +11D
0509   REF   3  LAST  148   06,2501   1 5333 0             TCF    GLOCKOK

0510   REF   1              06,2502   0 2750 1  GLAMPTST   TC     LAMPTEST      TURN OFF UNLESS LAMP TEST IN PROGRESS.
0511   REF   4  LAST  148   06,2503   1 5333 0             TCF    GLOCKOK
0512   REF   1              06,2504   1 2473 1             TCF    GLINVERT

0513                        06,2505    63434 1  -70DEGS    DEC    -.38888       -70 DEGREES SCALED IN HALF-REVOLUTIONS.
0514                        06,2506    75252 0  -15DEGS    DEC    -.08333
```

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P0515   PROGRAM NAME:  TLIM.

R0516   FUNCTIONAL DESCRIPTION:  THIS PROGRAM MAINTAINS THE TEMP LAMP (BIT 4 OF CHANNEL 11) ON THE DSKY TO AGREE WITH
R0518   THE TEMP SIGNAL FROM THE ISS (BIT 15 OF CHANNEL 30).  HOWEVER, THE LIGHT WILL NOT BE TURNED OFF IF A LAMP TEST
R0520   IS IN PROGRESS.

R0521   CALLING SEQUENCE:  CALLED BY IMUMON ON A CHANGE OF BIT 15 OF CHANNEL 30.

R0522   JOBS OR TASKS INITIATED:  NONE.

R0523   SUBROUTINES CALLED:  LAMPTEST.

R0524   ERASABLE INITIALIZATION:  FRESH START AND RESTART TURN THE TEMP LAMP OFF.

R0526   ALARMS:  TEMP LAMP TURNED ON WHEN IMU TEMP GOES OUT OF LIMITS.

R0527   EXIT:  NXTIFAIL.

R0528   OUTPUT:  SERVICE OF TEMP LAMP.                                          IN A, EXCEPT FOR TLIM.

 0530   REF   1              06,2507  7 4777 0  TLIM     MASK   POSMAX         REMOVE BIT FROM WORD OF CHANGES AND SET
 0531   REF   5  LAST  146   06,2510  54 071 0           TS     RUPTREG2       DSKY TEMP LAMP ACCORDINGLY.
 0532   REF  17  LAST  148   06,2511  11'320 0           CCS    IMODES30
 0533   REF   1              06,2512  1 2520 0           TCF    TEMPOK
 0534   REF   2  LAST  149   06,2513  1 2520 0           TCF    TEMPOK

 0535   REF  13  LAST  147   06,2514  3 5014 1           CAF    BIT4           TURN ON LAMP.
 0536                        06,2515  0 0006 1           EXTEND
 0537   REF   1              06,2516  05 011 1           WOR    DSALMOUT
 0538   REF   1              06,2517  1 2227 0           TCF    NXTIFAIL

 0539   REF   2  LAST  148   06,2520  0 2750 1  TEMPOK   TC     LAMPTEST       IF TEMP NOW OK, DONT TURN OFF LAMP IF
 0540   REF   2  LAST  149   06,2521  1 2227 0           TCF    NXTIFAIL       LAMP TEST IN PROGRESS.

 0541   REF  14  LAST  149   06,2522  4 5014 0           CS     BIT4
 0542                        06,2523  0 0006 1           EXTEND
 0543   REF   2  LAST  149   06,2524  03 011 1           WAND   DSALMOUT       TURN OFF TEMP CAUTION
 0544   REF   3  LAST  149   06,2525  1 2227 0           TCF    NXTIFAIL
```

P0545 PROGRAM NAME: ITURNON.

R0546 FUNCTIONAL DESCRIPTION: THIS PROGRAM IS CALLED BY IMUMON WHEN A CHANGE OF BIT 14 OF CHANNEL 30 (ISS TURN-ON
R0548 REQUEST) IS DETECTED. UPON ENTRY, ITURNON CHECKS IF A TURN-ON DELAY SEQUENCE HAS FAILED, AND IF SO, IT EXITS.
R0550 IF NOT, IT CHECKS WHETHER THE TURN-ON REQUEST CHANGE IS TO ON OR OFF. IF ON, IT SETS BIT 7 OF IMODES30 TO 1 SO
R0552 THAT TNONTEST WILL INITIATE THE ISS INITIALIZATION SEQUENCE. IF OFF, THE TURN-ON DELAY SIGNAL, CHANNEL 12 BIT
R0554 15, IS CHECKED AND IF IT IS ON, ITURNON EXITS. IF THE DELAY SIGNAL IS OFF, PROGRAM ALARM 00207 IS ISSUED, BIT 2
R0556 OF IMODES30 IS SET TO 1 AND THE PROGRAM EXITS.
R0557 THE SETTING OF BIT 2 OF IMODES30 (ISS DELAY SEQUENCE FAIL) INHIBITS THIS ROUTINE AND IMUOP FROM
R0559 PROCESSING ANY CHANGES. THIS BIT WILL BE RESET BY THE ENDTNON ROUTINE WHEN THE CURRENT 90 SECOND DELAY PERIOD
R0561 ENDS.

R0562 CALLING SEQUENCE: FROM IMUMOM WHEN ISS TURN-ON REQUEST CHANGES STATE.

R0563 JOBS OR TASKS INITIATED: NONE.

R0564 SUBROUTINES CALLED: ALARM, IF THE ISS TURN-ON REQUEST IS NOT PRESENT FOR 90 SECONDS.

R0566 ERASABLE INITIALIZATION: FRESH START AND RESTART SET BIT 15 OF CHANNEL 12 AND BITS 2 AND 7 OF IMODES30 TO 0,
R0568 AND BIT 14 OF IMODES30 TO 1.

R0569 ALARMS: PROGRAM ALARM 00207 IS ISSUED IF THE ISS TURN-ON REQUEST SIGNAL IS NOT PRESENT FOR 90 SECONDS.

R0571 EXIT: NXTIFAIL.

R0572 OUTPUT: BIT 7 OF IMODES30 TO START ISS INITIALIZATION, OR BIT 2 OF IMODES30 AND PROGRAM ALARM 00207 TO INDICATE
R0574 A FAILED TURN-ON SEQUENCE.

```
0575   REF  11  LAST  142   06,2526  3 5016 0  ITURNON  CAF    BIT2          IF DELAY REQUEST HAS GONE OFF
0576   REF  18  LAST  149   06,2527  7 1320 0           MASK   IMODES30      PREMATURELY, DO NOT PROCESS ANY CHANGES
0577   REF  15  LAST  148   06,2530  10 000 0           CCS    A             UNTIL THE CURRENT 90 SEC WAIT EXPIRES.
0578   REF   4  LAST  149   06,2531  1 2227 0           TCF    NXTIFAIL

0579   REF  20  LAST  143   06,2532  3 5002 0           CAF    BIT14         SEE IF JUST ON OR OFF.
0580   REF  19  LAST  150   06,2533  7 1320 0           MASK   IMODES30
0581                        06,2534  0 0006 1           EXTEND
0582   REF   1              06,2535  1 2551 0           BZF    ITURNON2      IF JUST ON.

0583   REF  14  LAST  148   06,2536  3 5001 0           CAF    BIT15
0584                        06,2537  0 0006 1           EXTEND                SEE IF DELAY PRESENT DISCRETE HAS BEEN
0585   REF   7  LAST  147   06,2540  02 012 0           RAND   CHAN12        SENT. IF SO, ACTION COMPLETE.
0586                        06,2541  0 0006 1           EXTEND
0587                        06,2542  1 2544 1           BZF    +2
0588   REF   5  LAST  150   06,2543  1 2227 0           TCF    NXTIFAIL

0589   REF  12  LAST  150   06,2544  3 5016 0           CAF    BIT2          IF NOT, SET BIT TO INDICATE REQUEST NOT
0590   REF  20  LAST  150   06,2545  27'320 0           ADS    IMODES30      PRESENT FOR FULL DURATION.
0591   REF   2  LAST  142   06,2546  0 5650 1           TC     ALARM
0592                        06,2547   00207 1           OCT    207
0593   REF   6  LAST  150   06,2550  1 2227 0           TCF    NXTIFAIL
```

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0594   REF  21  LAST  150   06,2551  4 1320 0  ITURNON2 CS     IMODES30       SET BIT7 TO INDICATE WAIT OF 1 SAMPLE
0595   REF  13  LAST  142   06,2552  7 5011 0           MASK   BIT7
0596   REF  22  LAST  151   06,2553  27'320 0           ADS    IMODES30
0597   REF   7  LAST  150   06,2554  1 2227 0           TCF    NXTIFAIL
```

R0598 PROGRAM NAME: IMUCAGE.

R0599 FUNCTIONAL DESCRIPTION: THIS PROGRAM PROCESSES CHANGES OF THE IMUCAGE INBIT, CHANNEL 30 BIT 11. IF THE BIT
R0601 CHANGES TO 0 (CAGE BUTTON PRESSED), THE ISS IS CAGED (ICDU ZERO + COARSE ALIGN + NO ATT LAMP) UNTIL THE
R0603 ASTRONAUT SELECTS ANOTHER PROGRAM TO ALIGN THE ISS. ANY PULSE TRAINS TO THE ICDU'S AND GYRO'S ARE TERMINATED,
R0605 THE ASSOCIATED OUTCOUNTERS ARE ZEROED AND THE GYRO'S ARE DE-SELECTED. NO ACTION OCCURS WHEN THE BUTTON IS
R0607 RELEASED (INBIT CHANGES TO 1).

R0608 CALLING SEQUENCE: BY IMUMON WHEN IMU CAGE BIT CHANGES.

R0609 JOBS OR TASKS INITIATED: NONE.

R0610 SUBROUTINES CALLED: CAGESUB.

R0611 ERASABLE INITIALIZATION: FRESH START AND RESTART SET BIT 11 OF IMODES30 TO 1.

R0613 ALARMS: NONE.

R0614 EXIT: NXTIFAIL.

R0615 OUTPUT: ISS CAGED, COUNTERS ZEROED, PULSE TRAINS TERMINATED AND NO ATT LAMP LIT.

```
 0617   REF  16  LAST  150   06,2555  10 000 0  IMUCAGE  CCS    A                NO ACTION IF GOING OFF.
 0618   REF   1               06,2556   1 2354 0          TCF    ISSZERO
 0619   REF   1               06,2557   4 2762 1          CS     OCT77000        TERMINATE ICDU,OPTICS,GYRO PULSE TRAINS
 0620                         06,2560   0 0006 1          EXTEND
 0621   REF   1               06,2561   03 014 1          WAND   CHAN14

 0622   REF   1               06,2562   4 2756 0          CS     OCT272          KNOCK DOWN TVC ENABLE, IMU ERROR COUNTER
 0623                         06,2563   0 0006 1          EXTEND                      ENABLE, ZERO ICDU, COARSE ALIGN
 0624   REF   8  LAST  150    06,2564   03 012 1          WAND   CHAN12               ENABLE, OPTICS ERR CNTR ENABLE

 0625   REF  14  LAST  146    06,2565   4 5003 0          CS     BIT13           TURN OFF ENGINE
 0626                         06,2566   0 0006 1          EXTEND
 0627   REF   3  LAST  149    06,2567   03 011 1          WAND   DSALMOUT

 0628   REF   1               06,2570   0 2725 0          TC     CAGESUB1

 0629   REF   5  LAST  147    06,2571   0 4740 0          TC     IBNKCALL        KNOCK DOWN TRACK, REFSMMAT, DRIFT FLAGS
 0630   REF   1               06,2572    17060 1          CADR   RNDREFDR

 0631   REF   5  LAST  148    06,2573   4 5021 0          CS     ZERO            ZERO COMMAND OUT-COUNTERS
 0632   REF   1               06,2574   54 050 0          TS     COUXCMD
 0633   REF   1               06,2575   54 051 1          TS     COUYCMD
 0634   REF   1               06,2576   54 052 1          TS     COUZCMD
 0635   REF   1               06,2577   54 047 0          TS     GYROCMD

 0636   REF   1               05,2600   4 2761 1          CS     OCT740          HAVING WAITED AT LEAST 27 MCT FROM
 0637                         06,2601   0 0006 1          EXTEND                  GYRO PULSE TRAIN TERMINATION, WE CAN
 0638   REF   2  LAST  152    06,2602   03 014 1          WAND   CHAN14           DE-SELECT THE GYROS.
```

L T4RUPT PROGRAM USER'S PAGE NO. 21 EO S3

0639 REF 8 LAST 151 06,2603 1 2227 0 TCF NXTIFAIL

R0640 PROGRAM NAME: IMUOP.

R0641 FUNCTIONAL DESCRIPTION: THIS PROGRAM PROCESSES CHANGES IN THE ISS OPERATE DISCRETE, BIT 9 OF CHANNEL 30.
R0643 IF THE INBIT CHANGES TO 0, INDICATING ISS ON, IMUOP GENERALLY SETS BIT 7 OF IMODES30 TO 1 TO REQUEST ISS
R0645 INITIALIZATION VIA TNONTEST. AN EXCEPTION IS DURING A FAILED ISS DELAY DURING WHICH BIT 2 OF IMODES30 IS SET
R0647 TO 1 AND NO FURTHER INITIALIZATION IS REQUIRED. WHEN THE INBIT CHANGES TO 1, INDICATING ISS OFF, IMUSEFLG IS
R0649 TESTED TO SEE IF ANY PROGRAM WAS USING THE ISS. IF SO, PROGRAM ALARM 00214 IS ISSUED.

R0651 CALLING SEQUENCE: BY IMUMON WHEN BIT 9 OF CHANNEL 30 CHANGES.

R0652 JOBS OR TASKS INITIATED: NONE.

R0653 SUBROUTINES CALLED: ALARM, IF ISS IS TURNED OFF WHILE IN USE.

R0654 ERASABLE INITIALIZATION: ON FRESH START AND RESTART, BIT 9 OF IMODES30 IS SET TO 1 EXCEPT WHEN THE GIMBAL LOCK
R0656 LAMP IS ON, IN WHICH CASE IT IS SET TO 0. THIS PREVENTS ICDU ZERO BY TNONTEST WITH THE ISS IN GIMBAL LOCK.

R0658 ALARMS: PROGRAM ALARM 00214 IF THE ISS IS TURNED OFF WHILE IN USE.

R0659 EXIT: NXTIFAIL.

R0660 OUTPUT: ISS INITIALIZATION REQUEST (IMODES30 BIT 7) OR PROGRAM ALARM 00214.

```
0662                          06,2604  0 0006 1  IMUOP    EXTEND                IF OPERATE JUST ON, WAIT 1 SAMPLE.
0663   REF   1               06,2605  1 2625 0           BZF     IMUOP2

0664   REF  10  LAST  146    06,2606  4 1321 1           CS      IMODES33      DISABLE DAP
0665   REF  17  LAST  148    06,2607  7 5012 0           MASK    BIT6
0666   REF  11  LAST  154    06,2610  27'321 1           ADS     IMODES33

0667   REF   6  LAST  152    06,2611  0 4740 0           TC      IBNKCALL      KNOCK DOWN TRACK, REFSMMAT, DRIFT FLAGS
0668   REF   2  LAST  152    06,2612   17060 1           CADR    RNDREFDR

0669   REF   2  LAST  142    06,2613  4 2757 1           CS      BITS7&8       KNOCK DOWN RENDEVOUS, IMUUSE FLAGS
0670   REF  16  LAST  144    06,2614  7 0074 0           MASK    STATE
0671   REF  17  LAST  154    06,2615  56 074 1           XCH     STATE         IF GOING OFF, ALARM IF PROG USING IMU
0672                          06,2616  4 0000 0           COM
0673   REF   3  LAST  144    06,2617  7 5010 1           MASK    IMUSEFLG
0674   REF  17  LAST  152    06,2620  10 000 0           CCS     A
0675   REF   9  LAST  153    06,2621  1 2227 0           TCF     NXTIFAIL

0676   REF   3  LAST  150    06,2622  0 5550 1           TC      ALARM
0677                          06,2623   00214 0          OCT     214
0678   REF  10  LAST  154    06,2624  1 2227 0           TCF     NXTIFAIL

0679   REF  13  LAST  150    06,2625  3 5016 0  IMUOP2   CAF     BIT2          SEE IF FAILED ISS TURN-ON SEQ IN PROG.
0680   REF  23  LAST  151    06,2626  7 1320 0           MASK    IMODES30
0681   REF  18  LAST  154    06,2627  10 000 0           CCS     A
0682   REF  11  LAST  154    06,2630  1 2227 0           TCF     NXTIFAIL      IF SO, DONT PROCESS UNTIL PRESENT 90
0683   REF   2  LAST  150    06,2631  1 2551 0           TCF     ITURNON2      SECONDS EXPIRES.
```

```
R0684   PROGRAM NAME:  PIPFAIL

R0685   FUNCTIONAL DESCRIPTION:  THIS PROGRAM PROCESSES CHANGES OF BIT 13 OF CHANNEL 33, PIPA FAIL.  IT SETS BIT 10 OF
R0687   IMODES30 TO AGREE.  IT CALLS SETISSW IN CASE A PIPA FAIL NECESSITATES AN ISS WARNING.  IF NOT,I.E., IMODES30
R0689   BIT 1 = 1, AND A PIPA FAIL IS PRESENT AND THE ISS IS NOT BEING INITIALIZED, PROGRAM ALARM 00212 IS ISSUED.

R0691   CALLING SEQUENCE:  BY C33TEST ON CHANGES OF CHANNEL 33 BIT 13.

R0692   JOBS OR TASKS INITIATED:  NONE.

R0693   SUBROUTINES CALLED:  1) SETISSW, AND 2) ALARM (SEE FUNCTIONAL DESCRIPTION).

R0695   ERASABLE INITIALIZATION:  SEE IMUMON FOR INITIALIZATION OF IMODES30.  THE RELAVANT BITS ARE 5, 7, 8, 9, AND 10.

R0697   ALARMS:  PROGRAM ALARM 00212 IF PIPA FAIL IS PRESENT BUT NEITHER ISS WARNING IS TO BE ISSUED NOR THE ISS IS
R0699   BEING INITIALIZED.

R0700   EXIT:  NXTFL33.

R0701   OUTPUT:  PROGRAM ALARM 00212 AND ISS WARNING MAINTENANCE.

 0702   REF  19  LAST  154   06,2632  10 000 0  PIPFAIL  CCS    A          SET BIT10 IN IMODES30 SO ALL ISS WARNING
 0703   REF  11  LAST   64   06,2633  3 5006 1           CAF    BIT10      INFO IS IN ONE REGISTER.
 0704   REF  24  LAST  154   06,2634  57'320 1           XCH    IMODES30
 0705   REF   1              06,2635  7 2763 0           MASK   -BIT10
 0706   REF  25  LAST  155   06,2636  27'320 0           ADS    IMODES30

 0707   REF   2  LAST  143   06,2637  0 2665 0           TC     SETISSW

 0708   REF  26  LAST  155   06,2640  4 1320 0           CS     IMODES30   IF PIP FAIL DOESNT LIGHT ISS WARNING, DO
 0709   REF  11  LAST   65   06,2641  7 5017 0           MASK   BIT1       A PROGRAM ALARM IF IMU OPERATING BUT NOT
 0710   REF  20  LAST  155   06,2642  10 000 0           CCS    A          CAGED OR BEING TURNED ON.
 0711   REF   1              06,2643  1 2425 1           TCF    NXTFL33

 0712   REF  27  LAST  155   06,2644  3 1320 1           CA     IMODES30
 0713   REF   1              06,2645  7 2760 0           MASK   OCT1720
 0714   REF  21  LAST  155   06,2646  10 000 0           CCS    A
 0715   REF   2  LAST  155   06,2647  1 2425 1           TCF    NXTFL33    ABOVE CONDITION NOT MET.

 0716   REF   4  LAST  154   06,2650  0 5650 1           TC     ALARM
 0717                        06,2651   00212 0           OCT    212
 0718   REF   3  LAST  155   06,2652  1 2425 1           TCF    NXTFL33
```

P0719 PROGRAM NAMES: DNTMFAST, UPTMFAST

R0720 FUNCTIONAL DESCRIPTION: THESE PROGRAMS PROCESS CHANGES OF BITS 12 AND 11 OF CHANNEL 33. IF A BIT CHANGES TO A
R0722 0, A PROGRAM ALARM IS ISSUED. THE ALARMS ARE:

R0723	BIT	ALARM	CAUSE
R0724	---	-----	-----
R0725	12	01105	DOWNLINK TOO FAST
R0726	11	01106	UPLINK TOO FAST

R0727 CALLING SEQUENCE: BY C33TEST ON A BIT CHANGE.

R0728 SUBROUTINES CALLED: ALARM, IF A BIT CHANGES TO A 0.

R0729 ERASABLE INITIALIZATION: FRESH START OR RESTART, BITS 12 AND 11 OF IMODES33 ARE SET TO 1.

R0731 ALARMS: SEE FUNCTIONAL DESCRIPTION.

R0732 EXIT: NXTFL33.

R0733 OUTPUT: PROGRAM ALARM ON A BIT CHANGE TO 0.

```
 0734   REF  22  LAST  155   06,2653  10 000 0  DNTMFAST CCS    A              DO PROG ALARM IF TM TOO FAST.
 0735   REF   4  LAST  155   06,2654  1 2425 1            TCF    NXTFL33

 0736   REF   5  LAST  155   06,2655  0 5650 1            TC     ALARM
 0737                        06,2656   01105 1            OCT    1105
 0738   REF   5  LAST  156   06,2657  1 2425 1            TCF    NXTFL33

 0739   REF  23  LAST  156   06,2660  10 000 0  UPTMFAST CCS    A              SAME AS DNLINK TOO FAST WITH DIFFERENT
 0740   REF   6  LAST  156   06,2661  1 2425 1            TCF    NXTFL33        ALARM CODE.

 0741   REF   6  LAST  156   06,2662  0 5650 1            TC     ALARM
 0742                        06,2663   01106 1            OCT    1106
 0743   REF   7  LAST  156   06,2664  1 2425 1            TCF    NXTFL33
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P0744   PROGRAM NAME:  SETISSW

R0745   FUNCTIONAL DESCRIPTION:  THIS PROGRAM TURNS THE ISS WARNING LAMP ON AND OFF (CHANNEL 11 BIT 1 = 1 FOR ON,
R0747   0 FOR OFF) DEPENDING ON THE STATUS OF IMODES30 BITS 13 (IMU FAIL) AND 4 (INHIBIT IMU FAIL), 12 (ICDU FAIL) AND
R0749   3 (INHIBIT ICDU FAIL), AND 10 (PIPA FAIL) AND 1 (INHIBIT PIPA FAIL).  THE LAMP IS LEFT ON IF A LAMP TEST IS IN
R0751   PROGRESS.

R0752   CALLING SEQUENCE:  CALLED BY IMUMON ON CHANGES TO IMU FAIL AND ICDU FAIL.  CALLED BY IFAILOK AND PFAILOK UPON
R0754   REMOVAL OF THE FAIL INHIBITS.  CALLED BY PIPFAIL WHEN THE PIPA FAIL DISCRETE CHANGES.  IT IS CALLED BY PIPUSE
R0756   SINCE THE PIPA FAIL PROGRAM ALARM MAY NECESSITATE AN ISS WARNING, AND LIKEWISE BY PIPFREE WHEN THE ALARM DEPARTS
R0758   AND IT IS CALLED BY IMUZERO3 AND ISSUP AFTER THE FAIL INHIBITS HAVE BEEN REMOVED.

R0760   JOBS OR TASKS INITIATED:  NONE.

R0761   SUBROUTINES CALLED:  NONE.

R0762   ERASABLE INITIALIZATION:

R0763           1) IMODES30 - SEE IMUMON.
R0764           2) IMODES33 BIT 1 = 0 (LAMP TEST NOT IN PROGRESS).

R0765   ALARMS:  ISS WARNING.

R0766   EXIT:  VIA Q.

R0767   OUTPUT:  ISS WARNING LAMP SET PROPERLY.

 0768   REF   1                 06,2665  3 5025 0  SETISSW  CAF    OCT15          SET ISS WARNING USING THE FAIL BITS IN
 0769   REF  28  LAST  155      06,2666  7 1320 0            MASK   IMODES30       BITS 13, 12, AND 10 OF IMODES30 AND THE
 0770                           06,2667  0 0006 1            EXTEND                 FAILURE INHIBIT BITS IN POSITIONS
 0771   REF  12  LAST  155      06,2670  7 5006 0            MP     BIT10           4, 3, AND 1.
 0772   REF  29  LAST  157      06,2671  3 1320 1            CA     IMODES30
 0773                           06,2672  0 0006 1            EXTEND
 0774   REF   5  LAST  145      06,2673  04 001 1            ROR    LCHAN           0 INDICATES FAILURE.
 0775                           06,2674  4 0000 0            COM
 0776   REF   1                 06,2675  7 5067 1            MASK   OCT15000
 0777   REF  24  LAST  156      06,2676  10 000 0            CCS    A
 0778   REF   1                 06,2677  1 2710 1            TCF    ISSWON          FAILURE.

 0779   REF  12  LAST  155      06,2700  3 5017 1  ISSWOFF   CAF    BIT1            DONT TURN OFF ISS WARNING IF LAMP TEST
 0780   REF  12  LAST  154      06,2701  7 1321 1            MASK   IMODES33        IN PROGRESS.
 0781   REF  25  LAST  157      06,2702  10 000 0            CCS    A
 0782   REF   3  LAST  135      06,2703  0 0002 0            TC     Q

 0783   REF  13  LAST  157      06,2704  4 5017 0            CS     BIT1
 0784                           06,2705  0 0006 1            EXTEND
 0785   REF   4  LAST  152      06,2706  03 011 1            WAND   DSALMOUT        TURN OFF ISS WARNING
 0786   REF   4  LAST  157      06,2707  0 0002 0            TC     Q

 0787                           06,2710  0 0006 1  ISSWON    EXTEND
```

```
07871  REF   1              06,2711  22 066 1           QXCH   ITEMP6
07872  REF   1              06,2712  0 5764 1           TC     VARALARM       TELL EVERYONE WHAT CAUSED THE ISSWARNING
07873  REF  14  LAST  157    06,2713  3 5017 1           CAF    BIT1
0788                        06,2714  0 0006 1           EXTEND
0789   REF   5  LAST  157    06,2715  05 011 1           WOR    DSALMOUT       TURN ON ISS WARNING
0790   REF   2  LAST  158    06,2716  0 0066 1           TC     ITEMP6
0791   REF   1              06,2717  4 7703 0  CAGESUB  CS     BIT15+6        SET OUTBITS + INTERNAL FLAGS FOR
0792                        06,2720  0 0006 1           EXTEND                SYSTEM TURN-ON OR CAGE. DISABLE THE
0793   REF   9  LAST  152    06,2721  03 012 1           WAND   CHAN12         ERROR COUNTER AND REMOVE IMU DELAY COMP.
0794   REF   2  LAST  143    06,2722  3 5027 1           CAF    BITS465        SEND ZERO AND COARSE.
0795                        06,2723  0 0006 1           EXTEND
0796   REF  10  LAST  158    06,2724  05 012 1           WOR    CHAN12

0797   REF  11  LAST  148    06,2725  4 1036 1  CAGESUB1 CS     DSPTAB +11D    TURN ON NO ATT LAMP
0798   REF   1              06,2726  7 2753 0           MASK   OCT40010
0799   REF  12  LAST  158    06,2727  27'036 1           ADS    DSPTAB +11D

0800   REF  30  LAST  157    06,2730  4 1320 0  CAGESUB2 CS     IMODES30       SET FLAGS TO INDICATE CAGING OR TURN-ON
0801   REF   1              06,2731  7 2755 0           MASK   OCT75                AND INHIBIT ALL ISS WARNING INFO
0802   REF  31  LAST  158    06,2732  27'320 0           ADS    IMODES30

0803   REF  13  LAST  157    06,2733  4 1321 1           CS     IMODES33       DISABLE DAP AUTO AND HOLD MODES
0804   REF  18  LAST  154    06,2734  7 5012 0           MASK   BIT6
0805   REF  14  LAST  158    06,2735  27'321 1           ADS    IMODES33

0806   REF   5  LAST  157    06,2736  0 0002 0           TC     Q

0807   REF   3  LAST  155    06,2665             IMUFAIL  EQUALS SETISSW
0808   REF   4  LAST  158    06,2665             ICDUFAIL EQUALS SETISSW
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P0809           JUMP TABLES AND CONSTANTS.

 0810   REF   1              06,2737  1 2526 0  IFAILJMP TCF    ITURNON        CHANNEL 30 DISPATCH.
 0811   REF   1              06,2740  1 2665 1           TCF    IMUFAIL
 0812   REF   1              06,2741  1 2665 1           TCF    ICDUFAIL
 0813   REF   1              06,2742  1 2555 1           TCF    IMUCAGE
 0814                        06,2743   76400 1  30RDMSK  OCT    76400          (BIT 10 NOT SAMPLED HERE).
 0815   REF   1              06,2744  1 2604 0           TCF    IMUOP

 0816   REF   1              06,2745  1 2632 0  C33JMP   TCF    PIPFAIL        CHANNEL 33 DISPATCH.
 0817   REF   1              06,2746  1 2653 1           TCF    DNTMFAST
 0818   REF   1              06,2747  1 2660 1           TCF    UPTMFAST

R0819           SUBROUTINE TO SKIP IF LAMP TEST NOT IN PROGRESS.
 0820   REF  15 LAST  158    06,2750  4 1321 1  LAMPTEST CS     IMODES33       BIT 1 OF IMODES33 = 1 IF LAMP TEST IN
 0821   REF  15 LAST  158    06,2751  7 5017 0           MASK   BIT1           PROGRESS.
 0822   REF   1              06,2752  1 3065 0           TCF    ZOPFIN3

 0823   REF   1                 5070             33RDMSK  EQUALS PRIO16
 0824                        06,2753   40010 1  OC40010  OCT    40010
 0826                        06,2754   00054 0  OCT54    OCT    54
 0827                        06,2755   00075 0  OCT75    OCT    75
 0828                        06,2756   00272 0  OCT272   OCT    00272
 0829                        06,2757   00300 1  BITS7&8  OCT    300
 0830                        06,2760   01720 0  OCT1720  OCT    1720
 0831                        06,2761   00740 1  OCT740   OCT    00740
 0832   REF   1                 5067             OCT15000 EQUALS PRIO15
 0933                        06,2762   77000 1  OCT77000 OCT    77000
 0834                        06,2763   76777 1  -BIT10   OCT    -1000

 0835                        06,2764   21450 0  90SECS   DEC    9000
 0836   REF   1                 5771             120MS    =      OCT14          (DEC 12)
 0837   REF   8 LAST  138       5333             GLOCKOK  EQUALS RESUME
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P0838   OPTICS MONITORING AND ZERO ROUTINES
 0839   REF   2  LAST  144   06,2765  3 1331 1  OPTMON   CA      OPTMODES        MONITOR OPTICS INBITS IN CHAN 30 AND 33
 0840                        06,2766  0 0006 1           EXTEND
 0841   REF   2  LAST  139   06,2767  06 030 1           RXOR    CHAN30          LOOK FOR OCDU FAIL BIT CHANGE
 0842   REF  14  LAST  151   06,2770  7 5011 0           MASK    BIT7
 0843   REF  13  LAST  146   06,2771  54 070 1           TS      RUPTREG1        STORE CHANGE BIT
 0844   REF  26  LAST  157   06,2772  10 000 0           CCS     A
 0845   REF   1               06,2773  0 3224 0           TC      OCDUFTST        PROCESS OCDUFAIL BIT CHANGE

 0846   REF   1               06,2774  11'303 1  33OPTMON CCS     OPTIND          BYPASS IF TVC TAKEOVER
 0847                        06,2775  1 3001 1           TCF     +4
 0848                        06,2776  1 3001 1           TCF     +3
 0849                        06,2777  1 3001 1           TCF     +2
 0850   REF   9  LAST  159   06,3000  1 5333 0           TCF     RESUME

 0851   REF   3  LAST  160   06,3001  3 1331 1           CA      OPTMODES        LOOK FOR OPTICS MODE SWITCH CHANGE
 0852                        06,3002  0 0006 1           EXTEND
 0853   REF   2  LAST  145   06,3003  06 033 1           RXOR    CHAN33
 0854   REF   1               06,3004  7 5027 0           MASK    OCTHIRTY
 0855   REF  14  LAST  160   06,3005  26 070 1           ADS     RUPTREG1        STORE INBIT CHANGES
 0856   REF   4  LAST  160   06,3006  23'331 1           LXCH    OPTMODES
 0857                        06,3007  0 0006 1           EXTEND
 0858   REF   6  LAST  157   06,3010  06 001 0           RXOR    LCHAN
 0859   REF   5  LAST  160   06,3011  55'331 0           TS      OPTMODES        UPDATE OPTMODES TO SHOW BIT CHANGES

 0860                        06,3012  4 0000 0           COM                     SAMPLE CURRENT SWITCH SETTING
 0861   REF   2  LAST  160   06,3013  7 5027 0           MASK    OCTHIRTY
 0862                        06,3014  0 0006 1           EXTEND
 0863   REF   1               06,3015  1 3022 0           BZF     SETSAMP         MANUAL-SET ZERO IN SWSAMPLE

 0864   REF  11  LAST  144   06,3016  7 5013 1           MASK    BIT5            SEE IF CSC
 0865   REF  27  LAST  160   06,3017  10 000 0           CCS     A
 0866                        06,3020  0 3022 1           TC      +2              CSC-SET SWSAMPLE POS
 0867   REF   1               06,3021  3 7716 0           CAF     NEGONE          ZOPTICS-SET SWSAMPLE (-1)
 0868   REF   1               06,3022  55'314 1  SETSAMP  TS      SWSAMPLE        CURRENT OPTICS SWITCH SETTING

 0869   REF   1               06,3023  11'315 0  PROCESSW CCS     DESOPMOD        BRANCH ON PREVIOUS SETTING
 0870   REF   1               06,3024  0 3125 1           TC      CSCDES          CSC
 0871   REF   1               06,3025  0 3077 1           TC      MANUDES         MANUAL
 0872   REF   1               06,3026  0 3027 1           TC      ZOPTDES         ZERO OPTICS
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0873   REF   2  LAST  160   06,3027  11'314 1  ZOPTDES  CCS    SWSAMPLE        IS SWITCH STILL AT ZOPTICS
0874   REF   1              06,3030  0 3047 1           TC     ZTOCSC          NOW AT CSC
0875   REF   1              06,3031  0 3037 0           TC     ZTOMAN          MANUAL
0876   REF   1              06,3032  0 3057 0           TC     ZOPFINI         ZOPTICS-SEE IF ZOPT PROCESSING
0877   REF   1              06,3033  0 3154 1           TC     SETDESMO        ZOPT NOT PROCESSING-NO ACTION

0878   REF   1              06,3034  11'317 1           CCS    ZOPTCNT         ZOPT PROCESSING-CHECK COUNTER
0879   REF   1              06,3035  0 3153 0           TC     SETCNT          32 SAMPLE NOT FINISHED-SET COUNTER
0880   REF   1              06,3036  0 3157 1           TC     SETZOEND        32 SAMPLE WAIT COMPLETED-SET UP ZOP END

0881   REF   2  LAST  161   06,3037  0 3057 0  ZTOMAN   TC     ZOPFINI         ZOP TO MANUAL-IS ZOPT DONE
0882   REF   2  LAST  161   06,3040  0 3154 1           TC     SETDESMO        YES-NORMAL EXIT

0883   REF   7  LAST  156   06,3041  0 5650 1  ZOPALARM TC     ALARM           ALARM-SWITCHED ALTERED WHILE ZOPTICS
0884                        06,3042   00116 1           OCT    00116
0885   REF   1              06,3043  3 5024 1           CAF    OCT13           PROCESSING-SET RETURN OPTION
0886   REF   1              06,3044  55'316 0           TS     WTOPTION

0887   REF   1              06,3045  0 3070 0           TC     CANZOPT         CANCEL ZOPT

0888   REF   3  LAST  161   06,3046  0 3154 1           TC     SETDESMO

0889   REF   3  LAST  161   06,3047  0 3057 0  ZTOCSC   TC     ZOPFINI         SEE IF ZOPT PROCESSING

0890   REF   1              06,3050  0 3115 1           TC     MANTOCSC +3     NO-CHECK RETURN TO COARS OPT
0891   REF   8  LAST  161   06,3051  0 5650 1           TC     ALARM           ZOPT PROCESSING-ALARM
0892                        06,3052   00116 1           OCT    00116
0893   REF   2  LAST  161   06,3053  0 3070 0           TC     CANZOPT         CANCEL ZOPT
0894   REF   2  LAST  161   06,3054  0 3112 0           TC     MANTOCSC        ZERO CNT-LOOK FOR COARS OPT RETURN

0895   REF  14  LAST  142   06,3055  3 5007 0  COARSLOK CAF    BIT9            IF COARS OPT SINCE FSTART GO TO L+2
0896   REF   1              06,3056  1 3064 1           TCF    ZOPFIN2         IF NOT GO TO L+1
0897   REF  16  LAST  159   06,3057  3 5017 1  ZOPFINI  CAF    BIT1            SEE IF END ZOPT TASK WORKING
0898   REF   6  LAST  160   06,3060  7 1331 0           MASK   OPTMODES
0899   REF  28  LAST  160   06,3061  10 000 0           CCS    A
0900   REF  10  LAST  160   06,3062  0 5333 1           TC     RESUME          ZOPT TASK WORKING-WAIT ONE SAMPLE PERIOD

0901   REF  10  LAST   64   06,3063  3 5015 0           CAF    BIT3            TEST IF ZOPTICS PROCESSING
0902   REF   7  LAST  161   06,3064  7 1331 0  ZOPFIN2  MASK   OPTMODES        RETURNS TO L+1 PROCESSING AND
0903   REF  29  LAST  161   06,3065  10 000 0  ZOPFIN3  CCS    A
0904   REF   6  LAST  158   06,3066  24 002 0           INCR   Q               L+2 IF NOT
0905   REF   7  LAST  161   06,3067  0 0002 0           TC     Q

0906   REF   2  LAST  147   06,3070  4 6211 1  CANZOPT  CS     SIX             CANCEL ZERO OPTICS
0907   REF   8  LAST  161   06,3071  7 1331 0           MASK   OPTMODES        ZERO ZOPT PROCESSING BIT-ENABLE OCDUFAIL
0908   REF   9  LAST  161   06,3072  55'331 0           TS     OPTMODES
0909   REF  17  LAST  161   06,3073  4 5017 0           CS     BIT1            MAKE SURE ZERO OCDU IS OFF
0910                        06,3074  0 0006 1           EXTEND
0911   REF  11  LAST  158   06,3075  03 012 1           WAND   CHAN12
0912   REF   8  LAST  161   06,3076  0 0002 0           TC     Q
```

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0913   REF   3  LAST  161   06,3077  11'314 1  MANUDES  CCS    SWSAMPLE        SEE IF SWITCH STILL IN MANUAL MODE
0914   REF   3  LAST  161   06,3100  0 3112 0           TC     MANTOCSC        NOW AT CSC
0915   REF   1              06,3101  0 3107 1           TC     MANTOMAN        STILL MANUAL
0916   REF   2  LAST  161   06,3102  11'316 0           CCS    WTOPTION        ZOPTICS-LOOK AT ZOPTICS RETURN OPTION
0917                        06,3103  0 3105 0           TC     +2              5 SEC RETURN GOOD-CONTINUE ZOPTICS
0918   REF   1              06,3104  0 3151 1           TC     OPTZERO         ZOPTICS MUST START ANEW

0919   REF   1              06,3105  0 3216 1           TC     INITZOPT        SHOW ZERO OPTICS PROCESSING
0920   REF   4  LAST  161   06,3106  0 3154 1           TC     SETDESMD        NORMAL EXIT

0922   REF   3  LAST  162   06,3107  11'316 0  MANTOMAN CCS    WTOPTION        DECREMENT RETURN OPTION TIME
0923   REF   4  LAST  162   06,3110  55'316 0           TS     WTOPTION
0924   REF   5  LAST  162   06,3111  0 3154 1           TC     SETDESMD

0925   REF   6  LAST  152   06,3112  3 5021 1  MANTOCSC CAF    ZERO            CANCEL ZOPT RETURN OPTION IF SET
0926   REF   5  LAST  162   06,3113  55'316 0           TS     WTOPTION
0927   REF   2  LAST  161   06,3114  55'317 1           TS     ZOPTCNT

0928   REF   1              06,3115  0 3055 1           TC     COARSLOK        CKECK FOR COARS OPT RETURN
0929   REF   6  LAST  162   06,3116  0 3154 1           TC     SETDESMD        NO COARS TASK-NO ACTION

0930   REF   5  LAST  146   06,3117  3 5017 1           CAF    ONE             SET COARS OPT WORKING
0931   REF   2  LAST  160   06,3120  55'303 1           TS     OPTIND
0932   REF  14  LAST  154   06,3121  3 5016 0           CAF    BIT2            ENABLE OPTICS CDU ERROR CNTS
0933                        06,3122  0 0006 1           EXTEND
0934   REF  12  LAST  161   06,3123  05 012 1           WOR    CHAN12

0935   REF   7  LAST  162   06,3124  0 3154 1           TC     SETDESMD

0936   REF   4  LAST  162   06,3125  11'314 1  CSCDES   CCS    SWSAMPLE        SEE IF SWITCH STILL AT CSC
0937   REF   8  LAST  162   06,3126  0 3154 1           TC     SETDESMD        STILL AT CSC
0938   REF   1              06,3127  0 3133 0           TC     CSCTOMAN        MANUAL
0939   REF   1              06,3130  3 5012 1  CSCTOZOP CAF    OCT40           ZOPTICS-INITIALIZE FOR ZOPT
0940   REF   3  LAST  162   06,3131  55'317 1           TS     ZOPTCNT
0941   REF   2  LAST  162   06,3132  0 3216 1           TC     INITZOPT

0942   REF   3  LAST  162   06,3133  11'303 1  CSCTOMAN CCS    OPTIND          SEE IF COARS WORKING
0943   REF   1              06,3134  0 3140 1           TC     CANCOARS        COARS WORKING-SWITCH NOT CSC-KILL COARS
0944   REF   2  LAST  162   06,3135  0 3140 1           TC     CANCOARS
0945                        06,3136  0 3137 1           TC     +1              NO COARS-NORMAL EXIT
0946   REF   9  LAST  162   06,3137  0 3154 1           TC     SETDESMD
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0947   REF   2  LAST  160   06,3140  3 7716 0  CANCOARS CA     NEGONE
0948   REF   4  LAST  162   06,3141  55'303 1           TS     OPTIND       SET OPTIND (-1)  TO SHOW NOT WORKING
0949   REF  15  LAST  162   06,3142  4 5016 1           CS     BIT2         DISABLE OCDU ERR CNTS
0950                        06,3143  0 0006 1           EXTEND
0951   REF  13  LAST  162   06,3144  03 012 1           WAND   CHAN12
0952   REF  10  LAST  161   06,3145  4 1331 0           CS     OPTMODES     SET RETURN=TO=COARS BIT
0953   REF  15  LAST  161   06,3146  7 5007 1           MASK   BIT9
0954   REF  11  LAST  163   06,3147  27'331 0           ADS    OPTMODES

0955   REF  10  LAST  162   06,3150  0 3154 1           TC     SETDESMD
0956   REF   3  LAST  162   06,3151  0 3216 1  OPTZERO  TC     INITZOPT     INITIALIZE ZERO OPTICS

0957   REF   2  LAST  162   06,3152  3 5012 1           CA     OCT40        SET UP 32 SAMPLE WAIT
0958   REF   4  LAST  162   06,3153  55'317 1  SETCNT   TS     ZOPTCNT
0959   REF   5  LAST  162   06,3154  3 1314 0  SETDESMD CA     SWSAMPLE     SET CURRENT SWITCH INDICATION=RESUME
0960   REF   2  LAST  160   06,3155  55'315 0           TS     DESOPMOD
0961   REF  11  LAST  161   06,3156  0 5333 1           TC     RESUME

0962   REF  18  LAST  161   06,3157  3 5017 1  SETZOEND CAF    BIT1         SEND ZERO OPTICS CDU
0963                        06,3160  0 0006 1           EXTEND
0964   REF  14  LAST  163   06,3161  05 012 1           WOR    CHAN12
0965   REF   1              06,3162  3 4112 1           CA     200MS        HOLD ZERO CDU FOR 200 MS
0966   REF   5  LAST  147   06,3163  0 5245 1           TC     WAITLIST
0967   REF  12  LAST  163      1331                     EBANK= OPTMODES
0968   REF   1              06,3164   03172 0           2CADR  ENDZOPT
0968   REF   1              06,3165   14062 0

0969   REF  13  LAST  163   06,3166  4 1331 0           CS     OPTMODES     SHOW ZOPTICS TASK WORKING
0970   REF  19  LAST  163   06,3167  7 5017 0           MASK   BIT1
0971   REF  14  LAST  163   06,3170  27'331 0           ADS    OPTMODES

0972   REF  11  LAST  163   06,3171  0 3154 1           TC     SETDESMD

0973   REF   1              06,3172  0 3210 1  ENDZOPT  TC     ZEROPCDU     ZERO OCDU COUNTERS
0974   REF  20  LAST  163   06,3173  4 5017 0           CS     BIT1         TURN OFF ZERO OCDU
0975                        06,3174  0 0006 1           EXTEND
0976   REF  15  LAST  163   06,3175  03 012 1           WAND   CHAN12
0977   REF   2  LAST  163   06,3176  3 4112 1           CAF    200MS        DELAY 200MS FOR CDUS TO RESYNCHRONIZE
0978   REF   3  LAST  143   05,3177  0 5272 0           TC     VARDELAY

0979   REF  15  LAST  163   06,3200  4 1331 0           CS     OPTMODES     SHOW ZOPTICS SINCE LAST FRESH START
0980   REF  13  LAST  157   06,3201  7 5006 0           MASK   BIT10            OR RESTART
0981   REF  16  LAST  163   06,3202  27'331 0           ADS    OPTMODES

0982   REF   2  LAST  133   05,3203  4 5023 1           CS     SEVEN        ENABLE OCDUFAIL-SHOW OPTICS COMPLETE
0983   REF  17  LAST  163   06,3204  7 1331 0           MASK   OPTMODES
0984   REF  18  LAST  163   06,3205  55'331 0           TS     OPTMODES

0985   REF   2  LAST  160   06,3206  0 3224 0           TC     OCDUFTST     CHECK OCDU FAIL BIT AFTER ENABLE
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0986   REF   3  LAST  143   06,3207  0 5324 1           TC     TASKOVER

0987   REF   7  LAST  162   06,3210  3 5021 1  ZERODPCDU CAF    ZERO
0988   REF   2  LAST   39   06,3211  54 036 0           TS     CDUS          ZERO IN CDUS,-20 IN CDUT
09881  REF   1             06,3212  55'307 0           TS     ZONE          INITIALIZE SHAFT MONITOR ZONE
0989   REF   1             06,3213  4 3261 0           CS     ZODEGS
0990   REF   2  LAST   39   06,3214  54 035 0           TS     CDUT
0991   REF   9  LAST  161   06,3215  0 0002 0           TC     Q

0992   REF   8  LAST  164   06,3216  3 5021 1  INITZOPT CAF    ZERO          INITIALIZE ZOPTICS-INHIBIT OCDUFAIL
0993   REF   6  LAST  162   06,3217  55'316 0           TS     WTOPTION      AND SHOW OPTICS PROCESSING
0994   REF  19  LAST  163   06,3220  4 1331 0           CS     OPTMODES      SET ZERO OPTICS PROCESSING
0995   REF   3  LAST  161   06,3221  7 6211 1           MASK   SIX               OPTICS CDU FAIL INHIBITED
0996   REF  20  LAST  164   06,3222  27'331 0           ADS    OPTMODES
0997   REF  10  LAST  164   06,3223  0 0002 0           TC     Q
```

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0998  REF  15  LAST  160   06,3224  3 5011 1  OCDUFTST CAF    BIT7          SEE IF OCDUFAIL ON OR OFF
0999                       06,3225  0 0006 1           EXTEND
1000  REF   3  LAST  160   06,3226  02 030 0           RAND   CHAN30
1001  REF  30  LAST  161   06,3227  10 000 0           CCS    A
1002  REF   1             06,3230  1 3252 0           TCF    OPFAILOF      OCDUFAIL LIGHT OFF

1003  REF  16  LAST  163   06,3231  3 5016 0           CAF    BIT2          OCDUFAIL LIGHT ON UNLESS INHIBITED
1004  REF  21  LAST  164   06,3232  7 1331 0           MASK   OPTMODES
1005  REF  31  LAST  165   06,3233  10 000 0           CCS    A
1006  REF  11  LAST  164   06,3234  0 0002 0           TC     Q             OCDUFAIL INHIBITED

1007  REF  14  LAST  142   06,3235  3 5010 0  OPFAILON CAF    BIT8          ON BIT
1008  REF  13  LAST  158   06,3236  6 1036 0           AD     OSPTAB +11D
1009  REF  15  LAST  165   06,3237  7 5010 1           MASK   BIT8
1010                       06,3240  0 0006 1  SETOFF   EXTEND
1011  REF   1             06,3241  1 6711 1           BZF    TCQ           NO CHANGE

1012  REF   3  LAST  145   06,3242  54 001 1           TS     L
1013  REF  14  LAST  165   06,3243  3 1036 0           CA     OSPTAB +11D
1014                       06,3244  0 0006 1           EXTEND
1015  REF   7  LAST  160   06,3245  06 001 0           RXOR   LCHAN
1016  REF   2  LAST  149   06,3246  7 4777 0           MASK   POSMAX
1017  REF  15  LAST  150   06,3247  6 5001 0           AD     BIT15         SHOW ACTION WANTED
1018  REF  15  LAST  165   06,3250  55'036 1           TS     DSPTAB +11D
1019  REF  12  LAST  165   06,3251  0 0002 0           TC     Q

1020  REF  21  LAST  163   06,3252  3 5017 1  OPFAILOF CAF    BIT1          DONT TURN OFF IF LAMP TEST
1021  REF  16  LAST  159   06,3253  7 1321 1           MASK   IMODES33
1022  REF  32  LAST  165   06,3254  10 000 0           CCS    A
1023  REF  13  LAST  165   06,3255  0 0002 0           TC     Q             LAMP TEST IN PROGRESS

1024  REF  16  LAST  165   06,3256  3 5010 0           CAF    BIT8          TURN OFF OCDUFAIL LIGHT
1025  REF  16  LAST  165   06,3257  7 1036 1           MASK   DSPTAB +11D
1026  REF   1             06,3260  1 3240 0           TCF    SETOFF

1027  REF   1                5024                    OCT13    =       ELEVEN
1028  REF   3  LAST  158      5027                    OCTHIRTY EQUALS  BITS4&5
1029                       06,3261    16037 1  20DEGS   DEC     7199
1030  REF  19  LAST  158      5012                    OCT40    EQUALS  BIT6
1031  REF   1                4112                    200MS    EQUALS  OCT24
```

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P1032   OPTICS CDU DRIVING PROGRAM

 1033                          10,2000                    BANK    10
 1034   REF   1                10,2000                    SETLOC  OPTDRV
 1035                          10,2000                    BANK
 1036   REF   1                                           COUNT*  $$/SXT

R1037   SHAFT STOP MONITOR-ZONE UPDATE

 1038   REF   3  LAST  164     10,2000  3 0036 1  OPTDRIVE CA      CDUS          GRAB OPTIC SHAFT CDU
 1039   REF   4  LAST  165     10,2001  54 001 1            TS      L
 1040   REF  33  LAST  165     10,2002  10 000 0            CCS     A             GET ABS(CDUS)
 1041   REF   1                10,2003  6 7707 0            AD      13,14,15
 1042                          10,2004  1 2006 1            TCF     +2            ABS(CDUS) - 45 DEG
 1043                          10,2005  1 2003 1            TCF     -2
 1044                          10,2006  0 0006 1            EXTEND
 1045   REF   1                10,2007  6 2016 1            BZMF    OZONE         LESS THAN 45 DEG-SET ZONE 0
 1046   REF   2  LAST  164     10,2010  3 1307 1            CA      ZONE          IF ZONE ZERO, CHANGE TO + OR - OTHERWISE
 1047                          10,2011  0 0006 1            EXTEND                DONT MESS WITH ZONE
 1048                          10,2012  1 2014 1            BZF     +2
 1049   REF   1                10,2013  1 2020 0            TCF     CONTDRVE      JUST CONTINUE
 1050   REF   5  LAST  166     10,2014  56 001 0            XCH     L             GREATER THAN 45 DEG-SET ZONE TO SIGN CDU
 1051   REF   2  LAST  166     10,2015  1 2017 1            TCF     OZONE +1
 1052   REF   9  LAST  164     10,2016  3 5021 1  OZONE     CAF     ZERO          ABS(CDUS) LESS THEN 90 DEG-ZONE ZERO
 1053   REF   3  LAST  166     10,2017  55'307 0            TS      ZONE
 1054   REF   1                                           COUNT*  $$/T4RPT
 1055   REF   5  LAST  163     10,2020  11'303 1  CONTDRVE CCS     OPTIND
 1056                          10,2021  0 2025 1            TC      +4            WORK COARS OPTICS
 1057                          10,2022  0 2025 1            TC      +3            WORK COARS OPTICS
 1058   REF  12  LAST  163     10,2023  0 5333 1            TC      RESUME        NO OPT
 1059   REF  13  LAST  166     10,2024  0 5333 1            TC      RESUME        NO OPT

 1060   REF   6  LAST  163     10,2025  3 1314 0            CA      SWSAMPLE      SEE IF SWITCH AT CMC
 1061                          10,2026  0 0006 1            EXTEND
 1062   REF  14  LAST  166     10,2027  6 5333 1            BZMF    RESUME        ZERO  (-1)          MANUAL  (+0)

 1063   REF  14  LAST  163     10,2030  3 5006 1            CAF     BIT10         SEE IF OCDUS ZEROED SINCE LAST FSTART
 1064   REF  22  LAST  165     10,2031  7 1331 0            MASK    OPTMODES
 1065   REF  34  LAST  166     10,2032  10 000 0            CCS     A
 1066                          10,2033  0 2036 0            TC      +3
 1067   REF   9  LAST  161     10,2034  0 5650 1            TC      ALARM         OPTICS NOT ZEROED
 1068                          10,2035   00120 1            OCT     00120

 1069   REF  17  LAST  165     10,2036  3 5016 0            CA      BIT2          SEE IF ERR CNTS ENABLED
 1070                          10,2037  0 0006 1            EXTEND
 1071   REF  16  LAST  163     10,2040  02 012 0            RAND    CHAN12
 1072                          10,2041  0 0006 1            EXTEND
 1073   REF   1                10,2042  1 2175 1            BZF     SETBIT        CNTS NOT ENABLED-DO IT AND RESUME

 1074   REF   6  LAST  162     10,2043  3 5017 1            CAF     ONE           INITIALIZE OPTIND
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1075   REF   6  LAST  166   10,2044  55'303 1  OPT2      TS      OPTIND
1076                        10,2045  0 0006 1             EXTEND
1077   REF   1              10,2046  1 2132 1             BZF     TRUNCMD        CHECK TRUNION COMMAND

1078   REF   7  LAST  167   10,2047  51'303 0  GETOPCMD  INDEX   OPTIND
1079   REF   2  LAST   98   10,2050  3 1160 1             CA      DESOPTT        PICK UP DESIRED OPT ANGLE
1080                        10,2051  0 0006 1             EXTEND
1081   REF   8  LAST  167   10,2052  5 1303 0             INDEX   OPTIND
1082   REF   3  LAST  164   10,2053  20 035 0             MSU     COUT           GET DIFFERENCE
1083                        10,2054  0 0006 1             EXTEND
1084   REF  15  LAST  152   10,2055  7 5003 0             MP      BIT13
1085   REF   6  LAST  166   10,2056  56 001 0             XCH     L
1086                        10,2057  6 0000 1             DOUBLE
1087   REF   3  LAST   68   10,2060  54 061 1             TS      ITEMP1
1088                        10,2061  1 2063 1             TCF     +2             NO OVFL

1089   REF   7  LAST  167   10,2062  26 001 1             ADS     L              WITH OVFL
1090   REF   9  LAST  167   10,2063  51'303 0  STORCMD   INDEX   OPTIND
1091   REF   1              10,2064  23'305 0             LXCH    COMMANDO       STORE COMMAND
1092   REF  10  LAST  167   10,2065  11'303 1             CCS     OPTIND
1093   REF   1              10,2066  1 2044 1             TCF     OPT2           GET NEXT COMMAND

1094   REF   4  LAST  167   10,2067  54 061 1             TS      ITEMP1         INITIALIZE SEND INDICATOR TO ZERO
1095   REF   2 LAST  166 TO  166:     16    16*           COUNT*  $$/SXT

R1096  SHAFT STOP AVOIDANCE

10961  REF   4  LAST  166   10,2070  10 036 0             CCS     CDUS           IF CDUS GREATER THAN +OR- 90 DEG CHECK
10962  REF   1              10,2071  6 5000 1             AD      NEG1/2          FOR POSSIBLE STOP PROBLEM
10963                       10,2072  1 2074 1             TCF     +2
10964                       10,2073  1 2071 1             TCF     -2
10965                       10,2074  0 0006 1             EXTEND
10966  REF   1              10,2075  6 2122 1             BZMF    CMDSETUP       CDUS LESS THAN 90 DEG. NO PROBLEMS

1097   REF   4  LAST  166   10,2076  3 1307 1             CA      ZONE
1098                        10,2077  0 0006 1             EXTEND
1099   REF   2  LAST  167   10,2100  1 2122 0             BZF     CMDSETUP       ZONE=3,NORMAL COMMAND
1100   REF  16  LAST  165   10,2101  7 5001 1             MASK    BIT15          GRAB SIGN OF ZONE
1101   REF   8  LAST  167   10,2102  54 001 1             TS      L
1102   REF   2  LAST  167   10,2103  3 1306 0             CA      COMMANDO +1
1103   REF  17  LAST  167   10,2104  7 5001 1             MASK    BIT15          GRAB SIGN OF SHAFT COMMAND
1104                        10,2105  0 0006 1             EXTEND
1105   REF   8  LAST  165   10,2106  06 001 0             RXOR    LCHAN
1106   REF  35  LAST  166   10,2107  10 000 0             CCS     A
1107   REF   3  LAST  167   10,2110  1 2122 0             TCF     CMDSETUP       SIGN ZONE NOT EQUAL TO SIGN COMMAND
1108   REF   2  LAST   98   10,2111  11'161 1             CCS     DESOPTS        SEE IF DESOPTS BETWEEN -90 AND +90
1109   REF   2  LAST  167   10,2112  6 5000 1             AD      NEG1/2
1110                        10,2113  1 2115 1             TCF     +2             ABS(DESOPTS) - 90 DEG
1111                        10,2114  1 2112 0             TCF     -2
1112                        10,2115  0 0006 1             EXTEND
```

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1113                          10,2116  6 2120 0          BZMF   +2              DESOPTS IN FIRST OR FOURTH QUAD
1114  REF   4 LAST  167       10,2117  1 2122 0          TCF    CMDSETUP
1115  REF   3 LAST  167       10,2120  4 1306 1          CS     COMMANDO +1     REVERSE REGULAR COMMAND
1116  REF   4 LAST  168       10,2121  55'306 1          TS     COMMANDO +1

1117  REF   2 LAST  166 TO  167:    40    40*           COUNT* $$/T4RPT

1118  REF   7 LAST  166       10,2122  3 5017 1  CMDSETUP CAF    ONE             SET OPTIND
1119  REF  11 LAST  167       10,2123  55'303 1          TS     OPTIND
1120  REF  36 LAST  167       10,2124  50 000 1          INDEX  A
1121  REF   5 LAST  168       10,2125  11'305 1          CCS    COMMANDO        GET SIGN OF COMMAND
1122  REF   1                 10,2126  0 2144 1          TC     POSOPCMD
1123  REF   1                 10,2127  0 2151 0          TC     NEXTOPT +1      ZERO COMMAND-SKIP SEND INDICATOR
1124  REF   1                 10,2130  0 2161 0          TC     NEGOPCMD
1125  REF   2 LAST  168       10,2131  0 2151 0          TC     NEXTOPT +1      ZERO COMMAND

1126  REF   4 LAST  167       10,2132  4 0035 0  TRUNCMD  CS     COUT            IF COMMAND GREATER THAN 45 DEG-COMMAND
1127  REF   3 LAST  167       10,2133  6 1160 1          AD     DESOPTT         45 DEG
1128  REF  14 LAST  165       10,2134  54 002 1          TS     Q
1129  REF   1                 10,2135  0 2047 0          TC     GETOPCMD        LESS THAN 45 DEG-NORMAL OPERATION

1130  REF  37 LAST  168       10,2136  10 000 0          CCS    A               GREATER THAN 45 DEG-USE OPSMAX WITH
1131  REF   3 LAST  165       10,2137  3 4777 1          CA     POSMAX          CORRECT SIGN
1132                          10,2140  0 2142 1          TC     +2
1133  REF   4 LAST  168       10,2141  4 4777 0          CS     POSMAX
1134  REF   9 LAST  167       10,2142  54 001 1          TS     L
1135  REF   1                 10,2143  0 2063 0          TC     STORCMD
1136  REF   1                 10,2144  6 2202 0  POSOPCMD AD     MAXPLS1
1137                          10,2145  0 0006 1          EXTEND
1138  REF   1                 10,2146  6 2165 1          BZMF   DELOPCMD        COMMAND LESS THAN MAX PULSE
1139  REF   1                 10,2147  4 2201 1          CS     MAXPLS          GREATER THAN MAX PULSE-USE MAX PULSE

1140  REF   5 LAST  167       10,2150  24 061 0  NEXTOPT  INCR   ITEMP1          SET SEND INDICATOR
1141  REF   2 LAST  135       10,2151  6 5020 0          AD     NEGO            MAKE SURE ZERO COMMAND IS -ZERO
1142  REF  12 LAST  168       10,2152  51'303 0          INDEX  OPTIND
1143  REF   3 LAST   40       10,2153  54 053 0          TS     COUTCMD         STORE PULSE IN SEND REG

1144  REF  13 LAST  168       10,2154  11'303 1          CCS    OPTIND
1145  REF   5 LAST  168       10,2155  0 2123 0          TC     CMDSETUP +1     GET NEXT OPT

1146  REF   6 LAST  168       10,2156  10 061 1          CCS    ITEMP1          ARE ANY PULSES TO GO
1147  REF   1                 10,2157  1 2171 0          TCF    SENDOCMD        YES-SEND EM
1148  REF  15 LAST  166       10,2160  0 5333 1          TC     RESUME          NO

1149  REF   2 LAST  168       10,2161  6 2202 0  NEGOPCMD AD     MAXPLS1
1150                          10,2162  0 0006 1          EXTEND
1151  REF   2 LAST  168       10,2163  6 2166 1          BZMF   DELOPCMD        LESS THAN MAX PULSE
1152  REF   2 LAST  168       10,2164  3 2201 0          CA     MAXPLS          MAX PULSES
1153  REF   3 LAST  168       10,2165  1 2150 0          TCF    NEXTOPT
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1154  REF  14  LAST  168   10,2166  51'303 0  DELOPCMD INDEX  OPTIND
1155  REF   6  LAST  168   10,2167  57'305 0           XCH    COMMANDO      SET UP SMALL COMMAND
1156  REF   4  LAST  169   10,2170  1 2150 0           TCF    NEXTOPT

1157  REF   1             10,2171  3 5062 0  SENDOCMD CAF    11,12         SEND OCDU DRIVE COMMANDS
1158                      10,2172  0 0006 1           EXTEND
1159  REF   3  LAST  152   10,2173  05 014 1           WOR    CHAN14
1160  REF  16  LAST  168   10,2174  0 5333 1           TC     RESUME

1161  REF  18  LAST  166   10,2175  3 5016 0  SETBIT   CAF    BIT2          ENABLE OCDU ERR CNTS
1162                      10,2176  0 0006 1           EXTEND
1163  REF  17  LAST  166   10,2177  05 012 1           WOR    CHAN12
1164  REF  17  LAST  169   10,2200  0 5333 1           TC     RESUME        START  COARS NEXT TIME AROUND

1165                      10,2201   77532 0  MAXPLS   DEC    -165          WAS  -80
1166                      10,2202   77533 1  MAXPLS1  DEC    -164          WAS  -79
1167  REF   1                5062            11,12    EQUALS PRIO6
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L DOWNLINK LISTS USER'S PAGE NO. 1 E0 S3

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 0001                        22,2000          BANK   22
 0002   REF   1              05,2000          SETLOC DOWNTELM
 0003                        05,2000          BANK

 0004   REF   2  LAST  132      0340          EBANK= DNTMBUFF

R0005   SPECIAL DOWNLINK OP CODES
A0006                                        OP CODE ADDRESS(EXAMPLE) SENDS..     BIT 15  BITS 14-12 BITS 11
A0007                                                                                                    -0
A0008                                        ------ ----------      ----------    ------  ---------- -------
A0009                                                                                                    --
A0010                                        1DNADR TIME2           (2 AGC WDS)     0         0      ECADR
A0011                                        2DNADR TEPHEM          (4 AGC WDS)     0         1      ECADR
A0012                                        3DNADR VGBODY          (6 AGC WDS)     0         2      ECADR
A0013                                        4DNADR STATE           (8 AGC WDS)     0         3      ECADR
A0014                                        5DNADR UPBUFF          (10AGC WDS)     0         4      ECADR
A0015                                        6DNADR DSPTAB          (12AGC WDS)     0         5      ECADR
A0016                                        DNCHAN 30              CHANNELS        0         7      CHANNEL
A0017                                                                                                   ADDRESS
A0018                                        DNPTR  NEXTLIST        POINTS TO NEXT  0         6      ADRES
A0019                                                               LIST.

R0020   DOWNLIST FORMAT DEFINITIONS AND RULES-
R0021   1. END OF A LIST = -XDNADR (X = 1 TO 6), -DNPTR, OR -DNCHAN.
R0022   2. SNAPSHOT SUBLIST = LIST WHICH STARTS WITH A -1DNADR.
R0023   3. SNAPSHOT SUBLIST CAN ONLY CONTAIN 1DNADRS.
R0024   4. TIME2 1DNADR MUST BE LOCATED IN THE CONTROL LIST OF A DOWNLIST.
R0025   5. ERASABLE DOWN TELEMETRY WORDS SHOULD BE GROUPED IN SEQUENTIAL
R0026      LOCATIONS AS MUCH AS POSSIBLE TO SAVE STORAGE USED BY DOWNLINK LISTS.
R0026(1 6. THE DOWNLINK LISTS(INCLUDING SUBLISTS) ARE ORGANIZED SUCH THAT THE ITEMS LISTED FIRST(IN FRONT OF FBANK) ARE
R0026(3    SENT FIRST. EXCEPTION--- SNAPSHOT SUBLISTS. IN THE SNAPSHOT SUBLISTS THE DATA REPRESENTED BY THE FIRST
R0026(5    11 1DNADRS IS PRESERVED (IN ORDER) IN DNTMBUFF AND SENT BY THE NEXT 11 DOWNRUPTS. THE DATA REPRESENTED BY THE
R0026(7    LIST IS SENT IMMEDIATELY.
R0026(8

 0027   REF   1                                    COUNT  05/DLIST
 0028                      0007          ERASZERO EQUALS 7
 0029   REF   1            0007          SPARE    EQUALS ERASZERO      USE SPARE TO INDICATE AVAILABLE SPACE
 0030                   05,2000  77340 0 LOWIDCOD OCT    77340         LOW ID CODE

 0031   REF   1         05,2107          NOMDNLST EQUALS CMCSTADL      FRESH START AND POST P27 DOWNLIST
 0032   REF   1         05,2207          UPDNLIST EQUALS CMENTRDL      UPDATE PROGRAM (P27) DOWNLIST
```

L DOWNLINK LISTS USER'S PAGE NO. 2 EO S3

P0033 CSM POWERED FLIGHT DOWNLIST

R0034 ----------CONTROL LIST----------

```
0035                          05,2001              CMPOWEDL EQUALS
0036   REF   1                05,2001   32043 1            DNPTR  CMPOWE01        COLLECT SNAPSHOT
0037   REF   3  LAST  170     05,2002   24340 0            6DNADR DNTMBUFF        SEND SNAPSHOT
0038   REF   1                05,2003   32052 1            DNPTR  CMPOWE02        COLLECT SECOND SNAPSHOT
0039   REF   4  LAST  171     05,2004   14340 0            4DNADR DNTMBUFF        SEND SNAPSHOT
0040   REF   1                05,2005   32057 1            DNPTR  CMPOWE03        COMMON DATA
0041   REF   3  LAST  128     05,2006   03412 0            1DNADR TIG             TIG,+1
0042   REF   2  LAST  117     05,2007   03422 0            1DNADR DELLT4          DELLT4,+1
0043   REF   2  LAST  117     05,2010   13414 1            3DNADR RTARG           RTARG,+1,+2,...+5
0044   REF   2  LAST  117     05,2011   03427 0            1DNADR TGO             TGO,+1
0045   REF   2  LAST   79     05,2012   01245 0            1DNADR PIPTIME1        PIPTIME1,+1
0046   REF   4  LAST   79     05,2013   11162 1            3DNADR DELV            DELV,+1,...+4,+5
0047   REF   1                05,2014   03023 0            1DNADR PACTOFF         PACTOFF,YACTOFF
0048   REF   2  LAST  105     05,2015   03223 1            1DNADR PCMD            PCMD,YCMD
0049   REF   2  LAST  124     05,2016   03702 1            1DNADR CSTEER          CSTEER,+1
0050   REF   2  LAST  101     05,2017   12444 0            3DNADR DELVEET1        CSI DELTA VELOCITY COMPONENTS   (31-33)
0053   REF   1                05,2020   25735 1            6DNADR REFSMMAT        REFSMMAT,+1,...+10,+11
0054   REF   1                05,2021   32061 1            DNPTR  CMPOWE04        COMMON DATA
0055   REF   1                05,2022   00024 1            1DNADR TIME2           TIME2,TIME1
0056   REF   1                05,2023   32063 0            DNPTR  CMPOWE05        COLLECT SNAPSHOT
0057   REF   5  LAST  171     05,2024   24340 0            6DNADR DNTMBUFF        SEND SNAPSHOT
0058   REF   2  LAST  171     05,2025   32052 1            DNPTR  CMPOWE02        COLLECT SNAPSHOT
0059   REF   6  LAST  171     05,2026   14340 0            4DNADR DNTMBUFF        SEND SNAPSHOT
0060   REF   2  LAST  171     05,2027   32057 1            DNPTR  CMPOWE03
0061   REF   1                05,2030   32072 0            DNPTR  CMPOWE06        COMMON DATA
0062   REF   2  LAST  126     05,2031   03743 1            1DNADR ELEV            ELEV,+1
006205 REF   2  LAST  129     05,2032   03753 0            1DNADR CENTANG         CENTANG,+1
00621  REF   2  LAST   93     05,2033   02610 1            1DNADR DELTAR          DELTAR,+1
0063   REF  18  LAST  154     05,2034   00106 0            1DNADR STATE +10D      FALGWRDS 10 AND 11
0064   REF   2  LAST   81     05,2035   01336 0            1DNADR TEVENT          TEVENT,+1
0065   REF   3  LAST  171     05,2036   03223 1            1DNADR PCMD            PCMD,YCMD
0066   REF  23  LAST  166     05,2037   01331 1            1DNADR OPTMODES        OPTMODES,HOLDFLAG
0067   REF   1                05,2040   32075 1            DNPTR  CMPOWE07        COMMON DATA
0068   REF   3  LAST  124     05,2041   13720 0            3DNADR VGTIG           VGTIG,+1,...+4,+5
0069   REF   1                05,2042   64111 1           -3DNADR DELVEET2        CDH DELTA VELOCITY COMPONENTS   (98-100)
```

R0072 ----------SUB LISTS----------

```
0073   REF   1                05,2043   76605 0  CMPOWE01-1DNADR RN +2          RN+2,+3          SNAPSHOT DATA
0074   REF   2  LAST  171     05,2044   01174 1            1DNADR RN +4          RN+4,+5
0075   REF   1                05,2045   01176 0            1DNADR VN             VN,+1
0076   REF   2  LAST  171     05,2046   01200 1            1DNADR VN +2          VN+2,+3
0077   REF   3  LAST  171     05,2047   01202 0            1DNADR VN +4          VN+4,+5
0078   REF   2  LAST   79     05,2050   01204 0            1DNADR PIPTIME        PIPTIME,+1
0079   REF   3  LAST  171     05,2051   76607 1           -1DNADR RN             RN,+1

0080   REF   2  LAST  147     05,2052   77743 1  CMPOWE02-1DNADR CDUZ           CDUZ,CDUT              SNAPSHOT DATA
```

```
0081   REF   3  LAST  116   05,2053   03133 0           1DNADR ADOT          ADOT,+1/OGARATE,+1
0082   REF   4  LAST  172   05,2054   03135 0           1DNADR ADOT +2       ADOT+2,+3/OMEGAB+2,+3
0083   REF   5  LAST  172   05,2055   03137 1           1DNADR ADOT +4       ADOT+4,+5/OMEGAB+4,+5
0084   REF   1               05,2056   77745 1          -1DNADR CDUX         CDUX,CDUY

0085   REF   2  LAST  113   05,2057   07076 1 CMPOWE03  2DNADR AK           AK,AK1,AK2,RCSFLAGS          COMMON DATA
0086   REF   3  LAST  113   05,2060   70605 0          -2DNADR THETADX      THETADX,THETADY,THETADZ,GARBAGE

0087   REF  19  LAST  171   05,2061   20074 0 CMPOWE04  5DNADR STATE        FLAGWRD0 THRU FLAGWRD9       COMMON DATA
0088   REF  17  LAST  165   05,2062   52754 0          -6DNADR DSPTAB       DISPLAY TABLES

0089   REF   1               05,2063   76054 1 CMPOWE05-1DNADR R-OTHER +2   R-OTHER+2,+3           SNAPSHOT DATA
0090   REF   2  LAST  172   05,2064   01725 0           1DNADR R-OTHER +4    R-OTHER+4,+5
0091   REF   1               05,2065   01727 1           1DNADR V-OTHER       V-OTHER,+1
0092   REF   2  LAST  172   05,2066   01731 0           1DNADR V-OTHER +2    V-OTHER+2,+3
0093   REF   3  LAST  172   05,2067   01733 1           1DNADR V-OTHER +4    V-OTHER+4,+5
0094   REF   1               05,2070   01642 0           1DNADR T-OTHER       T-OTHER,+1
0095   REF   3  LAST  172   05,2071   76056 0          -1DNADR R-OTHER       R-OTHER,+1

0096   REF   1               05,2072   01432 0 CMPOWE06  1DNADR RSBBQ        RSBBQ,+1               COMMON DATA
0097   REF   1               05,2073   10372 0           3DNADR CADRFLSH      CADRFLSH,+1,+2,FAILREG,+1,+2
0098   REF   5  LAST  167   05,2074   73741 1          -2DNADR CDUS         CDUS,PIPAX,PIPAY,PIPAZ

0099   REF   1               05,2075   03073 0 CMPOWE07  1DNADR LEMMASS      LEMMASS,CSMMASS              COMMON DATA
0100   REF   1               05,2076   03066 1           1DNADR DAPDATR1      DAPDATR1,DAPDATR2
0101   REF   3  LAST  113   05,2077   07167 0           2DNADR ERRORX        ERRORX,ERRORY,ERRORZ,GARBAGE
0102   REF   4  LAST  116   05,2100   13125 0           3DNADR WBODY         WBODY,...+5/OMEGAC,...+5
0103   REF   1               05,2101   05154 1           2DNADR REDOCTR       REDOCTR,THETAD,+1,+2
0104   REF  32  LAST  158   05,2102   01320 1           1DNADR IMODES30      IMODES30,IMODES33
0105                        05,2103   34011 0           DNCHAN 11            CHANNELS 11,12
0106                        05,2104   34013 1           DNCHAN 13            CHANNELS 13,14
0107                        05,2105   34030 0           DNCHAN 30            CHANNELS 30,31
0108                        05,2106   43745 0          -DNCHAN 32            CHANNELS 32,33

R0109  ------------------------------------------------------------------------
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L DOWNLINK LISTS USER'S PAGE NO. 4 E0 S3

P0110 CSM COAST AND ALIGNMENT DOWNLIST

R0111 ----------CONTROL LIST----------

```
0112                          05,2107            CMCSTADL EQUALS                 SEND ID BY SPECIAL CODING
0113  REF   1                 05,2107  32043 1           DNPTR  CMCSTA01         COLLECT SNAPSHOT
0114  REF   7  LAST  171      05,2110  24340 0           6DNADR DNTMBUFF         SEND SNAPSHOT
0115  REF   1                 05,2111  32052 1           DNPTR  CMCSTA02         COLLECT SECOND SNAPSHOT
0116  REF   8  LAST  173      05,2112  14340 0           4DNADR DNTMBUFF         SEND SNAPSHOT
0117  REF   1                 05,2113  32057 1           DNPTR  CMCSTA03         COMMON DATA
0118  REF   4  LAST  171      05,2114  03412 0           1DNADR TIG              TIG,+1
0119  REF   2  LAST   72      05,2115  00302 0           1DNADR BESTI            BESTI,BESTJ
0120  REF   4  LAST  125      05,2116  17674 1           4DNADR MARKDOWN         MARKDOWN,+1...+5,+6,GARBAGE
0121  REF   1                 05,2117  17502 0           4DNADR MARK2DWN         MARK2DWN,+1...+5,+6
0123  REF   2  LAST   91      05,2120  06351 0           2DNADR HAPOX            APOGEE AND PERIGEE FROM R30     (28-29)
0124  REF   2  LAST  171      05,2121  03023 0           1DNADR PACTOFF          PACTOFF, YACTOFF                  (30)
0125  REF   4  LAST  171      05,2122  13720 0           3DNADR VGTIG            VGTIG,...+5
0126  REF   2  LAST  171      05,2123  25735 1           6DNADR REFSMMAT         REFSMMAT,+1,...+10,+11
0127  REF   1                 05,2124  32061 1           DNPTR  CMCSTA04         COMMON DATA
0128  REF   2  LAST  171      05,2125  00024 1           1DNADR TIME2            TIME2,TIME1
0129  REF   1                 05,2126  32063 0           DNPTR  CMCSTA05         COLLECT SNAPSHOT
0130  REF   9  LAST  173      05,2127  24340 0           6DNADR DNTMBUFF         SEND SNAPSHOT
0131  REF   2  LAST  173      05,2130  32052 1           DNPTR  CMCSTA02         COLLECT SNAPSHOT
0132  REF  10  LAST  173      05,2131  14340 0           4DNADR DNTMBUFF         SEND SNAPSHOT
0133  REF   2  LAST  173      05,2132  32057 1           DNPTR  CMCSTA03         COMMON DATA
0134  REF   1                 05,2133  32072 0           DNPTR  CMCSTA06         COMMON DATA
0135  REF   2  LAST   95      05,2134  12757 1           3DNADR OGC              OGC,+1,IGC,+1,MGC,+1
0136  REF  20  LAST  172      05,2135  00106 0           1DNADR STATE +100       FALGWRDS 10 AND 11
0137  REF   3  LAST  171      05,2136  01336 0           1DNADR TEVENT           TEVENT,+1
0138  REF   1                 05,2137  02633 0           1DNADR LAUNCHAZ         LAUNCHAZ,+1
0139  REF  24  LAST  171      05,2140  01331 1           1DNADR OPTMODES         OPTMODES,HOLDFLAG
0140  REF   1                 05,2141  32075 1           DNPTR  CMCSTA07         COMMON DATA
0141  REF  18  LAST  172      05,2142  52754 0          -6DNADR DSPTAB           DISPLAY TABLES
```

R0142 ----------SUB LISTS----------

```
0143  REF   2  LAST  171      05,2043          CMCSTA01 EQUALS CMPOWE01        COMMON DOWNLIST DATA
0144  REF   3  LAST  171      05,2052          CMCSTA02 EQUALS CMPOWE02        COMMON DOWNLIST DATA
0145  REF   3  LAST  171      05,2057          CMCSTA03 EQUALS CMPOWE03        COMMON DOWNLIST DATA
0146  REF   2  LAST  171      05,2061          CMCSTA04 EQUALS CMPOWE04        COMMON DOWNLIST DATA
0147  REF   2  LAST  171      05,2063          CMCSTA05 EQUALS CMPOWE05        COMMON DOWNLIST DATA
0148  REF   2  LAST  171      05,2072          CMCSTA06 EQUALS CMPOWE06        COMMON DOWNLIST DATA
0149  REF   2  LAST  171      05,2075          CMCSTA07 EQUALS CMPOWE07        COMMON DOWNLIST DATA
```

R0150   ----------

L DOWNLINK LISTS USER'S PAGE NO. 6 EO S3

P0151 CSM RENDEZVOUS AND PRETHRUST LIST

R0152 ----------CONTROL LIST----------

```
 0153                          05,2143            CMRENDDL EQUALS                 SEND IO BY SPECIAL CODING
 0154  REF   1                 05,2143  32043 1           DNPTR  CMREND01          COLLECT SNAPSHOT
 0155  REF  11  LAST  173      05,2144  24340 0           6DNADR DNTMBUFF          SEND SNAPSHOT
 0156  REF   1                 05,2145  32052 1           DNPTR  CMREND02          COLLECT SECOND SNAPSHOT
 0157  REF  12  LAST  175      05,2146  14340 0           4DNADR DNTMBUFF          SEND SNAPSHOT
 0158  REF   1                 05,2147  32057 1           DNPTR  CMREND03          COMMON DATA
 0159  REF   5  LAST  173      05,2150  03412 0           1DNADR TIG               TIG,+1
 0160  REF   3  LAST  171      05,2151  03422 0           1DNADR DELLT4            DELLT4,+1
 0161  REF   3  LAST  171      05,2152  13414 1           3DNADR RTARG             RTARG,+1...+4,+5
 0162  REF   1                 05,2153  01151 0           1DNADR VHFTIME           VHFTIME,+1
 0163  REF   5  LAST  173      05,2154  17674 1           4DNADR MARKDOWN          MARKTIME(DP),YCDU,SCDU,ZCDU,TCDU,XCDU,RM
 0164  REF   1                 05,2155  01125 0           1DNADR VHFCNT            VHFCNT,+1
 0165  REF   2  LAST  124      05,2156  03662 0           1DNADR TTPI              TTPI,+1
 0166  REF   1                 05,2157  03424 0           1DNADR ECSTEER           ECSTEER,+1
 0167  REF   2  LAST   93      05,2160  02636 0           1DNADR DELVTPF           DELVTPF,+1
 0168  REF   2  LAST  101      05,2161  06634 0           2DNADR TCDH              CDH AND CSI TIME                (32-33)
 0170  REF   4  LAST  129      05,2162  03655 1           1DNADR TPASS4            TPASS4,+1
 0171  REF   3  LAST  117      05,2163  13404 0           3DNADR DELVSLV           DELVSLV,+1...+4,+5
 0172  REF   4  LAST   90      05,2164  06320 0           2DNADR RANGE             RANGE,+1,RRATE,+1
 0173  REF   1                 05,2165  32061 1           DNPTR  CMREND04          COMMON DATA
 0174  REF   3  LAST  173      05,2166  00024 1           1DNADR TIME2             TIME2,TIME1
 0175  REF   1                 05,2167  32063 0           DNPTR  CMREND05          COLLECT SNAPSHOT
 0176  REF  13  LAST  175      05,2170  24340 0           6DNADR DNTMBUFF          SEND SNAPSHOT
 0177  REF   2  LAST  175      05,2171  32052 1           DNPTR  CMREND02          COLLECT SNAPSHOT
 0178  REF  14  LAST  175      05,2172  14340 0           4DNADR DNTMBUFF          SEND SNAPSHOT
 0179  REF   2  LAST  175      05,2173  32057 1           DNPTR  CMREND03          COMMON DATA
 0180  REF   1                 05,2174  32072 0           DNPTR  CMREND06          COMMON DATA
 0181  REF   2  LAST  101      05,2175  02632 1           1DNADR DIFFALT           COH DELTA ALTITUDE              (74)
 018103 REF  3  LAST  171      05,2176  03753 0           1DNADR CENTANG           CENTANG,+1
 018106 REF  3  LAST  171      05,2177  02610 1           1DNADR DELTAR            DELTAR,+1
 0182  REF   2  LAST  123      05,2200  13645 1           3DNADR DELVEET3          DELVEET3,+1,...+4,+5
 0183  REF  25  LAST  173      05,2201  01331 1           1DNADR OPTMODES          OPTMODES,HOLDFLAG
 0184  REF   1                 05,2202  32075 1           DNPTR  CMREND07          COMMON DATA
 0185  REF   2  LAST   90      05,2203  02324 0           1DNADR RTHETA            RTHETA,+1
 0186  REF   2  LAST  117      05,2204  07400 1           2DNADR LAT(SPL)          LAT(SPL),LNG(SPL),+1
 0187  REF   3  LAST  120      05,2205  07766 1           2DNADR VPRED             VPRED,+1,GAMMAEI,+1
 0188  REF  21  LAST  173      05,2206  77671 1          -1DNADR STATE +100        FALGWRDS 10 AND 11
R0189  ----------SUB LISTS----------

 0190  REF   3  LAST  173      05,2043          CMREND01 EQUALS CMPOWE01          COMMON DOWNLIST DATA

 0191  REF   4  LAST  173      05,2052          CMREND02 EQUALS CMPOWE02          COMMON DOWNLIST DATA

 0192  REF   4  LAST  173      05,2057          CMREND03 EQUALS CMPOWE03          COMMON DOWNLIST DATA

 0193  REF   3  LAST  173      05,2061          CMREND04 EQUALS CMPOWE04          COMMON DOWNLIST DATA
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L DOWNLINK LISTS USER'S PAGE NO. 7 E0 S3

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 0194   REF   3  LAST  173   05,2063          CMREND05 EQUALS CMPOWE05        COMMON DOWNLIST DATA
 0195   REF   3  LAST  173   05,2072          CMREND06 EQUALS CMPOWE06        COMMON DOWNLIST DATA
 0196   REF   3  LAST  173   05,2075          CMREND07 EQUALS CMPOWE07        COMMON DOWNLIST DATA
R0197   ------------------------------------------------------------------
```

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P0198   CSM ENTRY AND UPDATE DOWNLIST

R0199   ----------------------------CONTROL LIST-----------------------------------

 0200                          05,2207              CMENTROL EQUALS                 SEND ID BY SPECIAL CODING
 0201   REF   1                05,2207   32043 1            DNPTR  CMENTRO1         COLLECT SNAPSHOT
 0202   REF  15  LAST  175     05,2210   24340 0            6DNADR DNTMBUFF         SEND SNAPSHOT
 0203   REF   1                05,2211   32052 1            DNPTR  CMENTRO2         COLLECT SECOND SNAPSHOT
 0204   REF  16  LAST  177     05,2212   14340 0            4DNADR DNTMBUFF         SEND SNAPSHOT
 0205   REF   1                05,2213   32057 1            DNPTR  CMENTRO3         COMMON DATA
 0206   REF   2  LAST  111     05,2214   07300 0            2DNADR CMDAPMOD         CMDAPMOD,PREL,QREL,RREL
 0208   REF   2  LAST  118     05,2215   03635 1            1DNADR L/D1             L/D1,+1
 0209   REF   3  LAST   73     05,2216   24304 0            6DNADR UPBUFF           UPBUFF,+1...+10,+11
 0210   REF   4  LAST  177     05,2217   14320 0            4DNADR UPBUFF +12D      UPBUFF+12,13...+18,19D
 0211   REF   3  LAST   72     05,2220   04300 0            2DNADR COMPNUMB         COMPNUMB,UPOLDMOD,UPVERB,UPCOUNT
 0212   REF   2  LAST  111     05,2221   03313 0            1DNADR PAXERR1          PAXERR1,ROLLTM
 0213   REF   3  LAST  119     05,2222   13675 1            3DNADR LATANG           LATANG,+1,RDOT,+1,THETAH,+1
 0216   REF   3  LAST  175     05,2223   07400 1            2DNADR LAT(SPL)         LAT(SPL),+1,LNG(SPL),+1
 0217   REF   2  LAST  111     05,2224   03265 0            1DNADR ALFA/180         ALFA/180,BETA/180
 0218   REF   1                05,2225   32061 1            DNPTR  CMENTRO4         COMMON DATA
 0219   REF   4  LAST  175     05,2226   00024 1            1DNADR TIME2            TIME2,TIME1
 0220   REF   1                05,2227   32257 0            DNPTR  CMENTRO5         COLLECT SNAPSHOT
 0221   REF  17  LAST  177     05,2230   24340 0            6DNADR DNTMBUFF         SEND SNAPSHOT
 0222   REF   2  LAST  177     05,2231   32052 1            DNPTR  CMENTRO2         COLLECT SNAPSHOT
 0223   REF  18  LAST  177     05,2232   14340 0            4DNADR DNTMBUFF         SEND SNAPSHOT
 0224   REF   3  LAST  172     05,2233   07076 1            2DNADR AK               AK,AK1,AK2,RCSFLAGS
 0225   REF   4  LAST  172     05,2234   13167 0            3DNADR ERRORX           ERRORX/Y/Z,THETADX/Y/Z
 0226   REF   3  LAST  177     05,2235   07300 0            2DNADR CMDAPMOD         CMDAPMOD,PREL,QREL,RREL
 0227   REF   5  LAST  177     05,2236   24304 0            6DNADR UPBUFF           UPBUFF+0,+1...+10,+11D
 0228   REF   6  LAST  177     05,2237   14320 0            4DNADR UPBUFF +12D      UPBUFF+12,+13...+18,+19D
 0229   REF   2  LAST  172     05,2240   03073 0            1DNADR LEMMASS          LEMMASS,CSMMASS
 0230   REF   2  LAST  172     05,2241   03066 1            1DNADR DAPDATR1         DAPDATR1,DAPDATR2
 0231   REF   2  LAST  111     05,2242   03314 1            1DNADR ROLLTM           ROLLTM,ROLLC
 0232   REF  26  LAST  175     05,2243   01331 1            1DNADR OPTMODES         OPTMODES,HOLDFLAG
 0233   REF   5  LAST  172     05,2244   13125 0            3DNADR WBODY            WBODY,...+5/OMEGAC,...+5
 0234   REF   2  LAST  172     05,2245   05154 1            2DNADR REDOCTR          REDOCTR,THETAD+0,+1,+2
 0235   REF  33  LAST  172     05,2246   01320 1            1DNADR IMODES30         IMODES30,IMODES33
 0236                          05,2247   34011 0            DNCHAN 11               CHANNELS 11,12
 0237                          05,2250   34013 1            DNCHAN 13               CHANNELS 13,14
 0238                          05,2251   34030 0            DNCHAN 30               CHANNELS 30,31
 0239                          05,2252   34032 1            DNCHAN 32               CHANNELS 32,33
 0240   REF   2  LAST  172     05,2253   01432 0            1DNADR RSBBQ            RSBBQ,+1
 0241   REF   2  LAST  172     05,2254   10372 0            3DNADR CADRFLSH         CADRFLSH,+1,+2,FAILREG,+1,+2
 0242   REF  22  LAST  175     05,2255   00106 0            1DNADR STATE +10D       FALGWRDS 10 AND 11
 0243   REF   4  LAST  120     05,2256   74007 0           -1DNADR GAMMAEI          GAMMAEI,+1

R0244   ----------------------------SUB LISTS-------------------------------------

 0245   REF   4  LAST  175     05,2043              CMENTRO1 EQUALS CMPOWE01        COMMON DOWNLIST DATA
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```
 0246   REF   5  LAST  175   05,2052            CMENTR02 EQUALS CMPOWE02       COMMON DOWNLIST DATA

 0247   REF   5  LAST  175   05,2057            CMENTR03 EQUALS CMPOWE03       COMMON DOWNLIST DATA

 0248   REF   4  LAST  175   05,2061            CMENTR04 EQUALS CMPOWE04       COMMON DOWNLIST DATA

 0249   REF   5  LAST  171   05,2257  76615 1   CMENTR05-1DNADR DELV           DELV,+1          SNAPSHOT DATA
 0250   REF   6  LAST  178   05,2260  01164 0            1DNADR DELV +2       DELV+2,+3
 0251   REF   7  LAST  178   05,2261  01166 1            1DNADR DELV +4       DELV+4,+5
 0252   REF   3  LAST  119   05,2262  03726 1            1DNADR TTE           TTE,+1
 0253   REF   3  LAST  119   05,2263  03724 0            1DNADR VIO           VIO,+1
 0254   REF   4  LAST  175   05,2264  03766 0            1DNADR VPRED         VPRED,+1
 0255   REF   3  LAST  171   05,2265  76532 1           -1DNADR PIPTIME1      PIPTIME1,+1

 0256   REF   4  LAST  176   05,2075            CMENTR07 EQUALS CMPOWE07       COMMON DOWNLIST DATA

R0257   ------------------------------------------------------------------
```

L DOWNLINK LISTS USER'S PAGE NO. 10 EO S3

P0258 P22 DOWNLISTS

R0259 ----------CONTROL LIST----------

```
0260                        05,2266          CMPG22DL EQUALS                SEND ID BY SPECIAL CODING
0261  REF   1               05,2265  32043 1         DNPTR  CMPG2201        COLLECT SNAPSHOT
0262  REF  19  LAST  177    05,2267  24340 0         6DNADR DNTMBUFF        SEND SNAPSHOT
0263  REF   1               05,2270  32052 1         DNPTR  CMPG2202        COLLECT SNAPSHOT
0264  REF  20  LAST  179    05,2271  14340 0         4DNADR DNTMBUFF        SEND SNAPSHOT
0265  REF   1               05,2272  32057 1         DNPTR  CMPG2203        COMMON DATA
0266  REF   2  LAST  121    05,2273  27537 0         6DNADR SVMRKDAT        LANDING SITE MARK DATA
0267  REF   3  LAST  179    05,2274  27553 1         6DNADR SVMRKDAT +12D   SVMRKDAT+0...+34
0268  REF   4  LAST  179    05,2275  27567 0         6DNADR SVMRKDAT +24D   LANDING SITE MARK DATA
0269  REF   2  LAST   97    05,2276  02751 0         1DNADR LANDMARK        LANDMARK,GARBAGE
0270  REF   1               05,2277  00007 0         1DNADR SPARE
0271  REF   2  LAST  179    05,2300  00007 0         1DNADR SPARE
0272  REF   3  LAST  179    05,2301  00007 0         1DNADR SPARE
0273  REF   1               05,2302  32061 1         DNPTR  CMPG2204        COMMON DATA
0274  REF   5  LAST  177    05,2303  00024 1         1DNADR TIME2           TIME2,TIME1
0275  REF   1               05,2304  32332 1         DNPTR  CMPG2205        COLLECT SNAPSHOT
0276  REF  21  LAST  179    05,2305  04340 1         2DNADR DNTMBUFF        SEND SNAPSHOT
0277  REF   4  LAST  179    05,2306  00007 0         1DNADR SPARE
0278  REF   5  LAST  179    05,2307  00007 0         1DNADR SPARE
0279  REF   6  LAST  179    05,2310  00007 0         1DNADR SPARE
0280  REF   7  LAST  179    05,2311  00007 0         1DNADR SPARE
0281  REF   2  LAST  179    05,2312  32052 1         DNPTR  CMPG2202        COLLECT SNAPSHOT
0282  REF  22  LAST  179    05,2313  14340 0         4DNADR DNTMBUFF        SEND SNAPSHOT
0283  REF   2  LAST  179    05,2314  32057 1         DNPTR  CMPG2203        COMMON DATA
0284  REF   1               05,2315  32072 0         DNPTR  CMPG2206        COMMON DATA
0285  REF   2  LAST   97    05,2316  02747 1         1DNADR BNN             BNN,GARBAGE
0286  REF  23  LAST  177    05,2317  00106 0         1DNADR STATE +10D      FALGWRDS 10 AND 11
0287  REF   1               05,2320  12025 0         3DNADR RLS             RLS,+1,...+4,+5
0288  REF   3  LAST  179    05,2321  00007 0         1DNADR SPARE
0289  REF  27  LAST  177    05,2322  01331 1         1DNADR OPTMODES        OPTMODES,HOLDFLAG
0290  REF   1               05,2323  32075 1         DNPTR  CMPG2207        COMMON DATA
0291  REF   9  LAST  179    05,2324  00007 0         1DNADR SPARE
0292  REF  10  LAST  179    05,2325  00007 0         1DNADR SPARE
0293  REF  11  LAST  179    05,2326  00007 0         1DNADR SPARE
0294  REF  12  LAST  179    05,2327  00007 0         1DNADR SPARE
0295  REF  13  LAST  179    05,2330  00007 0         1DNADR SPARE
0296  REF  14  LAST  179    05,2331  77770 1        -1DNADR SPARE
```

R0297 ----------SUB LISTS----------

```
0298  REF   5  LAST  177    05,2043          CMPG2201 EQUALS CMPOWE01       COMMON DOWNLIST DATA
0299  REF   6  LAST  178    05,2052          CMPG2202 EQUALS CMPOWE02       COMMON DOWNLIST DATA
0300  REF   6  LAST  178    05,2057          CMPG2203 EQUALS CMPOWE03       COMMON DOWNLIST DATA
```

```
 0301   REF   5  LAST  178   05,2061           CMPG2204 EQUALS CMPOWE04       COMMON DOWNLIST DATA

 0302   REF   2  LAST   78   05,2332   76672 0 CMPG2205-1DNADR LONG          LONG,+1            SNAPSHOT DATA
 0303   REF   2  LAST   78   05,2333   01107 0          1DNADR ALT           ALT,+1
 0304   REF   3  LAST   78   05,2334   76674 0         -1DNADR LAT           LAT,+1

 0305   REF   4  LAST  176   05,2072           CMPG2206 EQUALS CMPOWE06       COMMON DOWNLIST DATA

 0306   REF   5  LAST  178   05,2075           CMPG2207 EQUALS CMPOWE07       COMMON DOWNLIST DATA

R0307   ------------------------------------------------------------------

 0308   REF   2  LAST  170   05,2335   02107 0 DNTABLE  GENADR CMCSTADL
 0309   REF   2  LAST  170   05,2336   02207 0          GENADR CMENTRDL
 0310   REF   1           0 05,2337   02143 0          GENADR CMRENODL
 0311   REF   1           0 05,2340   02001 1          GENADR CMPOWEDL
 0312   REF   1           0 05,2341   02266 1          GENADR CMPG22DL

R0313   ------------------------------------------------------------------
```

P00001 PROGRAM DESCRIPTION 8 APRIL, 1967
R0001 SUNDISK REV 120
R0002 FUNCTIONAL DESCRIPTION

R0003 SLAP1 MAN INITIATED FRESH START
R0004 1. EXECUTE STARTSUB
R0005 2. TURN OFF DSKY DISCRETE-LAMPS
R0006 3. CLEAR FAIL REGISTERS,SELF CHECK ERROR COUNTER AND RESTART
R0007 COUNTER
R0008 4. EXECUTE DOFSTART

R0009 DOFSTART MACHINE INITIATED FRESH START

R0010 1. CLEAR SELF-CHECK REGISTERS, MODE REGISTER AND COUZ REGISTER
R0011 2. CLEAR PHASE TABLE
R0012 3. INITIALIZE IMU FLAGS
R0013 4. INITIALIZE FLAGWORDS
R0014 5. TRANSFER CONTROL TO IDLE LOOP IN DUMMYJOB

R0015 GOPROG HARDWARE RESTART

R0016 0. EXECUTE STARTSUB
R0017 1. TRANSFER CONTROL TO DOFSTART IF ANY OF THE FOLLOWING CONDITIONS
R0018 EXIST.
R0019 A. RESTART OCCURED DURING EXECUTION OF ERASCHK
R0020 B. BOTH OSCILLATOR FAIL AND AGC WARNING ARE ON
R0021 C. MARK REJECT AND EITHER NAV OR MAIN DSKY ERROR LIGHT RESET
R0022 ARE ON.
R0023 2. SCHEDULE A T5RUPT PROGRAM FOR THE DAP
R0024 3. SET FLAGWRD5 BITS FOR INTWAKE ROUTINE
R0025 4. EXTINGUISH ALL DSKY LAMPS, EXCEPT PROGRAM ALARM,GIMBAL LOCK AND
R0026 NO ATT
R0027 5. INITIALIZE IMU FLAGS
R0028 6. IF ENGINE COMMAND IS ON (FLAGWRD5,BIT 7), SET ENGINE ON (CHAN-
R0029 NEL 11, BIT 13)
R0030 7. TRANSFER CONTROL TO GOPROG3

R0031 ENEMA SOFTWARE RESTART INITIATED BY MAJOR MODE CHANGE

R0032 1. EXECUTE STARTSB2
R0033 2. KILL PROGRAMS THAT WERE INTEGRATING OR WAITING FOR INTEGRATION
R0034 ROUTINE
R0035 3. TRANSFER CONTROL TO GOPROG3

R0036 GOPROG3 SUBROUTINE COMMON TO GOPROG AND ENEMA

R0037 1. TEST PHASE TABLES - IF INCORRECT, DISPLAY ALARM 1107 AND
R0038 TRANSFER CONTROL TO DOFSTART
R0039 2. DISPLAY MAJOR MODE
R0040 3. IF ANY GROUPS WERE ACTIVE UPON RESTART,TRANSFER CONTROL TO THE

```
R0041            RESTARTS SUBROUTINE TO RESCHEDULE PENDING TASKS, LONGCALLS, AND
R0042            JOBS (P20 IS RESTARTED VIA FINDVAC)
R0043          4. IF NO GROUPS WERE ACTIVE UPON RESTART, DISPLAY ALARM CODE
R0044             1110 (RESTART WITH NO ACTIVE GROUPS).
R0045          5. TRANSFER CONTROL TO IDLE LOOP IN DUMMYJOB

R0046       STARTSUB    SUBROUTINE COMMON TO SLAP1 AND GOPROG

R0047          1. CLEAR OUTBIT CHANNELS 5 AND 6
R0048          2. INITIALIZE TIME5,TIME4,TIME3
R0049          3. TRANSFER CONTROL TO STARTSB2

R0050       STARTSB2    SUBROUTINE COMMON TO STARTSUB AND ENEMA

R0051          1. INITIALIZE OUTBIT CHANNELS 11,12,13 AND 14
R0052          2. REPLACE ALL TASKS ON WAITLIST WITH ENDTASK
R0053          3. MAKE ALL EXECUTIVE REGISTERS AVAILABLE
R0054          4. MAKE ALL VAC AREAS AVAILABLE
R0055          5. CLEAR DSKY REGISTERS
R0056          6. ZERO NUMEROUS SWITCHES
R0057          7. INITIALIZE OPTICS FLAGS
R0058          8. INITIALIZE PIPA AND TELEMETRY FAIL FLAGS
R0059          9. INITIALIZE DOWN TELEMETRY

R0060   INPUT/OUTPUT INITIALIZATION

R0061       A. CALLING SEQUENCE

R0062             SLAP1 -  TC   POSTJUMP    OR    VERB 36,ENTER
R0063                      CADR SLAP1

R0064             ENEMA -  TC   POSTJUMP     ***  DO NOT CALL ENEMA WITHOUT  ***
R0065                      CADR ENEMA        ***  CONSULTING POOH PEOPLE     ***

R0066       B. OUTPUT

R0067             ERASABLE MEMORY INITIALIZATION

R0068   PROGRAM ANALYSIS

R0069       A. SUBROUTINES CALLED

R0070           MR.KLEAN,WAITLIST,DSPMM,ALARM,RESTARTS,FINDVAC

R0071       B. ALARMS

R0072             1107  PHASE TABLE ERROR
R0073             1110  RESTART WITH NO ACTIVE GROUPS
```

```
0074                                10,2203                         BANK   10
0075  REF   1                      05,2000                         SETLOC FRANDRES
0076                                05,2342                         BANK

0077  REF   3  LAST  132           E3,1400                         EBANK= LST1

0078  REF   1                                                       COUNT  05/START

0079                                05,2342  0 0004 0  SLAP1       INHINT
0080  REF   1                      05,2343  0 2776 0              TC     STARTSUB        SUBROUTINE DOES MOST OF THE WORK.

0081  REF   1                      05,2344  1 2351 0  STARTSW     TCF    SKIPSIM         PATCH....TCF STARTSIM...FOR SIMULATION
0082  REF  21  LAST  150           05,2345  3 5002 0  STARTSIM    CAF    BIT14
0083  REF   1                      05,2346  0 5147 0              TC     FINDVAC
0084                                05,2347   77777 0  SIM2CADR    OCT    77777           PATCH 2CADR (AND EBANK DESIGNATION) OF
0085                                05,2350   77777 0               OCT    77777           SIMULATION START ADDRESS.

0086  REF  19  LAST  173           05,2351  3 1036 0  SKIPSIM     CA     DSPTAB +11D
00861 REF   1                      05,2352  7 5033 0              MASK   BITS4&6
00862 REF  18  LAST  167           05,2353  6 5001 0              AD     BIT15
0087  REF  20  LAST  183           05,2354  55'036 1              TS     DSPTAB +11D     REQUESTED FRESH START.

0088  REF  10  LAST  166           05,2355  3 5021 1              CAF    ZERO            SAME STORY ON ZEROING FAILREG.
0089  REF   2  LAST   82           05,2356  55'365 1              TS     ERCOUNT
0092  REF   1                      05,2357  54 375 1              TS     FAILREG
0093  REF   2  LAST  183           05,2360  54 376 1              TS     FAILREG +1
0094  REF   3  LAST  183           05,2361  54 377 0              TS     FAILREG +2
0096  REF   3  LAST  177           05,2362  55'154 1              TS     REDOCTR

0100  REF   1                      05,2363  4 4710 1              CS     PRIO12
0101  REF  10  LAST  138           05,2364  55'302 0              TS     DSRUPTSW

0102  REF  11  LAST  183           05,2365  3 5021 1  DOFSTART    CAF    ZERO            DO A FRESH START.
0103  REF   2  LAST   82           05,2366  55'360 1              TS     ERESTORE        ***** MUST NOT BE REMOVED FROM DOFSTART
0104  REF   2  LAST   82           05,2367  55'362 0              TS     SMODE           ***** MUST NOT BE REMOVED FROM DOFSTART
01045 REF   2  LAST   85           05,2370  55'501 0              TS     UPSVFLAG        UPDATE STATE VECTOR REQUEST FLAGWORD
01046                              05,2371  0 0006 1              EXTEND
01047 REF   1                      05,2372  01 005 0              WRITE  CHAN5           TURN OFF RCS JETS
01048                              05,2373  0 0006 1              EXTEND
01049 REF   1                      05,2374  01 006 0              WRITE  CHAN6           TURN OFF RCS JETS
0105                               05,2375  0 0006 1              EXTEND
0106  REF   6  LAST  158           05,2376  01 011 0              WRITE  DSALMOUT        ZERO CHANNEL 11
0107                               05,2377  0 0006 1              EXTEND
0108  REF  18  LAST  169           05,2400  01 012 0              WRITE  CHAN12          ZERO CHANNEL 12
0109                               05,2401  0 0006 1              EXTEND
0110  REF   1                      05,2402  01 013 1              WRITE  CHAN13          ZERO CHANNEL 13
0111                               05,2403  0 0006 1              EXTEND
0112  REF   4  LAST  169           05,2404  01 014 0              WRITE  CHAN14          ZERO CHANNEL 14
0114  REF   7  LAST  164           05,2405  55'316 0              TS     WTOPTION
0116  REF   2  LAST   73           05,2406  54 332 1              TS     DNLSTCOD
```

```
0117   REF   1              05,2407  54 371 0        TS      NVSAVE
0118   REF   1              05,2410  55'071 1        TS      EBANKTEM
0120   REF   1              05,2411  55'130 0        TS      RATEINDX
01201  REF   2  LAST   78   05,2412  55'126 1        TS      TRKMKCNT
01202  REF   2  LAST  175   05,2413  55'125 1        TS      VHFCNT
01203  REF   1              05,2414  55'044 1        TS      EXTVBACT

01204  REF  21  LAST  183   05,2415  4 1036 1        CS      DSPTAB +11D
012045 REF   2  LAST  183   05,2416  7 5033 0        MASK    BITS4&6
01205  REF  38  LAST  168   05,2417  10 000 0        CCS     A
01206                       05,2420  0 2424 1        TC      +4
01207  REF   3  LAST  184   05,2421  3 5033 1        CA      BITS4&6
01208                       05,2422  0 0006 1        EXTEND                  THE IMU WAS IN COARSE ALIGN IN GIMBAL
01209  REF  19  LAST  183   05,2423  05 012 1        WOR     CHAN12          LOCK. SO PUT IT BACK INTO COARSE ALIGN.
0121   REF   1              05,2424  0 2501 1        TC      MR.KLEAN

01215  REF  12  LAST  183   05,2425  4 5021 0        CS      ZERO
01216  REF   1              05,2426  55'011 1        TS      MODREG

01217  REF   1              05,2427  3 4371 0        CAF     PRIO30
01218  REF   1              05,2430  54 366 0        TS      RESTREG

0122   REF   1              05,2431  3 3177 0        CAF     IM30INIF        FRESH START IMU INITIALIZATION.
0123   REF  34  LAST  177   05,2432  55'320 0        TS      IMODES30

0126   REF   3  LAST  163   05,2433  3 7716 0        CAF     NEGONE
0127   REF  15  LAST  169   05,2434  55'303 1        TS      OPTIND          KILL COARSE OPTICS

0128   REF   1              05,2435  3 3202 1        CAF     OPTINITF
0129   REF  28  LAST  179   05,2436  55'331 0        TS      OPTMODES

0130   REF   1              05,2437  3 5070 0        CAF     IM33INIT
0131   REF  17  LAST  165   05,2440  55'321 1        TS      IMODES33

0132                        05,2441  0 0006 1        EXTEND                  LET T5 IDLE.
0133   REF   1              05,2442  3 3156 0        DCA     T5IDLER
0134   REF   2  LAST  132   05,2443  53'313 0        DXCH    T5LOC

0135   REF   1              05,2444  3 3204 1        CA      SWINIT
0136   REF  24  LAST  179   05,2445  54 074 0        TS      STATE

0137   REF   1              05,2446  3 0075 0        CA      FLAGWRD1
01375  REF   1              05,2447  7 5004 1        MASK    NOPO18LT        LEAVE NODOPO1 FLAG UNTOUCHED
0138   REF   2  LAST  184   05,2450  6 3205 0        AD      SWINIT +1
01385  REF   2  LAST  184   05,2451  54 075 1        TS      FLAGWRD1

0139   REF   3  LAST  184   05,2452  3 3206 0        CA      SWINIT +2
01393  REF  25  LAST  184   05,2453  54 076 1        TS      STATE +2

01397  REF   1              05,2454  3 0077 1        CA      FLAGWRD3
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0140   REF  16  LAST  167   05,2455  7 5003 0          MASK   BIT13          REFSMMAT FLAG
01403  REF   4  LAST  184   05,2456  6 3207 1          AD     SWINIT +3
01405  REF   2  LAST  184   05,2457  54 077 0          TS     FLAGWRD3

0141                        05,2460  0 0006 1          EXTEND
0142   REF   5  LAST  185   05,2461  3 3211 0          DCA    SWINIT +4
0143   REF  26  LAST  184   05,2462  52 101 0          DXCH   STATE +4
0144                        05,2463  0 0006 1          EXTEND
0145   REF   6  LAST  185   05,2464  3 3213 1          DCA    SWINIT +6
0146   REF  27  LAST  185   05,2465  52 103 1          DXCH   STATE +6
01462  REF   1              05,2466  3 0104 1          CA     FLAGWRD8
01463  REF   1              05,2467  7 2525 0          MASK   OCT6200         CMOONFLG, LMOONFLG, AND SUFFLAG
014635 REF   7  LAST  185   05,2470  6 3214 0          AD     SWINIT +8D
01464  REF   2  LAST  135   05,2471  54 104 0          TS     FLAGWRD8

01465  REF   8  LAST  185   05,2472  3 3215 1          CA     SWINIT +9D
01466  REF  28  LAST  185   05,2473  54 105 1          TS     STATE +9D

0147                        05,2474  0 0006 1          EXTEND
0148   REF   9  LAST  185   05,2475  3 3217 0          DCA    SWINIT +10D
01481  REF  29  LAST  185   05,2476  52 107 0          DXCH   STATE +10D

0155   REF   2  LAST  143   05,2477  0 4701 0  ENDRSTRT TC     POSTJUMP
0156   REF   1              05,2500   03225 1          CADR   DUMMYJOB + 2    DOES A RELINT.  (IN A SWITCHED BANK.)

0157                        05,2501  0 0004 0  MR.KLEAN INHINT
01571                       05,2502  0 0006 1          EXTEND
0158   REF   3  LAST  168   05,2503  3 5021 1          DCA    NEGO
0159   REF   1              05,2504  52 755 1          DXCH   -PHASE2
0160                        05,2505  0 0006 1  POOKLEAN EXTEND
0161   REF   4  LAST  185   05,2506  3 5021 1          DCA    NEGO
0162   REF   1              05,2507  52 761 0          DXCH   -PHASE4
0163                        05,2510  0 0006 1          EXTEND
0164   REF   5  LAST  185   05,2511  3 5021 1          DCA    NEGO
0165   REF   1              05,2512  52 753 1          DXCH   -PHASE1
0166                        05,2513  0 0006 1  V37KLEAN EXTEND
0167   REF   6  LAST  185   05,2514  3 5021 1          DCA    NEGO
0168   REF   1              05,2515  52 757 0          DXCH   -PHASE3
0169                        05,2516  0 0006 1          EXTEND
0170   REF   7  LAST  185   05,2517  3 5021 1          DCA    NEGO
0171   REF   1              05,2520  52 763 1          DXCH   -PHASE5
0172                        05,2521  0 0006 1          EXTEND
0173   REF   8  LAST  185   05,2522  3 5021 1          DCA    NEGO
0174   REF   1              05,2523  52 765 1          DXCH   -PHASE6
0175   REF  15  LAST  168   05,2524  0 0002 0          TC     Q

0176                        05,2525   06200 0  OCT6200  OCT    6200
```

```
P0177           COMES HERE FROM LOCATION 4000, GOJAM. RESTART ANY PROGRAMS WHICH MAY HAVE BEEN RUNNING AT THE TIME.

 0179   REF   4  LAST  183   05,2526  25'154 0  GOPROG  INCR    REDOCTR          ADVANCE RESTART COUNTER.

 0180   REF  16  LAST  185   05,2527  22 002 0          LXCH    Q
 01805                       05,2530  0 0006 1          EXTEND
 01806  REF   1               05,2531  04 007 1          ROR     SUPERBNK
 0181   REF   3  LAST  177   05,2532  53'433 0          OXCH    RSBBQ
 01815  REF   1               05,2533  0 4662 1          TC      BANKCALL         STORE ERASABLES FOR DEBUGGING PURPOSES.
 01816  REF   1               05,2534   40000 0          CADR    VAC5STOR
 0182   REF  19  LAST  183   05,2535  3 5001 0          CA      BIT15            TEST OSC FAIL BIT TO SEE IF WE HAVE
 01821                       05,2536  0 0006 1          EXTEND                   HAD A POWER TRANSIENT. IF SO, ATTEMPT
 01822  REF   3  LAST  160   05,2537  03 033 1          WAND    CHAN33           A RESTART. IF NOT, CHECK THE PRESENT
 018225                      05,2540  0 0006 1          EXTEND                   STATE OF AGC WARNING BIT.
 01823  REF   1               05,2541  1 2547 1          BZF     BUTTONS

 01824  REF  22  LAST  183   05,2542  3 5002 0          CA      BIT14            IF AGC WARNING ON (BIT = 0), DO A
 01825                       05,2543  0 0006 1          EXTEND                   FRESH START ON ASSUMPTION THAT
 01826  REF   4  LAST  186   05,2544  02 033 0          RAND    CHAN33           WE ARE IN A RESTART LOOP.
 01827                       05,2545  0 0006 1          EXTEND
 01828  REF   1               05,2546  1 2774 0          BZF     NONAVKEY +1

 01829  REF   1               05,2547  0 2753 1  BUTTONS TC      LIGHTSET         MAKE FRESH START CHECKS BEFORE ERESTORE.

R0183                                                                            ERASCHK TEMPORARILY STORES THE CONTENTS OF TWO ERASABLE LOCATIONS, X
R0185                                                                            AND X+1 INTO SKEEP5 AND SKEEP6. IT ALSO STORES X INTO SKEEP7 AND
R0187                                                                            ERESTORE. IF ERASCHK IS INTERRUPTED BY A RESTART, C(ERESTORE) SHOULD
R0189                                                                            EQUAL C(SKEEP7),AND BE A + NUMBER LESS THAN 2000 OCT. OTHERWISE
R0191                                                                            C(ERESTORE) SHOULD EQUAL +0.

 0192   REF   2  LAST  135   05,2550  3 4364 1          CAF     HI5
 0193   REF   3  LAST  183   05,2551  7 1360 1          MASK    ERESTORE
 0194                       05,2552  0 0006 1          EXTEND
 0195                       05,2553  1 2555 1          BZF     +2               IF ERESTORE NOT = +0 OR +N LESS THAN 2K,
 0196   REF   2  LAST  186   05,2554  1 2774 0          TCF     NONAVKEY +1      DOUBT E MEMORY AND DO FRESH START.
 0197   REF   4  LAST  186   05,2555  4 1360 1          CS      ERESTORE
 0198                       05,2556  0 0006 1          EXTEND
 0199   REF   1               05,2557  1 2574 1          BZF     ELRSKIP -1
 0200   REF   1               05,2560  6 1377 0          AD      SKEEP7
 0201                       05,2561  0 0006 1          EXTEND
 0202                       05,2562  1 2564 0          BZF     +2               = SKEEP7, RESTORE E MEMORY.
 0203   REF   3  LAST  186   05,2563  1 2774 0          TCF     NONAVKEY +1      NOT=SKEEP7, DOUBT EMEM, DO FRESH START
 0204   REF   2  LAST   82   05,2564  3 1374 0          CA      SKEEP4
 0205   REF   1               05,2565  54 003 0          TS      EBANK            EBANK OF E MEMORY THAT WAS UNDER TEST.
 0206                       05,2566  0 0006 1          EXTEND                   (NOT DXCH SINCE THIS MIGHT HAPPEN AGAIN)
 0207   REF   2  LAST   82   05,2567  3 1376 1          DCA     SKEEP5
 0208   REF   2  LAST  186   05,2570  51'377 0          INDEX   SKEEP7
 0209                       05,2571  52 001 1          DXCH    0000             E MEMORY RESTORED.
 0210   REF  13  LAST  184   05,2572  3 5021 1          CA      ZERO
 0211   REF   5  LAST  186   05,2573  55'360 1          TS      ERESTORE
```

```
0235  REF   2  LAST  183   05,2574  0 2776 0            TC      STARTSUB        DO INITIALIZATION AFTER ERASE RESTORE.
0238  REF   1              05,2575  3 0102 1  ELRSKIP   CA      FLAGWRD6        RESTART AUTOPILOTS
0239                       05,2576  0 0006 1            EXTEND
0240  REF  11  LAST  161   05,2577  7 5015 1            MP      BIT3            BITS 15,14 00 T5IDLOC
0241  REF   4  LAST  164   05,2600  7 6211 1            MASK    SIX                        01 REDORCS
0242                       05,2601  0 0006 1            EXTEND                     10 REDOTVC
0243  REF  39  LAST  184   05,2602  5 0000 1            INDEX   A                  11 REDOSAT
0244  REF   2  LAST  184   05,2603  3 3156 0            DCA     T5IDLER
0245  REF   3  LAST  184   05,2604  53'313 0           DXCH    T5LOC

0246  REF   1              05,2605  4 5002 1            CS      INTFLBIT
0247  REF   1              05,2606  7 0106 1            MASK    RASFLAG
0248  REF   2  LAST  187   05,2607  54 106 1            TS      RASFLAG

0256  REF  29  LAST  184   05,2610  3 1331 1            CA      OPTMODES
0257  REF   1              05,2611  7 3203 1            MASK    OPTINITR
0258  REF  16  LAST  165   05,2612  6 5011 1            AD      BIT7
0259  REF  30  LAST  187   05,2613  55'331 0           TS      OPTMODES

0260  REF  20  LAST  165   05,2614  3 5012 1            CAF     BIT6
0261  REF  18  LAST  184   05,2615  7 1321 1            MASK    IMODES33
0262  REF   2  LAST  184   05,2616  6 5070 0            AD      IM33INIT
0263  REF  19  LAST  187   05,2617  55'321 1           TS      IMODES33

0264  REF   1              05,2620  3 3201 1            CA      9,6,4           LEAVE PROG ALARM,GIMBAL LOCK, NO ATT
0265  REF  22  LAST  184   05,2621  7 1036 1            MASK    DSPTAB +11D     LAMPS INTACT ON HARDWARE RESTART
0266  REF  20  LAST  186   05,2622  6 5001 0            AD      BIT15
0267  REF  23  LAST  187   05,2623  57'036 0           XCH     DSPTAB +11D
0268  REF  15  LAST  149   05,2624  7 5014 0            MASK    BIT4            IF NO ATT LAMP WAS ON, LEAVE ISS IN
0269                       05,2625  0 0006 1            EXTEND                  COURSE ALIGN
0270  REF   1              05,2626  1 2635 1            BZF     NOCOARSE
0271  REF   7  LAST  154   05,2627  0 4740 0            TC      IBNKCALL        IF NO ATT LAMP ON, RETURN ISS TO
0272  REF   2  LAST  147   05,2630   17027 1           CADR    SETCOARS            COARSE ALIGN

02721 REF   5  LAST  187   05,2631  3 6211 0            CAF     SIX
02722 REF   6  LAST  163   05,2632  0 5245 1            TC      WAITLIST
02723 REF   4  LAST  148   E3,1474                      EBANK=  COUIND
02724 REF   2  LAST  148   05,2633   03023 0           2CADR   CA+ECE
02724                      05,2634   16063 0
0273  REF   1              05,2635  3 3165 0  NOCOARSE CAF     IFAILINH        LEAVE FAILURE INHIBITS INTACT ON
0274  REF  35  LAST  184   05,2636  7 1320 0            MASK    IMODES30            HARDWARE RESTART. RESET ALL
0275  REF   1              05,2637  6 3200 0            AD      IM30INIR            FAILURE CODES.
0276  REF  36  LAST  187   05,2640  55'320 0           TS      IMODES30

0277  REF   2  LAST  135   05,2641  4 0101 0            CS      FLAGWRD5
0278  REF   1              05,2642  7 5011 0            MASK    ENGONBIT
0279  REF  40  LAST  187   05,2643  10 000 0            CCS     A
0280  REF   1              05,2644  1 2667 0            TCF     GOPROG3
0281  REF  17  LAST  185   05,2645  3 5003 1            CAF     BIT13
0282                       05,2646  0 0006 1            EXTEND
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0283   REF   7  LAST  183   05,2647  05 011 1          WOR    DSALMOUT       TURN ENGINE ON
0284   REF   2  LAST  187   05,2650  1 2667 0          TCF    GOPROG3
0285                        05,2651  0 0004 0  ENEMA    INHINT
028505 REF   2  LAST  186   05,2652  0 2753 1          TC     LIGHTSET       EXIT TO DOFSTART IF ERROR RESET AND
02851  REF   1              05,2653  0 3006 1          TC     STARTSB2       MARK REJECT DEPRESSED SIMULTANEOUSLY
0289   REF   1              05,2654  4 3172 1          CS     INTMASK        RESET INTEGRATION BITS
02891  REF   3  LAST  187   05,2655  7 0106 1          MASK   RASFLAG
0290   REF   4  LAST  188   05,2656  54 106 1          TS     RASFLAG

02901  REF   2  LAST  187   05,2657  4 0102 0          CS     FLAGWRD6       IS TVC ON
02902  REF   1              05,2660  7 4105 0          MASK   OCT60000
02903                       05,2661  0 0006 1          EXTEND
02904  REF   3  LAST  188   05,2662  6 2667 1          BZMF   GOPROG3        NO

02905  REF   2  LAST  131   05,2663  3 5036 1          CAF    .5SEC          YES, CALL TVCEXEC TASK WHICH WAS KILLED
02906  REF   7  LAST  187   05,2664  0 5245 1          TC     WAITLIST             IN STARTSB2.
02907  REF   1              E6,1702                    EBANK= BZERO
02908  REF   1              05,2665   02720 0          2CADR  TVCEXEC
02908  REF   1              05,2666   34066 0
0291   REF   1              05,2667  3 5022 1  GOPROG3  CAF    NUMGRPS        VERIFY PHASE TABLE AGREEMENTS
0292   REF   1              05,2670  54 161 0  PCLOOP   TS     MPAC +5
0293                        05,2671  6 0000 1          DOUBLE
0294                        05,2672  0 0006 1          EXTEND
0295   REF  41  LAST  187   05,2673  5 0000 1          INDEX  A
0296   REF   2  LAST  185   05,2674  3 0753 0          DCA    -PHASE1        COMPLEMENT INTO A, DIRECT INTO L.
0297                        05,2675  0 0006 1          EXTEND
0298   REF   9  LAST  167   05,2676  06 001 0          RXOR   LCHAN          RESULT MUST BE -0 FOR AGREEMENT.
0299   REF  42  LAST  188   05,2677  10 000 0          CCS    A
0300   REF   1              05,2700  1 2746 1          TCF    PTBAD          RESTART FAILURE.
0301   REF   2  LAST  188   05,2701  1 2746 1          TCF    PTBAD
0302   REF   3  LAST  188   05,2702  1 2746 1          TCF    PTBAD

0303   REF   2  LAST  188   05,2703  10 161 0          CCS    MPAC +5        PROCESS ALL RESTART GROUPS.
0304   REF   1              05,2704  1 2670 0          TCF    PCLOOP

0305   REF   3  LAST  188   05,2705  54 162 0          TS     MPAC +6        SET TO +0.
0306   REF   1              05,2706  0 5360 1          TC     MMDSPLAY       DISPLAY MAJOR MODE

0307                        05,2707  0 0004 0          INHINT                RELINT DONE IN MMDSPLAY

03071  REF   3  LAST  188   05,2710  30 102 1          CAE    FLAGWRD6       IS RCS DAP RUNNING (BITS 15 14 OF
030715 REF   2  LAST  188   05,2711  7 4105 0          MASK   OCT60000       FLAGWRD6 = 01)
03072                       05,2712  0 0006 1          EXTEND                YES, DO STOPRATE
030725 REF   1              05,2713  6 2721 1          BZMF   NXTRST -1      NO, SKIP TO NXTRST -1
03073  REF   1              05,2714  3 5057 0          CAF    EBANK6         STOPRATE IS DONE IN EBANK 6
03074  REF   2  LAST  186   05,2715  54 003 0          TS     EBANK
03075  REF   1              05,2716  0 4526 1          TC     STOPRATE       ZERO DELCDUS, WBODYS, AND BIASES THUS
A03075                                                                       STOPPING AUTOMATIC MANEUVERING
03077  REF   1              05,2717  3 5051 0          CAF    EBANK3
03078  REF   3  LAST  188   05,2720  54 003 0          TS     EBANK
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 0308   REF   2  LAST  188   05,2721  3 5022 1          CAF    NUMGRPS        SEE IF ANY GROUPS RUNNING.
 0309   REF   4  LAST  188   05,2722  54 161 0  NXTRST  TS     MPAC +5
 0310                        05,2723  6 0000 1          DOUBLE
 0311   REF  43  LAST  188   05,2724  50 000 1          INDEX  A
 0312   REF   1              05,2725  10 753 1          CCS    PHASE1
 0313   REF   1              05,2726  1 2730 0          TCF    PACTIVE        PNZ - GROUP ACTIVE.
 0314   REF   1              05,2727  1 2735 0          TCF    PINACT         +0 - GROUP NOT RUNNING.

 0315   REF   5  LAST  189   05,2730  54 154 0  PACTIVE TS     MPAC
 0316   REF   6  LAST  189   05,2731  24 154 1          INCR   MPAC           ABS OF PHASE.
 0317   REF   7  LAST  189   05,2732  24 162 1          INCR   MPAC +6        INDICATE GROUP DEMANDS PRESENT.
 0318   REF   1              05,2733  3 2752 0          CA     RACTCADR
 0319   REF   1              05,2734  0 4666 0          TC     SWCALL         MUST RETURN TO SWRETURN.

 0320   REF   8  LAST  189   05,2735  10 161 0  PINACT  CCS    MPAC +5        PROCESS ALL RESTART GROUPS.
 0321   REF   2  LAST  188   05,2736  1 2722 0          TCF    NXTRST

 0326   REF   9  LAST  189   05,2737  10 162 0          CCS    MPAC +6        NO. CHECK PHASE ACTIVITY FLAG
 0327   REF   1              05,2740  1 2477 0          TCF    ENDRSTRT       PHASE ACTIVE
 0328   REF  21  LAST  187   05,2741  3 5001 0          CAF    BIT15          IS MODE -0
 0329   REF   2  LAST  184   05,2742  7 1011 1          MASK   MODREG
 03291                       05,2743  0 0006 1          EXTEND
 03292  REF   1              05,2744  1 4106 0          BZF    GOTOPOOH       NO
 03293  REF   2  LAST  189   05,2745  1 2477 0          TCF    ENDRSTRT       YES
 0336   REF  10  LAST  166   05,2746  0 5650 1  PTBAD   TC     ALARM          SET ALARM TO SHOW PHASE TABLE FAILURE.
 0337                        05,2747   01107 0          OCT    1107

 0338   REF   1              05,2750  1 2365 1          TCF    DOFSTART       IN R2).

R0339   ******** ****** ******
R0340
R0341   DO NOT USE GOPROG2 OR ENEMA WITHOUT CONSULTING POOH PEOPLE
R0342
 0343   REF   1              05,2651           GOPROG2  EQUALS ENEMA
 0344   REF  18  LAST  187      5003           OCT10000 =      BIT13
 0345   REF   2  LAST  184      4371           OCT30000 =      PRIO30
 0346                        05,2751   07777 1  OCT7777  OCT    7777
 0347   REF   1              05,2752   03520 0  RACTCADR CADR   RESTARTS
 0348   REF  17  LAST  187   05,2753  3 5011 1  LIGHTSET CAF    BIT7           DOFSTART IF MARK REJECT AND EITHER
 0349                        05,2754  0 0006 1          EXTEND                 ERROR LIGHT RESET BUTTONS ARE DEPRESSED
 0350   REF   1              05,2755  02 016 1          RAND   NAVKEYIN
 0351                        05,2756  0 0006 1          EXTEND
 0352   REF   4  LAST  186   05,2757  1 2773 1          BZF    NONAVKEY       NO MARK REJECT
 0353   REF   1              05,2760  3 4362 1          CAF    OCT37
 0354                        05,2761  0 0006 1          EXTEND
 0355   REF   2  LAST  189   05,2762  02 016 1          RAND   NAVKEYIN       NAV DSKY KEYCODES,MARK,MARK REJECT
 0356   REF   1              05,2763  6 3176 1          AD     -ELR
 0357                        05,2764  0 0006 1          EXTEND
 0358   REF   5  LAST  189   05,2765  1 2774 0          BZF    NONAVKEY +1
 0359                        05,2766  0 0006 1          EXTEND
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 0360   REF   1              05,2767  00 015 0          READ   MNKEYIN        MAIN DSKY KEYCODES
 0361   REF   2  LAST  189   05,2770  6 3176 1          AD     -ELR
 0362                        05,2771  0 0006 1          EXTEND
 0363                        05,2772  1 2774 0          BZF    +2

 0364   REF  17  LAST  186   05,2773  0 0002 0 NONAVKEY TC     Q

 0365   REF   3  LAST  187   05,2774  0 2776 0          TC     STARTSUB
 0366   REF   2  LAST  189   05,2775  1 2365 1          TCF    DOFSTART
 0367   REF   1              05,2776  3 3166 0 STARTSUB CAF    LONPHAS1       SET POINTER SO NEXT 20MS DOWNRUPT WILL
 0368   REF   1              05,2777  54 335 0          TS     DNTMGOTO       CAUSE THE CURRENT DOWNLIST TO BE
A0369                                                                         INTERRUPTED AND START SENDING FROM THE
A0370                                                                         BEGINNING OF THE CURRENT DOWNLIST.

 0371   REF   5  LAST  168   05,3000  3 4777 1          CA     POSMAX
 0372   REF   1              05,3001  54 026 1          TS     TIME3          37777 TO TIME3.
 0373   REF   1              05,3002  6 7715 0          AD     MINUS2
 0374   REF   4  LAST  137   05,3003  54 027 0          TS     TIME4          37775 TO TIME4.
 0375   REF   4  LAST  184   05,3004  6 7716 0          AD     NEGONE
 0376   REF   2  LAST  131   05,3005  54 030 0          TS     TIME5          37774 TO TIME5.

 0377   REF   1              05,3006  3 3173 1 STARTSB2 CAF    OCT77603       TURN OFF UPLINK ACTY, TEMP CAUTION, KR,
 0378                        05,3007  0 0006 1          EXTEND                 FLASH, OP. ERROR. LEAVE OTHERS UNCHANGED
 0379   REF   8  LAST  188   05,3010  03 011 1          WAND   DSALMOUT

 0383   REF   1              05,3011  3 3174 0          CAF    OCT74777       TURN OFF TEST ALARMS, STANDBY ENABLE.
 0384                        05,3012  0 0006 1          EXTEND
 0385   REF   2  LAST  183   05,3013  03 013 0          WAND   CHAN13
03881   REF   1              05,3014  4 7662 0          CS     PRIO25         CLEAR R21MARK, P21FLAG, AND SKIPVHF BIT.
03882   REF   1              05,3015  7 0076 1          MASK   FLAGWRD2
03883   REF   1              05,3016  6 5006 1          AD     SKIPVBIT       NOW SET SKIPVHF FLAG.
03884   REF   2  LAST  190   05,3017  54 076 1          TS     FLAGWRD2
 0389   REF   4  LAST  183   E3,1400                    EBANK= LST1
 0390   REF   1              05,3020  3 3175 1          CAF    STARTEB
 0391   REF   4  LAST  188   05,3021  54 003 0          TS     EBANK          SET FOR E3

 0392   REF   3  LAST  167   05,3022  3 5000 1          CAF    NEG1/2         INITIALIZE WAITLIST DELTA-TS.
 0393   REF   5  LAST  190   05,3023  55'407 1          TS     LST1 +7
 0394   REF   6  LAST  190   05,3024  55'406 0          TS     LST1 +6
 0395   REF   7  LAST  190   05,3025  55'405 0          TS     LST1 +5
 0396   REF   8  LAST  190   05,3026  55'404 1          TS     LST1  +4
 0397   REF   9  LAST  190   05,3027  55'403 0          TS     LST1  +3
 0398   REF  10  LAST  190   05,3030  55'402 1          TS     LST1  +2
 0399   REF  11  LAST  190   05,3031  55'401 1          TS     LST1  +1
 0400   REF  12  LAST  190   05,3032  55'400 0          TS     LST1

 0401   REF   1              05,3033  4 5304 1          CS     ENDTASK
 0402   REF   1              05,3034  55'410 1          TS     LST2
 0403   REF   2  LAST  190   05,3035  55'412 0          TS     LST2 +2
 0404   REF   3  LAST  190   05,3036  55'414 0          TS     LST2 +4
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0405   REF   4  LAST  190   05,3037  55'416 1          TS     LST2 +6
0406   REF   5  LAST  191   05,3040  55'420 1          TS     LST2 +8D
0407   REF   6  LAST  191   05,3041  55'422 0          TS     LST2 +10D
0408   REF   7  LAST  191   05,3042  55'424 0          TS     LST2 +12D
0409   REF   8  LAST  191   05,3043  55'426 1          TS     LST2 +14D
0410   REF   9  LAST  191   05,3044  55'430 0          TS     LST2 +16D
0411   REF   2  LAST  190   05,3045  4 5305 0          CS     ENDTASK +1
0412   REF  10  LAST  191   05,3046  55'411 0          TS     LST2 +1
0413   REF  11  LAST  191   05,3047  55'413 1          TS     LST2 +3
0414   REF  12  LAST  191   05,3050  55'415 1          TS     LST2 +5
0415   REF  13  LAST  191   05,3051  55'417 0          TS     LST2 +7
0416   REF  14  LAST  191   05,3052  55'421 0          TS     LST2 +9D
0417   REF  15  LAST  191   05,3053  55'423 1          TS     LST2 +11D
0418   REF  16  LAST  191   05,3054  55'425 1          TS     LST2 +13D
0419   REF  17  LAST  191   05,3055  55'427 0          TS     LST2 +15D
0420   REF  18  LAST  191   05,3056  55'431 1          TS     LST2 +17D

0421   REF  14  LAST  186   05,3057  4 5021 0          CS     ZERO          MAKE ALL EXECUTIVE REGISTER SETS
0422   REF   1               05,3060  54 167 0          TS     PRIORITY      AVAILABLE.
0423   REF   2  LAST  191   05,3061  54 203 1          TS     PRIORITY +12D
0424   REF   3  LAST  191   05,3062  54 217 1          TS     PRIORITY +24D
0425   REF   4  LAST  191   05,3063  54 233 1          TS     PRIORITY +36D
0426   REF   5  LAST  191   05,3064  54 247 1          TS     PRIORITY +48D
0427   REF   6  LAST  191   05,3065  54 263 1          TS     PRIORITY +60D
0428   REF   7  LAST  191   05,3066  54 277 1          TS     PRIORITY +72D

0429   REF  11  LAST  183   05,3067  55'302 0          TS     DSRUPTSW
0430   REF   1               05,3070  54 067 1          TS     NEWJOB        SHOWS NO ACTIVE JOBS.

0431   REF   1               05,3071  3 3170 1          CAF    VAC1ADRC      MAKE ALL VAC AREAS AVAILABLE.
0432   REF   1               05,3072  54 400 1          TS     VAC1USE
0433   REF   1               05,3073  6 3171 0          AD     LTHVACA
0434   REF   1               05,3074  54 454 0          TS     VAC2USE
0435   REF   2  LAST  191   05,3075  6 3171 0          AD     LTHVACA
0436   REF   1               05,3076  54 530 0          TS     VAC3USE
0437   REF   3  LAST  191   05,3077  6 3171 0          AD     LTHVACA
0438   REF   1               05,3100  54 604 1          TS     VAC4USE
0439   REF   4  LAST  191   05,3101  6 3171 0          AD     LTHVACA
0440   REF   1               05,3102  54 660 0          TS     VAC5USE

0441   REF   1               05,3103  3 4377 0          CAF    TEN           BLANK DSKY REGISTERS (PROGRAM,VERB,NOUN,
A0442                                                                       R1,R2,R3)
0443   REF  10  LAST  189   05,3104  54 154 0  DSPOFF   TS     MPAC
0444   REF  12  LAST   67   05,3105  4 5004 1           CS     BIT12
0445   REF  11  LAST  191   05,3106  50 154 1          INDEX  MPAC
0446   REF  24  LAST  187   05,3107  55'023 0          TS     DSPTAB
0447   REF  12  LAST  191   05,3110  10 154 0          CCS    MPAC
0448   REF   1               05,3111  1 3104 0          TCF    DSPOFF

0449   REF   1               05,3112  55'141 0          TS     DELAYLOC
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0450   REF   2  LAST  191   05,3113  55'142 0            TS     DELAYLOC +1
0451   REF   3  LAST  192   05,3114  55'143 1            TS     DELAYLOC +2
04515  REF   4  LAST  192   05,3115  55'144 0            TS     DELAYLOC +3
0452   REF   1               05,3116  55'073 0            TS     RISAVE
0453   REF   1               05,3117  54 045 1            TS     INLINK
0454   REF   7  LAST  135   05,3120  54 776 0            TS     DSPCNT
0455   REF   1               05,3121  55'042 1            TS     CADRSTOR
0456   REF   1               05,3122  55'013 0            TS     REQRET
0457   REF   1               05,3123  55'015 0            TS     CLPASS
0458   REF   1               05,3124  55'012 1            TS     DSPLOCK
0459   REF   1               05,3125  55'020 0            TS     MONSAVE          KILL MONITOR
0460   REF   1               05,3126  55'021 1            TS     MONSAVE1
0461   REF   1               05,3127  55'001 0            TS     VERBREG
0462   REF   1               05,3130  55'002 0            TS     NOUNREG
0463   REF   1               05,3131  55'043 0            TS     DSPLIST
0464   REF   1               05,3132  55'330 1            TS     MARKSTAT
0465   REF   1               05,3133  55'322 1            TS     IMUCADR
0466   REF   1               05,3134  55'323 0            TS     OPTCADR
0467   REF   1               05,3135  55'324 1            TS     RADCADR
0468   REF   2  LAST   81    05,3136  55'325 0            TS     ATTCADR
0469   REF   1               05,3137  55'304 0            TS     LGYRO
0470   REF   1               05,3140  54 100 1            TS     FLAGWRD4         KILL INTERFACE DISPLAYS
0471   REF   1               05,3141  3 5024 1            CAF    NOUTCON
0472   REF   5  LAST  137   05,3142  55'016 0            TS     NOUT

0473   REF  23  LAST  186   05,3143  3 5002 0            CAF    BIT14
0474   REF   2  LAST  184   05,3144  7 1044 1            MASK   EXTVBACT
0475   REF   3  LAST  192   05,3145  55'044 1            TS     EXTVBACT
0476   REF   1               05,3146  3 3167 1            CAF    LESCHK           SELF CHECK GO-TO REGISTER.
0477   REF   2  LAST   82    05,3147  55'361 0            TS     SELFRET

0478   REF   1               05,3150  4 4374 1            CS     VD1
0479   REF   2  LAST  136   05,3151  54 777 1            TS     DSPCOUNT

0480   REF  18  LAST  190   05,3152  0 0002 0            TC     Q
0481   REF  10  LAST  168   05,3153  3 0001 0  T5IDLOC    CA     L                T5RUPT COMES HERE EVERY 163.84 SECS
0482   REF   1               05,3154  1 5336 0            TCF    NOQRSM +1        WHEN NOBODY IS USING IT.

0483   REF   2  LAST  106   E6,1662                      EBANK= OGANOW
0484   REF   1               05,3155   03153 0  T5IDLER  2CADR  T5IDLOC
0484   REF   1               05,3156   12066 1
0485   REF   3  LAST  192   E6,1662                      EBANK= OGANOW
0486   REF   1               05,3157   02105 1          2CADR  REDORCS
0486   REF   1               05,3160   42066 1
0487   REF   4  LAST  192   E6,1662                      EBANK= OGANOW
0488   REF   1               05,3161   03140 1          2CADR  REDOTVC
0488   REF   1               05,3162   34066 0
0489   REF   5  LAST  192   E6,1662                      EBANK= OGANOW
0490   REF   1               05,3163   02765 1          2CADR  REDOSAT
0490   REF   1               05,3164   46066 0
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0491                          05,3165   00435 0  IFAILINH OCT    435
0492   REF   1                05,3166   03530 1  LDNPHAS1 GENADR DNPHASE1
0493   REF   1                05,3167   03340 0  LESCHK   GENADR SELFCHK
0494   REF   2  LAST  191     05,3170   00400 0  VAC1ADRC ADRES  VAC1USE
0495                          05,3171   00054 0  LTHVACA  DEC    44

04955                         05,3172   20100 1  INTMASK  OCT    20100
0496                          05,3173   77603 1  OCT77603 OCT    77603
0497                          05,3174   74777 0  OCT74777 OCT    74777
0498   REF  13  LAST  190     05,3175   01400 1  STARTEB  ECADR  LST1
0499   REF   1                   5022             NUMGRPS  EQUALS FIVE
0500                          05,3176   77755 0  -ELR     OCT    -22          -ERROR LIGHT RESET KEY CODE.
0501                          05,3177   37411 1  IM30INIF OCT    37411        INHIBITS IMU FAIL FOR 5 SEC AND PIP ISSW
0502                          05,3200   37000 0  IM30INIR OCT    37000
0503   REF   2  LAST  159        5070          IM33INIT =      PRIO16       NO PIP OR TM FAIL SIGNALS.
0504                          05,3201   00450 0  9,6,4    OCT    450
0505                          05,3202   00130 0  OPTINITF OCT    130
0506                          05,3203   00430 0  OPTINITR OCT    430
0507                          05,3204   00000 1  SWINIT   OCT    0
0508                          05,3205   00000 1           OCT    0
0509                          05,3206   00000 1           OCT    0
0510                          05,3207   00000 1           OCT    0
0511                          05,3210   00000 1           OCT    0
0512                          05,3211   00200 0           OCT    00200
0513                          05,3212   00000 1           OCT    0
0514                          05,3213   00000 1           OCT    0
0515                          05,3214   00000 1           OCT    0
0516                          05,3215   00000 1           OCT    0
05162                         05,3216   00000 1           OCT    0
05163                         05,3217   00000 1           OCT    0
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P0517   PROGRAM NAME    GOTOPOOH                    ASSEMBLY     SUNDISK
R0518   LOG SECTION     FRESH START AND RESTART

R0519   FUNCTIONAL DESCRIPTION

R0520           1. DISPLAY MAJOR MODE NUMBER 00 IN DSKY REGISTER R1 AND R3. FLASH V50 N07 ON DSKY. (M M CHANGE REQUEST)
R0522           2. PERMIT A CURRENT PENDING REQUEST (FLASH ON DSKY) TO BE REPLACED (WITHOUT AN ABORT) BY THE MAJOR MODE
R0524              CHANGE REQUEST

R0525   INPUT/OUTPUT INFORMATION

R0526           A. CALLING SEQUENCE         TC GOTOPOOH

R0527           B. ERASABLE INITIALIZATION        NONE

R0528           C. OUTPUT        FLASH VERB 50 NOUN 07 ON DSKY

R0529           D. DEBRIS        L

R0530   PROGRAM ANALYSIS

R0531           A. SUBROUTINES CALLED     GOPERF3, LINUS

R0532           B. NORMAL EXIT          TCF ENDOFJOB

R0533           C. ALARM AND ABORT EXITS        NONE

 0534                                4106                          BLOCK  02
 0535   REF   1                     4000                          SETLOC FFTAG10
 0536                                4106                          BANK

 0537   REF   1                                                   COUNT  02/P00

 0538   REF   1                     4106  0 5412 0  GOTOPOOH TC     PHASCHNG        RESTART GOTOPOOH
 0539                                4107   00014 1              OCT    14

 0540   REF   3  LAST  185          4110  0 4701 0              TC     POSTJUMP
 0541   REF   1                     4111   10000 0              CADR   GOPOOFIX
 0542                          10,2203                          BANK   10
 0543   REF   1                 04,2000                          SETLOC VER837
 0544                           04,2000                          BANK

 0545   REF   1                                                   COUNT  04/P00

 0546   REF   1                 04,2000  0 2330 0  GOPOOFIX TC     INITSUB
 05461  REF   1                 04,2001  0 5540 0              TC     CLEARMRK +2
 05465  REF   1                 04,2002  3 2010 1              CAF    V37N99
 0547   REF   2  LAST  186      04,2003  0 4662 1              TC     BANKCALL
 0548   REF   1                 04,2004   20720 0              CADR   GOFLASH
 0549                           04,2005  1 2002 0              TCF    -5
```

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0550                    04,2006  1 2002 0          TCF    -4
0551                    04,2007  1 2002 0          TCF    -5

0552                    04,2010   11343 0 V37N99   VN     3799
```

L FRESH START AND RESTART USER'S PAGE NO. 16 E3 S3

P0553 PROGRAM NAME V37 ASSEMBLY SUNDISK
R0554 LOG SECTION FRESH START AND RESTART

R0555 FUNCTIONAL DESCRIPTION

R0556 1. CHECK IF NEW PROGRAM ALLOWED. IF BIT 1 OF FLAGWRD2(NODOFLAG) ISSET, AN ALARM 1520 IS CALLED.
R0558 2. CHECK FOR VALIDITY OF PROGRAM SELECTED. IF AN INVALID PROGRAM IS SELECTED, THE OPERATOR ERROR LIGHT IS
R0560 SET AND CURRENT ACTIVITY, IF ANY, CONTINUES.
R0561 3. SERVICER IS TERMINATED IF IT HAS BEEN RUNNING.
R0562 4. INSTALL IS EXECUTED TO AVOID INTERRUPTING INTEGRATION.
R0563 5. THE ENGINE IS TURNED OFF AND THE DAP IS INITIALIZED FOR COAST.
R0564 6. TRACK, UPDATE AND TARGI FLAGS ARE SET TO ZERO.
R0565 7. DISPLAY SYSTEM IS RELEASED.
R0566 8. THE FOLLOWING ARE PERFORMED FOR EACH OF THE THREE CASES.
R0567 A. PROGRAM SELECTED IS P00.
R0568 1. RENDEZVOUS FLAG IS RESET (KILL P20).
R0569 2. STATINT1 IS SCHEDULED BY SETTING RESTART GROUP 2.
R0570 3. MAJOR MODE 00 IS STORED IN THE MODE REGISTER(MODREG).
R0571 4. SUPERBANK 3 IS SELECTED.
R0572 5. NODOFLAG IS RESET.
R0573 6. ALL RESTART GROUPS EXCEPT GROUP 2 ARE CLEARED. CONTROL ISTRANSFERRED TO RESTART PROGRAM (GOPROG2)
R0575 WHICH CAUSES ALL CURRENT ACTIVITY TO BE DISCONTINUED AND A 9 MINUTE INTEGRATION CYCLE TO BE
R0577 INITIATED.
R0578 B. PROGRAM SELECTED IS P20
R0579 1. IF THE CURRENT MAJOR MODE IS THE SAME AS THE SELECTED NEWPROGRAM, THE PROGRAM IS RE-INITIALIZED
R0581 VIA V37XEQ, ALL RESTART GROUPS, EXCEPT GROUP 4 ARE CLEARED.
R0583 2. IF THE CURRENT MAJOR MODE IS NOT EQUAL TO THE NEW REQUEST, A CHECK IS MADE TO SEE IF THE REQUEST-
R0585 ED MAJOR MODE HAS BEEN RUNNING IN THE BACKGROUND,
R0586 AND IF IT HAS, NO NEW PROGRAM IS SCHEDULED, THE EXISTING
R0587 P20 IS RESTARTED TO CONTINUE, AND ITS MAJOR MODE IS SET.
R0588 3. CONTROL IS TRANSFERRED TO GOPROG2.
R0589 C. PROGRAM SELECTED IS NEITHER P00 NOR P20
R0590 1. V37XEQ IS SCHEDULED (AS A JOB) BY SETTING RESTART GROUP 4
R0591 2. ALL CURRENT ACTIVITY EXCEPT RENDEZVOUS AND TRACKING IS DISCONTINUED BY CLEARING ALL RESTART
R0593 GROUPS. GROUP 2 IS CLEARED. IF THE RENDEZVOUS FLAG IS ON P20 IS RESTARTED IN GOPROG2 VIA REDOP20.
R0595 TO CONTINUE.

R0596 INPUT/OUTPUT INFORMATION

R0597 A. CALLING SEQUENCE

R0598 CONTROL IS DIRECTED TO V37 BY THE VERBFAN ROUTINE.
R0599 VERBFAN GOES TO C(VERBTAB+C(VERBREG)). VERB 37 = MMCHANG.
R0600 MMCHANG EXECUTES A TC POSTJUMP, CADR V37.

R0601 B. ERASABLE INITIALIZATION NONE

R0602 C. OUTPUT
R0603 MAJOR MODE CHANGE

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R0604          D. DEBRIS
R0605               MMNUMBER, MPAC +1, MINDEX, BASETEMP +C(MINDEX), FLAGWRD0, FLAGWRD1, FLAGWRD2, MODREG, GOLOC -1,
R0607               GOLOC, GOLOC +1, GOLOC +2, BASETEMP, -PHASE2, PHASE2, -PHASE4

R0608    PROGRAM ANALYSIS

R0609          A. SUBROUTINES CALLED
R0610               ALARM, RELDSP, PINBRNCH, INTSTALL, ENGINOF2, ALLCOAST, V37KLEAN, GOPROG2, FALTON, FINDVAC, SUPERSW,
R0612               DSPMM

R0613          B. NORMAL EXIT        TC ENDOFJOB

R0614          C. ALARMS      1520 (MAJOR MODE CHANGE NOT PERMITTED)

 0615                                4112                          BLOCK  02
 0616    REF   2  LAST  194         4000                          SETLOC FFTAG10
 0617                                4112                          BANK

 0618    REF   1                                                   COUNT  02/V37

 0619                                4112    00024 1  OCT24        MM     20
 0620                                4113    00031 0  OCT31        MM     25
 0621                              27,2000                         BANK   27
 0622    REF   2  LAST  194        04,2000                         SETLOC VER837
 0623                              04,2011                         BANK

 0624    REF   1                                                   COUNT  04/V37

 0625    REF   1                   04,2011   54 775 0  V37         TS     MMNUMBER        SAVE MAJOR MODE
 0626    REF   3  LAST  189        04,2012    3 4371 0             CAF    PRIO30          RESTART AT PINBALL PRIORITY
 0627    REF   2  LAST  184        04,2013   54 366 0              TS     RESTREG

 0628    REF  37  LAST  187        04,2014    3 1320 1             CA     IMODES30        IS IMU BEING INITIALIZED
 0629    REF  21  LAST  187        04,2015    7 5012 0             MASK   BIT6
 0630    REF  44  LAST  189        04,2016   10 000 0              CCS    A
 0631    REF   1                   04,2017    1 2071 1             TCF    CANTROO

 0632    REF  19  LAST  189        04,2020    3 5003 1             CAF    BIT13           IS ENGINE ON
 0633                              04,2021    0 0006 1             EXTEND
 0634    REF   9  LAST  190        04,2022    02 011 0             RAND   DSALMOUT
 0635    REF  45  LAST  197        04,2023   10 000 0              CCS    A
 0636    REF   1                   04,2024    1 2031 0             TCF    ROOTOPOO        YES, SET UP FOR POO

 0637    REF   4  LAST  188        04,2025    4 0102 0             CS     FLAGWRD6        NO, IS TVC DAP ON
 0638    REF   3  LAST  188        04,2026    7 4105 0             MASK   OCT60000
 0639                              04,2027    0 0006 1             EXTEND
 0640    REF   1                   04,2030    6 2062 1             BZMF   ISITPOO         NO, CONTINUE WITH ROO

 0641                              04,2031    0 0004 0  ROOTOPOO   INHINT
 06412   REF   2  LAST  188        04,2032    3 5057 0             CAF    EBANK6
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0642   REF   5  LAST  190   04,2033  54 003 0          TS      EBANK
0643   REF   3  LAST  177   E6,1466                    EBANK=  DAPDATR1
0644   REF   1               04,2034  31'474 1         CAE     CSMMASS
0645   REF   2  LAST  106   04,2035  55'652 0         TS      MASSTMP
0647   REF   8  LAST  187   04,2036  0 4740 0         TC      IBNKCALL
0648   REF   1               04,2037   51017 0         CADR    SPSOFF
0649   REF   9  LAST  198   04,2040  0 4740 0         TC      IBNKCALL
0650   REF   1               04,2041   13366 0         CADR    MASSPROP
0651   REF   1               04,2042  3 2415 0         CAF     3.1SEC
0652   REF  10  LAST  198   04,2043  0 4740 0         TC      IBNKCALL
0653   REF   1               04,2044   42025 0         CADR    RCSDAPON +1

0654   REF  11  LAST  198   04,2045  0 4740 0         TC      IBNKCALL
0655   REF   1               04,2046   51071 0         CADR    TVCZAP          DISABLE TVC
0656   REF  15  LAST  191   04,2047  3 5021 1         CAF     ZERO
0657   REF   2  LAST  197   04,2050  54 775 0         TS      MMNUMBER
0658                        04,2051  0 0003 1         RELINT
0659   REF   2  LAST  193   04,2052  3 5022 1         CAF     FIVE
0660   REF   3  LAST  194   04,2053  0 4662 1         TC      BANKCALL
06602  REF   1               04,2054   01732 0         CADR    DELAYJOB
06604  REF  16  LAST  198   04,2055  3 5021 1         CAF     ZERO
06606                       04,2056  0 0006 1         EXTEND
06608                       04,2057  01 005 0         WRITE   5
0661                        04,2060  0 0006 1         EXTEND
06615                       04,2061  01 006 0         WRITE   6
0662   REF   3  LAST  198   04,2062  3 0775 1  ISITPOO CA      MMNUMBER
0663                        04,2063  0 0006 1         EXTEND
0664   REF   1               04,2064  1 2113 1         BZF     ISSERVON        YES, CHECK SERVICER STATUS

0665   REF   3  LAST  190   04,2065  4 0076 1         CS      FLAGWRD2        NO, IS NODO V37 FLAG SET
0666   REF   1               04,2066  7 5017 0         MASK    NODOBIT
0667   REF  46  LAST  197   04,2067  10 000 0         CCS     A
0668   REF   1               04,2070  1 2076 0         TCF     CHECKTAB        NO
0669   REF  11  LAST  189   04,2071  0 5650 1  CANTROO TC      ALARM
0670                        04,2072   01520 1         OCT     1520

0671   REF   1               04,2073  0 4473 0  V37BAD  TC      RELDSP          RELEASES DISPLAY FROM ASTRONAUT

0672   REF   4  LAST  194   04,2074  0 4701 0         TC      POSTJUMP        BRING BACK LAST NORMAL DISPLAY IF THERE
0673   REF   1               04,2075   21272 0         CADR    PINBRNCH        WAS ONE. OY

0674   REF   1               04,2076  3 2520 1  CHECKTAB CA     NOV37MM         THE NO. OF MM
0675   REF  13  LAST  191   04,2077  54 155 1  AGAINMM TS      MPAC +1
0676   REF  14  LAST  198   04,2100  50 155 0         NDX     MPAC +1
0677   REF   1               04,2101  3 2457 0         CA      PREMM1          OBTAIN WHICH MM THIS IS FOR
0678   REF   1               04,2102  7 6043 1         MASK    LOW7
0679                        04,2103  4 0000 0         COM
0680   REF   4  LAST  193   04,2104  6 0775 1         AD      MMNUMBER
0681   REF  47  LAST  198   04,2105  10 000 0         CCS     A
0682   REF  15  LAST  198   04,2106  10 155 1         CCS     MPAC +1         IF GR, SEE IF ANYMORE IN LIST
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0683   REF   1              04,2107  1 2077 1          TCF    AGAINMM        YES, GET NEXT ONE
0684   REF   1              04,2110  1 2272 0          TCF    V37NONO        LAST TIME OR PASSED MM

0685   REF  16  LAST  198   04,2111  3 0155 0          CA     MPAC +1
0686   REF   1              04,2112  54 774 1          TS     MINDEX         SAVE INDEX FOR LATER

0687   REF   1              04,2113  4 0103 1  ISSERVON CS     FLAGWRD7       V37 FLAG SET - I.E. IS SERVICER GOING
0688   REF   1              04,2114  7 5012 0          MASK   V37FLBIT
0689   REF  48  LAST  198   04,2115  10 000 0          CCS    A
0690   REF   1              04,2116  1 2124 0          TCF    CANV37         NO

0691                        04,2117  0 0004 0          INHINT
0692   REF   1              04,2120  4 5017 0          CS     AVEGBIT          YES TURN OFF AVERAGE G FLAG AND WAIT
0693   REF   3  LAST  184   04,2121  7 0075 1          MASK   FLAGWRD1       FOR SERVICER TO RETURN TO CANV37
0694   REF   4  LAST  199   04,2122  54 075 1          TS     FLAGWRD1

0695   REF   1              04,2123  1 5217 1          TCF    ENDOFJOB

0714   REF   1              04,2124  3 2412 1  CANV37   CAF    ROOAD
0715   REF   1              04,2125  54 374 0          TS     TEMPFLSH

0716   REF   2  LAST  194   04,2126  0 5412 0          TC     PHASCHNG
0717                        04,2127   00014 1          OCT    14

0718   REF   1              04,2130  0 6006 1  ROO      TC     INTPRET

0719                        04,2131   77624 1          CALL                  WAIT FOR INTEGRATION TO FINISH
0720   REF   1              04,2132   27442 0                INTSTALL
0721                        04,2133   77776 1  DUMMYAD  EXIT

0722   REF   1              04,2134  4 5051 1          CS     OCT1400        CLEAR CAUTION RESET
0723                        04,2135  0 0006 1          EXTEND                  AND TEST CONNECTOR OUTBIT
0724                        04,2136  03 011 1          WAND   11

0725   REF   1              04,2137  3 2403 1          CAF    OCT44571       CLEAR ENABLE OPTICS ERROR COUNTER, STAR
0726                        04,2140  0 0006 1          EXTEND                 TRAKERS ON BIT, TVC ENABLE, ZERO OPTICS,
0727                        04,2141  03 012 1          WAND   12             DISENGAGE OPTICS DAP, SIVB IN J SEQUENCE
A0728                                                                       START, AND SIVB CUTOFF BIT.
A07285
0729   REF   1              04,2142  4 2404 1          CS     OCT600         CLEAR UNUSED BITS
0730                        04,2143  0 0006 1          EXTEND
0731                        04,2144  03 013 0          WAND   13

0732   REF   2  LAST  194   04,2145  0 2330 0          TC     INITSUB

0733   REF   2  LAST  194   04,2146  0 5536 1          TC     CLEARMRK

0734   REF   1              04,2147  0 5560 1          TC     DOWNFLAG
0735   REF   1              04,2150   00020 0          ADRES  STIKFLAG
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0736   REF   4  LAST  198   04,2151  0 4662 1          TC      BANKCALL
0737   REF   1              04,2152   57757 0          CADR    UPACTOFF       TURN OFF UPLINK ACTIV LIGHT

0738   REF   2  LAST  199   04,2153  0 5560 1          TC      DOWNFLAG
0739   REF   1              04,2154   00215 1          ADRES   VHFRFLAG
0740   REF   3  LAST  200   04,2155  0 5560 1          TC      DOWNFLAG
0741   REF   1              04,2156   00037 0          ADRES   R21MARK

0742   REF   5  LAST  198   04,2157  10 775 0          CCS     MMNUMBER       IS THIS A POOH REQUEST
0743   REF   1              04,2160  1 2260 0          TCF     NOUVEAU        NO, PICK UP NEW PROGRAM

0744   REF   2 LAST  194 TO  197:     9      9*         COUNT   04/P00

0745   REF   2  LAST  198   04,2161  0 4473 0  POOH    TC      RELDSP         RELEASE DISPLAY SYSTEM

0746   REF   1              04,2162  3 5061 0          CAF     PRIO5          SET VARIABLE RESTART REGISTER FOR P00.
0747   REF   1              04,2163  55'056 1          TS      PHSPRDT2

0748                        04,2164  0 0004 0          INHINT

0749   REF   2  LAST  198   04,2165  4 5017 0          CS      NODOBIT        TURN OFF NODOFLAG
0750   REF   4  LAST  198   04,2166  7 0076 1          MASK    FLAGWRD2
0751   REF   5  LAST  200   04,2167  54 076 1          TS      FLAGWRD2

0752   REF   3  LAST  198   04,2170  3 5022 1          CA      FIVE           SET 2.5 RESTART FOR STATEINT1
0753   REF  11  LAST  192   04,2171  54 001 1          TS      L
0754                        04,2172  4 0000 0          COM
0755   REF   2  LAST  185   04,2173  52 755 1          DXCH    -PHASE2

0756   REF   1              04,2174  4 2407 1          CS      BIT7-B         RESET IMUSE + KILL P20 BY TURNING OFF
0757   REF   1              04,2175  7 0074 0          MASK    FLAGWRD0
0758   REF   2  LAST  200   04,2176  54 074 0          TS      FLAGWRD0                              RENDFLG

0759   REF   1              04,2177  3 5021 1          CAF     DNLADP00

0760   REF   2 LAST  197 TO  200:    104    104*        COUNT   04/V37

0761   REF   3  LAST  183   04,2200  54 332 1  SEUDOP00 TS      DNLSTCOD       SET UP APPROPRIATE DOWNLIST.

A0762                                                                          (OLD ONE WILL BE FINISHED FIRST)
0763   REF   1              04,2201  4 2410 1          CS      OCT01120       TURN OFF TRACK, TARG1, UPDATE FLAGS
0764   REF   2  LAST  184   04,2202  55'071 1          TS      EBANKTEM
0765   REF   5  LAST  199   04,2203  7 0075 1          MASK    FLAGWRD1
0766   REF   6  LAST  200   04,2204  54 075 1          TS      FLAGWRD1

0767   REF  12  LAST  198   04,2205  0 4740 0  GROUPKIL TC      IBNKCALL       KILL GROUPS 3(5,6
0768   REF   1              04,2206   12513 0          CADR    V37KLEAN

0769   REF   6  LAST  200   04,2207  10 775 0          CCS     MMNUMBER       IS IT POOH
0770   REF   1              04,2210  1 2217 0          TCF     RENDV00        NO
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0771   REF  13  LAST  200   04,2211  0 4740 0           TC     IBNKCALL
0772   REF   1              04,2212   12505 1           CADR   POOKLEAN       REDUNDANT EXCEPT FOR GROUP 4.

0773   REF   7  LAST  200   04,2213  3 0775 1  GOMOD    CA     MMNUMBER
0774   REF   3  LAST  189   04,2214  55'011 1           TS     MODREG

0775   REF   5  LAST  198   04,2215  0 4701 0  GOGOPROG TC     POSTJUMP
0776   REF   1              04,2216   12651 0           CADR   GOPROG2

0777   REF   8  LAST  201   04,2217  4 0775 0  RENDVOO  CS     MMNUMBER       IS NEW PROG = 20
0778   REF   2  LAST  165   04,2220  6 4112 1           AD     OCT24          20
0779                        04,2221  0 0006 1           EXTEND
0780   REF   1              04,2222  1 2224 0           BZF    RENDNOO        YES
0781   REF   1              04,2223  1 2234 1           TCF    POOFIZZ

0782   REF   9  LAST  201   04,2224  4 0775 0  RENDNOO  CS     MMNUMBER
0783   REF   4  LAST  201   04,2225  6 1011 0           AD     MODREG
0784                        04,2226  0 0006 1           EXTEND
0785   REF   1              04,2227  1 2240 1           BZF    KILL20

0786   REF   3  LAST  200   04,2230  3 0074 1           CA     FLAGWRDO       IS RENDEZVOO FLAG SET
0787   REF   1              04,2231  7 5011 0           MASK   RNDVZBIT
0788   REF  49  LAST  199   04,2232  10 000 0           CCS    A
0789   REF   1              04,2233  1 2251 1           TCF    STATQUO

0790   REF   2  LAST  201   04,2234  3 5011 1  POOFIZZ  CAF    RNDVZBIT
0791   REF   4  LAST  201   04,2235  7 0074 0           MASK   FLAGWRDO
0792   REF  50  LAST  201   04,2236  10 000 0           CCS    A
0793   REF   1              04,2237  1 2246 1           TCF    REV37
0794                        04,2240  0 0006 1  KILL20   EXTEND                 NO, KILL GROUPS 1 + 2
0795   REF   9  LAST  185   04,2241  3 5021 1           DCA    NEGO
0796   REF   3  LAST  198   04,2242  52 753 1           DXCH   -PHASE1

0797                        04,2243  0 0006 1           EXTEND
0798   REF  10  LAST  201   04,2244  3 5021 1           DCA    NEGO
0799   REF   3  LAST  200   04,2245  52 755 1           DXCH   -PHASE2

0800   REF   1              04,2246  3 2411 1  REV37    CAF    V37QCAD        SET RESTART POINT
0801   REF   2  LAST  199   04,2247  54 374 0           TS     TEMPFLSH

0802   REF   1              04,2250  1 2215 1           TCF    GOGOPROG

0803   REF   7  LAST  200   04,2251  4 0075 1  STATQUO  CS     FLAGWRD1       SET TRACK FLAG AND UPDATE FLAG
0804   REF   1              04,2252  7 5037 1           MASK   OCT120
0805   REF   8  LAST  201   04,2253  26 075 1           ADS    FLAGWRD1

0806                        04,2254  0 0006 1           EXTEND                 KILL GROUP 4
0807   REF  11  LAST  201   04,2255  3 5021 1           DCA    NEGO
0808   REF   2  LAST  185   04,2256  52 761 0           DXCH   -PHASE4
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0809   REF   1                 04,2257  1 2213 1            TCF    GOMOD

0810   REF   3  LAST  201      04,2260  3 5011 1  NOUVEAU   CAF    RNDVZBIT
0811   REF   5  LAST  201      04,2261  7 0074 0            MASK   FLAGWRDO
0812   REF  51  LAST  201      04,2262  10 000 0            CCS    A
0813                           04,2263  1 2266 0            TCF    +3
0814   REF   4  LAST  200      04,2264  0 5560 1            TC     DOWNFLAG       NO, RESET IMUSE FLAG.
0815   REF   1                 04,2265   00007 0            ADRES  IMUSE          BIT 8 FLAG 0
0816   REF   2  LAST  199      04,2266  50 774 0  +3        INDEX  MINDEX
0817   REF   1                 04,2267  3 2521 0            CAF    DNLADMM1       OBTAIN NEW DOWNLIST ADDRESS

0818                           04,2270  0 0004 0            INHINT
0819   REF   1                 04,2271  1 2200 0            TCF    SEUDOPOO

0820   REF   1                 04,2272  0 4400 1  V37NONO   TC     FALTON         COME HERE IF MM REQUESTED DOESNT EXIST

0821   REF   1                 04,2273  1 2073 0            TCF    V37BAD

0822   REF  16  LAST  187        5014                 OCT00010 EQUALS BIT4
0823                           04,2274  0 0004 0  V37XEQ    INHINT
0824   REF   3  LAST  202      04,2275  50 774 0            INDEX  MINDEX
0825   REF   2  LAST  198      04,2276  3 2457 0            CAF    PREMM1
0826   REF   1                 04,2277  55'060 1            TS     MMTEMP         OBTAIN PRIORITY BITS 15 - 11
0827   REF   1                 04,2300  54 020 1            TS     CYR            SHIFT RIGHT TO BITS 14 - 10

0828   REF   2  LAST  202      04,2301  3 0020 0            CA     CYR
0829   REF   1                 04,2302  7 7674 1            MASK   PRIO37
0830   REF   1                 04,2303  55'062 0            TS     PHSPRDT4       PRESET GROUP4 RESTART PRIORITY
0831   REF   1                 04,2304  54 063 0            TS     NEWPRIO        STORE PRIO FOR SPVAC

0832   REF   2  LAST  202      04,2305  3 1060 0            CA     MMTEMP         OBTAIN EBANK - BITS 8, 9, 10 OF MMTEMP.
0833                           04,2306  0 0006 1            EXTEND
0834   REF  17  LAST  165      04,2307  7 5010 1            MP     BIT8
0835   REF   1                 04,2310  7 5023 1            MASK   LOW3
0836   REF  12  LAST  200      04,2311  54 001 1            TS     L
0837   REF   4  LAST  202      04,2312  50 774 0            INDEX  MINDEX
0838   REF   1                 04,2313  3 2416 0            CAF    FCADRMM1
0839   REF   1                 04,2314  55'061 0            TS     BASETEMP
0840   REF   3  LAST  186      04,2315  7 4364 0            MASK   HI5
0841   REF  13  LAST  202      04,2316  26 001 1            ADS    L

0842   REF   2  LAST  202      04,2317  3 1061 1            CA     BASETEMP       OBTAIN GENADR PORTION OF 2CADR.
0843   REF   2  LAST   35      04,2320  7 5054 1            MASK   LOW10
0844   REF  12  LAST  143      04,2321  6 5005 1            AD     BIT11

0845   REF   1                 04,2322  0 5160 0            TC     SPVAC

0846   REF   3  LAST  202      04,2323  3 1060 0  V37XEQC   CA     MMTEMP         UPON RETURN FROM FINDVAC PLACE THE
0847   REF   2  LAST  198      04,2324  7 6043 1            MASK   LOW7           NEW MM IN MODREG (THE LOW 7 BITS OF
0848   REF   1                 04,2325  0 5357 0            TC     NEWMODEA       PHSBRDT1)
```

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R0849   FOR SUNDISK ONLY
 0850   REF   3  LAST  200   04,2326  0 4473 0          TC     RELDSP          RELEASE DISPLAY
 0851   REF   2  LAST  199   04,2327  0 5217 0          TC     ENDOFJOB        AND EXIT

 0852                        04,2330  0 0006 1  INITSUB EXTEND
 0853   REF  17  LAST  199   04,2331  22 155 0          QXCH   MPAC +1

 0854   REF   3  LAST  197   04,2332  3 5057 0          CAF    EBANK6          SET E6 FOR DEADBAND CODING
 0855   REF   6  LAST  198   04,2333  54 003 0          TS     EBANK           WILL BE RESET IN STARTSB2.
 0856                        04,2334  0 0004 0          INHINT
 0857   REF   2  LAST  188   04,2335  0 4526 1          TC     STOPRATE

 0858   REF   1              04,2336  3 0105 0          CA     FLAGWRD9        RESTORE DEADBAND
 0859   REF   1              04,2337  7 3004 1          MASK   MAXDBBIT
 0860   REF  52  LAST  202   04,2340  10 000 0          CCS    A
 0861   REF   1              04,2341  1 2345 0          TCF    SETMAXER        MAX DB SELECTED
 0862   REF   5  LAST  200   04,2342  0 4662 1          TC     BANKCALL        MIN DB SELECTED
 0863   REF   1              04,2343   50304 0          CADR   SETMINDB
 0864   REF   1              04,2344  1 2347 1          TCF    RAKE
 0865   REF   6  LAST  203   04,2345  0 4662 1  SETMAXER TC     BANKCALL
 0866   REF   1              04,2346   50320 0          CADR   SETMAXDB

 0867   REF   2  LAST  165   04,2347  3 5024 1  RAKE    CAF    ELEVEN          THIS PART CLEARS FLAGWORD BITS.
 0868   REF  18  LAST  203   04,2350  54 154 0  +1      TS     MPAC            LOOP COMES HERE.
 0869   REF  19  LAST  203   04,2351  50 154 1          INDEX  MPAC
 0870   REF   1              04,2352  4 2367 0          CS     FLAGTABL
 0871   REF  20  LAST  203   04,2353  50 154 1          INDEX  MPAC
 0872   REF   6  LAST  202   04,2354  7 0074 0          MASK   FLAGWRD0
 0873   REF  21  LAST  203   04,2355  50 154 1          INDEX  MPAC            PUT REVISED FLAGWORD BACK.
 0874   REF   7  LAST  203   04,2356  54 074 0          TS     FLAGWRD0
 0875   REF  22  LAST  203   04,2357  10 154 0          CCS    MPAC
 0876   REF   2  LAST  203   04,2360  1 2350 1          TCF    RAKE +1         GET THE NEXT FLAGWORD.
 0877                        04,2361  0 0003 1          RELINT

 0878   REF   1              04,2362  0 5546 0          TC     UPFLAG          NOW SET IMPULSW
 0879   REF   1              04,2363   00044 1          ADRES  IMPULSW

 0880   REF   5  LAST  190   04,2364  3 7716 0          CA     NEGONE
 0881   REF  16  LAST  184   04,2365  55'303 1          TS     OPTIND
 0882   REF  23  LAST  203   04,2366  0 0155 0          TC     MPAC +1         RETURN FROM INITSUB

 0883                        04,2367   00000 1  FLAGTABL OCT    0
 0884                        04,2370   00040 0          OCT    00040           IDLEFAIL
 0885                        04,2371   06000 1          OCT    06000           P21FLAG, STEERSW
 0886                        04,2372   00000 1          OCT    0
 0887                        04,2373   00000 1          OCT    0
 0888                        04,2374   04140 0          OCT    04140           V59FLAG, ENGBNFLG, 3AXISFLG
 0889                        04,2375   10000 0          OCT    10000           STRULLSW
 0890                        04,2376   16000 0          OCT    16000
 0891                        04,2377   00000 1          OCT    0
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L FRESH START AND RESTART USER'S PAGE NO. 24 E6 S3

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0892                          04,2400   42000 1          OCT     42000          SWTOVER, V94FLAG
0893                          04,2401   00000 1          OCT     0
0894                          04,2402   00000 1          OCT     0

08945  REF   1                20,2000                    SETLOC  VAC5LOC
08955                         20,2000                    BANK
08965  REF  17  LAST  198     20,2000   3 5021 1 VAC5STOR CA      ZERO           INITIALIZE INDEX REGISTERS
08975  REF   7  LAST  168     20,2001   54 061 1         TS      ITEMP1
08985  REF   3  LAST   68     20,2002   54 062 1         TS      ITEMP2

08995                         20,2003   0 0006 1 V5LOOP1 EXTEND                 LOOP TO STORE LOCS, BANKSETS, AND PRIOS.
09005  REF   9  LAST  204     20,2004   5 0061 0         INDEX   ITEMP1
09015  REF   1                20,2005   3 0165 0         DCA     LOC
09025  REF   4  LAST  204     20,2006   50 062 0         INDEX   ITEMP2
09035  REF   1                20,2007   52 662 1         DXCH    VAC5

09045  REF   9  LAST  204     20,2010   50 061 0         INDEX   ITEMP1
09055  REF   8  LAST  191     20,2011   3 0167 1         CA      PRIORITY
09065  REF   5  LAST  204     20,2012   50 062 0         INDEX   ITEMP2
09075  REF   2  LAST  204     20,2013   54 663 0         TS      VAC5 +2

09085  REF   6  LAST  204     20,2014   4 0062 1         CS      ITEMP2         HAVE WE STORED THEM ALL?
09095  REF   1                20,2015   6 2064 1         AD      EIGHTEEN
09105                         20,2016   0 0006 1         EXTEND
09115  REF   1                20,2017   1 2025 0         BZF     V5OUT1         YES, GET PHASE INFORMATION.

09125  REF   1                20,2020   3 5771 0         CA      TWELVE         NO, INCREMENT INDEXES AND LOOP.
09135  REF  10  LAST  204     20,2021   26 061 1         ADS     ITEMP1
09145  REF   2  LAST   35     20,2022   3 6214 0         CA      THREE
09155  REF   7  LAST  204     20,2023   26 062 1         ADS     ITEMP2
09165  REF   1                20,2024   1 2003 1         TCF     V5LOOP1

09175  REF   1                E3,1436                    EBANK=  PHSNAME1
09185  REF   2  LAST  188     20,2025   3 5051 0 V5OUT1  CA      EBANK3         PHSNAME REGISTERS ARE IN EBANK3.
09195  REF   7  LAST  203     20,2026   54 003 0         TS      EBANK

09205  REF   3  LAST  203     20,2027   3 5024 1         CA      ELEVEN         GET PHASE 2CADRS.
09215  REF   1                20,2030   0 5606 1         TC      GENTRAN
09225  REF   2  LAST  204     20,2031    01436 1         ADRES   PHSNAME1
09235  REF   3  LAST  204     20,2032    00706 0         ADRES   VAC5 +21D

09245  REF  18  LAST  204     20,2033   3 5021 1         CA      ZERO           NOW INITIALIZE INDEXES AGAIN.
09255  REF  11  LAST  204     20,2034   54 061 1         TS      ITEMP1
09265  REF   8  LAST  204     20,2035   54 062 1         TS      ITEMP2

09275  REF  12  LAST  204     20,2036   50 061 0 V5LOOP2 INDEX   ITEMP1         LOOP TO GET PHASE TABLES.
09285  REF   2  LAST  189     20,2037   3 0753 0         CA      PHASE1
09295  REF   9  LAST  204     20,2040   50 062 0         INDEX   ITEMP2
09305  REF   4  LAST  204     20,2041   54 722 1         TS      VAC5 +330
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09315  REF  10  LAST  204   20,2042  4 0062 1            CS      ITEMP2          DO WE HAVE THEM ALL?
09325  REF   4  LAST  200   20,2043  6 5022 1            AD      FIVE
09335                       20,2044  0 0006 1            EXTEND
09345  REF   1              20,2045  1 2052 0            BZF     V5OUT2          YES, GO FINISH UP.

09355  REF   1              20,2046  3 5016 0            CA      TWO             NO, INCREMENT INDEXES AND LOOP.
09365  REF  13  LAST  204   20,2047  26 061 1            ADS     ITEMP1
09375  REF  11  LAST  205   20,2050  24 062 0            INCR    ITEMP2
09385  REF   1              20,2051  1 2036 1            TCF     V5LOOP2

09395  REF  24  LAST  203   20,2052  3 0157 1  V5OUT2    CA      MPAC +3
09405  REF   5  LAST  204   20,2053  54 730 1            TS      VAC5 +39D

09415                       20,2054  0 0006 1            EXTEND
09425  REF   1              20,2055  3 0066 1            DCA     NEWLOC
09435  REF   6  LAST  205   20,2056  52 732 0            DXCH    VAC5 +40D

09445  REF   2  LAST  191   20,2057  3 0067 0            CA      NEWJOB
09455  REF   7  LAST  205   20,2060  54 707 0            TS      VAC5 +22D

09465  REF   2  LAST  202   20,2061  3 0063 1            CA      NEWPRIO
09475  REF   8  LAST  205   20,2062  54 713 0            TS      VAC5 +26D

09485  REF   1              20,2063  0 4675 1            TC      SWRETURN

09495                       20,2064   00022 1  EIGHTEEN OCT     22
09496  REF   3  LAST  197   04,2000                      SETLOC  VERB37
09497                       04,2403                      BANK

09505  REF   1                 5731          NEG7       EQUALS  OCT77770

09515                       04,2403   44571 1  OCT44571 OCT     44571          CONSTANTS TO CLEAR CHANNEL BITS IN V37
09525                       04,2404   00600 1  OCT600   OCT     600
09535  REF   3  LAST  173   E6,1423                      EBANK=  PACTOFF
09545  REF   2  LAST  192   04,2405   03153 0  POODAPAD 2CADR   T5IDLOC
09545                       04,2406   12066 1
09555  REF   1                 1060          MMTEMP     EQUALS  PHSPROT3
09565  REF   1                 1061          BASETEMP   EQUALS  TBASE4
09575                       04,2407   00300 1  BIT7-8   OCT     300
09585                       04,2410   01120 0  OCT01120 OCT     01120

09595  REF   1              04,2411   10277 1  V37QCAD  CADR    V37XEQ +3
09605  REF   1              04,2412   10133 1  RODAD    CADR    DUMMYAD
09615  REF   4  LAST  198   E6,1466                      EBANK=  DAPDATR1
09625  REF   1              04,2413   02122 1  RCSADDR4 2CADR   RCSATT
09625  REF   1              04,2414   42066 1
09635                       04,2415   37312 0  3.1SEC   OCT     37312          2.5 + 0.6 SEC
R09645  FOR VERB 37 TWO TABLES ARE MAINTAINED. EACH TABLE HAS AN ENTRY FOR EACH
R09655  MAJOR MODE THAT CAN BE STARTED FROM THE KEYBOARD. THE ENTRIES ARE PUT
R09665  INTO THE TABLE WITH THE ENTRY FOR THE HIGHEST MAJOR MODE COMING FIRST,
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R09675  TO THE LOWEST MAJOR MODE WHICH IS THE LAST ENTRY IN EACH TABLE.

R09685          THE FCADRMM TABLE CONTAINS THE FCADR OF THE STARTING JOB OF
R09695  THE MAJOR MODE.   FOR EXAMPLE,

A09705                                  FCADRMM1 FCADR  P79             START OF P 79
A09715                                           FCADR  PROG18          START OF P 18
A09725                                           FCADR  P01             START OF P 01

 09735                  04,2416          FCADRMM1 EQUALS
 09745  REF   1         04,2416  11172 0         FCADR  P79
 09755  REF   1         04,2417  10744 1         FCADR  P78
 09765  REF   1         04,2420  73153 1         FCADR  P77
 09775  REF   1         04,2421  26071 0         FCADR  P76
 09785  REF   1         04,2422  72163 0         FCADR  P75
 09795  REF   1         04,2423  72002 0         FCADR  P74
 09805  REF   1         04,2424  11441 0         FCADR  P73
 09815  REF   1         04,2425  11305 1         FCADR  P72
 09825  REF   1         04,2426  54320 1         FCADR  P62
 09835  REF   1         04,2427  54217 1         FCADR  P61
 09845  REF   1         04,2430  32000 0         FCADR  P54
 09855  REF   1         04,2431  31067 1         FCADR  P53
 09865  REF   1         04,2432  32000 0         FCADR  PROG52
 09875  REF   1         04,2433  31067 1         FCADR  P51
 09885  REF   1         04,2434  50463 0         FCADR  P47CSM
 09895  REF   1         04,2435  56614 1         FCADR  P41CSM
 09905  REF   1         04,2436  50073 0         FCADR  P40CSM
 09915  REF   1         04,2437  11166 0         FCADR  P39
 09925  REF   1         04,2440  10742 1         FCADR  P38
 09935  REF   1         04,2441  74466 0         FCADR  P37
 09945  REF   1         04,2442  72157 1         FCADR  P35
 09955  REF   1         04,2443  72000 1         FCADR  P34
 09965  REF   1         04,2444  11437 1         FCADR  P33
 09975  REF   1         04,2445  11303 1         FCADR  P32
 09985  REF   1         04,2446  73337 1         FCADR  P31
 09995  REF   1         04,2447  73323 1         FCADR  P30
 10005  REF   1         04,2450  62403 1         FCADR  P23
 10015  REF   1         04,2451  60000 1         FCADR  PROG22
 10025  REF   1         04,2452  76001 1         FCADR  PROG21
 10035  REF   1         04,2453  76261 0         FCADR  PROG20
 10045  REF   1         04,2454  73151 0         FCADR  P17
 10065  REF   1         04,2455  55660 1         FCADR  P06
 10075  REF   1         04,2456  66001 0         FCADR  GTSCPSS1        GYROCOMPASS STANDARD LEAD IN.

R10085          THE PREMM TABLE CONTAINS THE E-BANK,MAJOR MODE, AND PRIORITY
R10095  INFORMATION, IT IS IN THE FOLLOWING FORM,

R10105          PPP PPE EEM MMM MMM
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R10115          WHERE THE 7 M BITS CONTAIN THE MAJOR MODE NUMBER
R10125                3 E BITS CONTAIN THE E-BANK NUMBER
R10135                5 P BITS CONTAIN THE PRIORITY AT WHICH THE JOB IS
R10145                    TO BE STARTED

R10155          FOR EXAMPLE,

A10165                                  PREMM1  OCT     67213           PRIORITY      33
A10175                                                                  E-BANK         5
A10185                                                                  MAJOR MODE    11
A10195                                          OCT     25437           PRIORITY      12
A10205                                                                  E-BANK         6
A10215                                                                  MAJOR MODE    31

 10225                  04,2457                 PREMM1  EQUALS
 10235                  04,2457  27117 0                OCT     27117           MM 79  EBANK 4  PRIO 13
 10245                  04,2460  27116 1                OCT     27116           MM 78  EBANK 4 PR23 13
 10255                  04,2461  27115 1                OCT     27115           MM 77  EBANK 4  PRIO 13
 10265                  04,2462  27714 0                OCT     27714           MM 76  EBANK 7  PRIO 13
 10275                  04,2463  27113 1                OCT     27113           MM 75  EBANK 4  PRIO 13
 10285                  04,2464  27112 0                OCT     27112           MM 74  EBANK 4  PRIO13
 10295                  04,2465  27111 0                OCT     27111           MM 73  EBANK 4  PRIO 13
 10305                  04,2466  27110 1                OCT     27110           MM 72  EBANK 4  PRIO 13
 10315                  04,2467  27476 1                OCT     27476           MM 62  EBANK 6  PRIO 13
 10325                  04,2470  27475 1                OCT     27475           MM 61  EBANK 6  PRIO 13
 10335                  04,2471  27266 0                OCT     27266           MM 54  EBANK 5  PRIO 13
 10345                  04,2472  27265 0                OCT     27265           MM 53  EBANK 5  PRIO 13
 10355                  04,2473  27264 1                OCT     27264           MM 52  EBANK 5  PRIO 13
 10365                  04,2474  27263 0                OCT     27263           MM 51  EBANK 5  PRIO 13
 10375                  04,2475  27657 0                OCT     27657           MM 47  EBANK 7  PRIO 13
 10385                  04,2476  27451 1                OCT     27451           MM 41  EBANK 6  PRIO 13
 10395                  04,2477  27450 0                OCT     27450           MM 40  EBANK 6  PRIO 13
 10405                  04,2500  27047 1                OCT     27047           MM 39  EBANK 4 PRIO13
 10415                  04,2501  27046 0                OCT     27046           MM 38  EBANK 4 PRIO 13
 10425                  04,2502  27645 0                OCT     27645           MM 37  EBANK 7 PRIO13
 10435                  04,2503  27043 0                OCT     27043           MM 35  EBANK 4  PRIO 13
 10445                  04,2504  27042 1                OCT     27042           MM 34  EBANK 4  PRIO13
 10455                  04,2505  27041 1                OCT     27041           MM 33  EBANK 4  PRIO 13
 10465                  04,2506  27040 0                OCT     27040           MM 32  EBANK 4  PRIO 13
 10475                  04,2507  27637 0                OCT     27637           MM 31  EBANK 7  PRIO 13
 10485                  04,2510  27636 1                OCT     27636           MM 30  EBANK 7  PRIO 13
 10495                  04,2511  27227 0                OCT     27227           MM 23  EBANK 5  PRIO 13
 10505                  04,2512  27226 1                OCT     27226           MM 22  EBANK 5  PRIO 13
 10515                  04,2513  27025 0                OCT     27025           MM 21  EBANK 4  PRIO 13
 10525                  04,2514  27424 0                OCT     27424           MM 20  EBANK 6  PRIO 13
 10535                  04,2515  27021 1                OCT     27021           MM 17  EBANK 4  PRIO 13
 10545                  04,2516  27006 1                OCT     27006           MM 06  EBANK 4  PRIO 13
 10555                  04,2517  41201 1                OCT     41201           MM 01  EBANK 5  PRIO 20
R10565
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R10575          THE FOLLOWING LIST IS FOR THE PURPOSE OF VERIFYING THAT THE EBA

 10585  REF   6  LAST  175   E7,1412                EBANK= TIG          EBANK SETTING REQUIRED BY MM 76
 10595  REF   4  LAST   91   E4,1763                EBANK= KT           EBANK SETTING REQUIRED BY MM 75
 10605  REF   2  LAST   91   E4,1770                EBANK= SUBEXIT      EBANK SETTING REQUIRED BY MM 74
 10615  REF   3  LAST  208   E4,1770                EBANK= SUBEXIT      EBANK SETTING REQUIRED BY MM 73
 10625  REF   4  LAST  208   E4,1770                EBANK= SUBEXIT      EBANK SETTING REQUIRED BY MM 72
 10635  REF   2  LAST  111   E6,1661                EBANK= AOG          EBANK SETTING REQUIRED BY MM 62
 10645  REF   3  LAST  208   E6,1661                EBANK= AOG          EBANK SETTING REQUIRED BY MM 61
 10655  REF   3  LAST  173      0302                EBANK= BESTI        EBANK SETTING REQUIRED BY MM 54
 10665  REF   1                0304                EBANK= STARIND      EBANK SETTING REQUIRED BY MM 53
 10675  REF   4  LAST  208      0302                EBANK= BESTI        EBANK SETTING REQUIRED BY MM 52
 10685  REF   2  LAST  208      0304                EBANK= STARIND      EBANK SETTING REQUIRED BY MM 51
 10695  REF   4  LAST  124   E7,1672                EBANK= P40TMP       EBANK SETTING REQUIRED BY MM 47
 10705  REF   5  LAST  205   E6,1466                EBANK= DAPDATR1     EBANK SETTING REQUIRED BY MM 41
 10715  REF   2  LAST  108   E6,1510                EBANK= KMPAC        EBANK SETTING REQUIRED BY MM 40
 10725  REF   5  LAST  208   E4,1763                EBANK= KT           EBANK SETTING REQUIRED BY MM 35
 10735  REF   5  LAST  208   E4,1770                EBANK= SUBEXIT      EBANK SETTING REQUIRED BY MM 34
 10745  REF   6  LAST  208   E4,1770                EBANK= SUBEXIT      EBANK SETTING REQUIRED BY MM 33
 10755  REF   7  LAST  208   E4,1770                EBANK= SUBEXIT      EBANK SETTING REQUIRED BY MM 32
 10765  REF   2  LAST  122   E7,1625                EBANK= +MGA         EBANK SETTING REQUIRED BY MM 30
 10775  REF   3  LAST  179   E5,1751                EBANK= LANDMARK     EBANK SETTING REQUIRED BY MM 23
 10785  REF   2  LAST   72      0301                EBANK= MARKINDX     EBANK SETTING REQUIRED BY MM 22
 10795  REF   2  LAST  129   E7,1777                EBANK= WHOCARES     EBANK SETTING REQUIRED BY MM 21
 10805  REF   1                E6,1413                EBANK= ESTROKER     EBANK SETTING REQUIRED BY MM 20
 10815  REF   2  LAST   79      1150                EBANK= TIME2SAV     EBANK SETTING REQUIRED BY MM 06
 10825  REF   1                E5,1425                EBANK= QPLACE       EBANK SETTING REQUIRED BY MM 01

R10835  NOTE.    THE FOLLOWING CONSTANT IS THE NUMBER OF ENTRIES IN EACH OF
R10845  ----     THE ABOVE LISTS-1(IE, THE NUMBER OF MAJOR MODES(EXCEPT P00)
R10855           THAT CAN BE CALLED FROM THE KEYBOARD MINUS ONE)

 10865                  04,2520          EPREMM1  EQUALS                 END OF PREMM1 TABLE
 10875  REF   3  LAST  202   04,2457                SETLOC  PREMM1        THIS CODING WILL AUTOMATICALLY CHANGE
 10885  REF   1                0041          NO.MMS   =MINUS  EPREMM1     THE 'NOV37MM' CONSTANT AS ENTRIES ARE
 10895  REF   4  LAST  205   04,2000                SETLOC  VERB37        INSERTED(IN) OR DELETED(FROM) THE
 10905                  04,2520                BANK                  'PREMM1' TABLE.

 10915  REF   1                04,2520   00040 0  NOV37MM  ADRES  NO.MMS -1   ITEMS IN 'PREMM1'TABLE - 1. *DON'T MOVE*

 10925                  04,2521          DNLADMM1 EQUALS
 10935  REF   1                04,2521   00002 0        ADRES  RENDEZVU   P79
 10945  REF   2  LAST  208   04,2522   00002 0        ADRES  RENDEZVU   P78
 10955  REF   3  LAST  208   04,2523   00002 0        ADRES  RENDEZVU   P77
 10965  REF   4  LAST  208   04,2524   00002 0        ADRES  RENDEZVU   P76
 10975  REF   5  LAST  208   04,2525   00002 0        ADRES  RENDEZVU   P75
 10985  REF   6  LAST  208   04,2526   00002 0        ADRES  RENDEZVU   P74
 10995  REF   7  LAST  208   04,2527   00002 0        ADRES  RENDEZVU   P73
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11005  REF   8  LAST  208   04,2530   00002 0          ADRES  RENDEZVU      P72
11015  REF   1              04,2531   00001 0          ADRES  ENTRYUPD      P62
11025  REF   1              04,2532   00003 1          ADRES  POWERED       P61
11035  REF   1              04,2533   00000 1          ADRES  COSTALIN
11045  REF   2  LAST  209   04,2534   00000 1          ADRES  COSTALIN
11055  REF   3  LAST  209   04,2535   00000 1          ADRES  COSTALIN      P52
11065  REF   4  LAST  209   04,2536   00000 1          ADRES  COSTALIN      P51
11075  REF   2  LAST  209   04,2537   00003 1          ADRES  POWERED       P47
11085  REF   3  LAST  209   04,2540   00003 1          ADRES  POWERED       P41
11095  REF   4  LAST  209   04,2541   00003 1          ADRES  POWERED       P40
11105  REF   9  LAST  209   04,2542   00002 0          ADRES  RENDEZVU      P39
11115  REF  10  LAST  209   04,2543   00002 0          ADRES  RENDEZVU      P38
11125  REF  11  LAST  209   04,2544   00002 0          ADRES  RENDEZVU      P37
11135  REF  12  LAST  209   04,2545   00002 0          ADRES  RENDEZVU      P35
11145  REF  13  LAST  209   04,2546   00002 0          ADRES  RENDEZVU      P34
11155  REF  14  LAST  209   04,2547   00002 0          ADRES  RENDEZVU      P33
11165  REF  15  LAST  209   04,2550   00002 0          ADRES  RENDEZVU      P32
11175  REF  16  LAST  209   04,2551   00002 0          ADRES  RENDEZVU
11185  REF  17  LAST  209   04,2552   00002 0          ADRES  RENDEZVU      P30
11195  REF  18  LAST  209   04,2553   00002 0          ADRES  RENDEZVU      P23
11205  REF   1              04,2554   00004 0          ADRES  P22DNLST      P22
11215  REF  19  LAST  209   04,2555   00002 0          ADRES  RENDEZVU      P21
11225  REF  20  LAST  209   04,2556   00002 0          ADRES  RENDEZVU      P20
11235  REF  21  LAST  209   04,2557   00002 0          ADRES  RENDEZVU      P17
11245  REF   5  LAST  209   04,2560   00000 1          ADRES  COSTALIN      P06
11255  REF   6  LAST  209   04,2561   00000 1          ADRES  COSTALIN      P01
11265  REF  19  LAST  204      5021             ONLADPOO =     ZERO
11275                          0000             COSTALIN =     0
11285                          0001             ENTRYUPD =     1
11295                          0002             RENDEZVU =     2
11305                          0003             POWERED  =     3

11315                          0004             P22ONLST =     4
R11325  ORBITAL INTEGRATION CONSTANTS

R11335  THESE CONSTANTS ARE USED IN COMPUTING THE SETTING OF MIDFLAG.
11345                  04,2562   00465 0  RMM      2DEC   2538.09 E3 B-27 800 KM ABOVE LUNAR SURFACE
11345                  04,2563   32324 0
11355                  04,2564   00333 1  RME      2DEC   7178165 B-29    800 KM ABOVE EQ. RADIUS
11355                  04,2565   01733 1
11365                  13,2000                     BANK   13
11375  REF   1         13,2000                     SETLOC INTINIT
11385                  13,2000                     BANK

11395  REF   1                                     COUNT* $$/INTIN

11405  REF   2  LAST   86   E3,1554                EBANK= RRECTCSM

11415                  13,2000   43014 0  STATEUP  SET    BOF            EXTRAPOLATE CM STATE VECTOR
11425  REF   1         13,2001   01474 1                  VINTFLAG
```

```
11435  REF  1            13,2002  01751 0          ORBWFLAG      ALSO 6X6 W-MATRIX IF VALID
11445                    13,2003  26006 0          +3                 FOR ORBITAL NAVIGATION
11455                    13,2004  77614 1     SET
11465  REF  1            13,2005  01476 0          DIMOFLAG
11475                    13,2006  45014 0     CLEAR CALL
11485  REF  1            13,2007  01667 1          PRECIFLG
11495  REF  1            13,2010  27162 1          INTEGRV
11505                    13,2011  71214 0     BON   DLOAD
11515  REF  1            13,2012  04307 1          SURFFLAG
11525  REF  1            13,2013  26031 1          STATEND
11535  REF  2 LAST  86   13,2014  01571 0          TETCSM
11545  REF  1            13,2015  34041 0     STCALL TDEC1
11555  REF  2 LAST 199   13,2016  27442 0          INTSTALL
11565                    13,2017  45014 0     CLEAR CALL          EXTRAPOLATE LM STATE VECTOR
11575  REF  2 LAST 209   13,2020  01674 0          VINTFLAG
11585  REF  1            13,2021  26670 1          SETIFLGS            AND 6X6 W-MATRIX IF VALID
11595                    13,2022  43014 0     BOF   SET
11605  REF  1            13,2023  02756 1          RENDWFLG            FOR RENDEZVOUS NAVIGATION
11615                    13,2024  26026 1          +2
11625  REF  2 LAST 210   13,2025  01476 0          DIMOFLAG
11635                    13,2026  45014 0     SET   CALL
11645  REF  2 LAST 210   13,2027  01467 0          PRECIFLG
11655  REF  2 LAST 210   13,2030  27162 1          INTEGRV
11665                    13,2031  77614 1  STATEND  CLRGO
11675  REF  1            13,2032  01236 1                    NODOFLAG
11685  REF  1            13,2033  26656 0                    ENDINT

R11695   THISVINT IS CALLED BY MIDTOAV1 AND2

11705                    13,2034  43414 1  THISVINT SET      RVQ
11715  REF  3 LAST 210   13,2035  01474 1                    VINTFLAG
```

P0001 RESTART TABLES

R0002 ----------

R0003 THERE ARE TWO FORMS OF RESTART TABLES FOR EACH GROUP. THEY ARE KNOWN AS THE EVEN RESTART TABLES AND THE ODD
R0005 RESTART TABLES. THE ODD TABLES HAVE ONLY ONE ENTRY OF THREE LOCATIONS WHILE THE EVEN TABLES HAVE TWO ENTRIES
R0007 EACH USING THREE LOCATIONS. THE INFORMATION AS TO WHETHER IT IS A JOB, WAITLIST, OR A LONGCALL IS GIVEN BY THE
R0009 WAY THINGS ARE PUT INTO THE TABLES.
R0010 A JOB HAS ITS PRIORITY STORED IN PRDTTAB OF THE CORRECT PHASE SPOT - A POSITIVE PRIORITY INDICATES A
R0012 FINDVAC JOB, A NEGATIVE PRIORITY A NOVAC. THE 2CADR OF THE JOB IS STORED IN THE CADRTAB.
R0014 FOR EXAMPLE,

```
A0015                                   5.7SPOT  OCT    23000
A0016                                            2CADR  SOMEJOB
```

R0017 A RESTART OF GROUP 5 WITH PHASE SEVEN WOULD THEN CAUSE SOMEJOB TO BE RESTARTED AS A FINOVAC WITH PRIORITY 23.

```
R0019 5.5SPOT  OCT    -23000
A0020                                            2CADR  ANYJOB
```

R0021 HERE A RESTART OF GROUP 5 WITH PHASE 7 WOULD CAUSE ANYJOB TO BE RESTARTED AS A NOVAC WITH PRIORITY 23.
R0023 A LONGCALL HAS ITS GENADR OF ITS 2CADR STORED NEGATIVELY AND ITS BBCON STORED POSITIVELY. IN ITS PRDTTAB IS
R0025 PLACED THE LOCATION OF A DP REGISTER THAT CONTAINS THE DELTA TIME THAT LONGCALL HAD BEEN ORIGINALLY STARTED
R0027 WITH. EXAMPLE.

```
A0028                                   3.6SPOT  GENADR DELTAT
A0029                                           -GENADR LONGTASK
A0030                                            BBCON  LONGTASK

A0031                                            OCT    31000
A0032                                            2CADR  JOBAGAIN
```

R0033 THIS WOULD START UP LONGTASK AT THE APPROPRIATE TIME, OR IMMEDIATELY IF THE TIME HAD ALREADY PASSED. IT SHOULD
R0035 BE NOTED THAT IF DELTAT IS IN A SWITCHED E BANK, THIS INFORMATOIN SHOULD BE IN THE BBCON OFTHE 2CADR OF THE
R0037 TASK. FROM ABOVE, WE SEE THAT THE SECOND PART OF THIS PHASE WOULD BE STARTED AS A JOB WITH A PRIORITY OF 31.

R0039 WAITLIST CALLS ARE IDENTIFIED BY THE FACT THAT THEIR 2CADR IS STORED NEGATIVELY. IF PRDTTAB OF THE PHASE SPOT
R0041 IS POSITIVE, THEN IT CONTAINS THE DELTA TIME, IF PRDTTAB IS NEGATIVE THEN IT IS THE -GENADR OF AN ERASABLE
R0043 LOCATION CONTAINING THE DELTA TIME, THAT IS, THE TIME IS STORED INDIRECTLY. IT SHOULD BE NOTED AS ABOVE, THAT
R0045 IF THE TIME IS STORED INDIRECTLY, THE BBCON MUST CONTAIN THE NECESSARY E BANK INFORMATION IF APPLICABLE. WITH
R0047 WAITLIST WE HAVE ONE FURTHER OPTION, IF -0 IS STORED IN PRDTTAB, IT WILL CAUSE AN IMMEDIATE RESTART OF THE
R0049 TASK. EXAMPLES.

```
A0050                                            OCT    77777          THIS WILL CAUSE AN IMMEDIATE RESTART
A0051                                           -2CADR  ATASK          OF THE TASK :ATASK:

A0052                                            DEC    200            IF THE TIME OF THE 2 SECONDS SINCE DUMMY
A0053                                           -2CADR  DUMMY          WAS PUT ON WAITLIST IS UP, IT WILL BEGIN
A0054                                                                  IN 10 MS, OTHERWISE IT WILL BEGIN WHEN
A0055                                                                  IT NORMALLY WOULD HAVE BEGUN.
```

```
A0056                                          -GENADR DTIME          WHERE DTIME CONTAINS THE DELTA TIME
A0057                                          -2CADR  TASKTASK       OTHERWISE THIS IS AS ABOVE

R0058   *****   NOW THE TABLES THEMSELVES *****

 0059                       01,2000                      BANK   01
 0060   REF  1              01,2000                      SETLOC RESTART
 0061                       01,2000                      BANK

 0062   REF  1                                           COUNT  01/RSTAB

 0063                       01,2000          PRDTTAB     EQUALS 12000          USED TO FIND THE PRIORITY OR DELTATIME
 0064                       01,2001          CADRTAB     EQUALS 12001          THIS AND THE NEXT RELATIVE LOC CONTAIN
A0065                                                                          RESTART 2CADR

 0066   REF  1              01,2000  0 0063 1 SIZETAB     TC     1.2SPOT -12006
 0067   REF  1              01,2001  0 0010 0              TC     1.3SPOT -12004
 0068   REF  1              01,2002  0 0063 1              TC     2.2SPOT -12006
 0069   REF  1              01,2003  0 0024 1              TC     2.3SPOT -12004
 0070   REF  1              01,2004  0 0063 1              TC     3.2SPOT -12006
 0071   REF  1              01,2005  0 0043 0              TC     3.3SPOT -12004
 0072   REF  1              01,2006  0 0063 1              TC     4.2SPOT -12006
 0073   REF  1              01,2007  0 0107 1              TC     4.3SPOT -12004
 0074   REF  1              01,2010  0 0242 0              TC     5.2SPOT -12006
 0075   REF  1              01,2011  0 0260 0              TC     5.3SPOT -12004
 0076   REF  1              01,2012  0 0336 1              TC     6.2SPOT -12006
 0077   REF  1              01,2013  0 0346 0              TC     6.3SPOT -12004
 0078   REF  2 LAST 212     01,2071                1.2SPOT EQUALS 3.2SPOT
R0079   ANY MORE GROUP 1.EVEN RESTART VALUES SHOULD GO HERE

 0080                       01,2014   00170 1  1.3SPOT  DEC    120             THIS NUMBER MUST EQUAL C(JTAGTIME)
 0081   REF  4 LAST 208     E6,1661                     EBANK= AOG
 0082   REF  1              01,2015   74570 0           -2CADR  SETJTAG
 0082   REF  1              01,2016   45711 1
 0083                       01,2017   10000 0  1.5SPOT  OCT    10000
 0084   REF  6 LAST 208     E6,1466                     EBANK= DAPDATR1
 0085   REF  1              01,2020   02405 1           2CADR  RED040.9
 0085   REF  1              01,2021   34066 0
 0086                       01,2022   10000 0  1.7SPOT  OCT    10000
 0087   REF  2 LAST 208     E6,1413                     EBANK= ESTROKER
 0088   REF  1              01,2023   02074 0           2CADR  RELINUS
 0088   REF  1              01,2024   56066 1
 0089                       01,2025   10000 0  1.11SPOT OCT    10000
 0090   REF  3 LAST 212     E6,1413                     EBANK= ESTROKER
 0091   REF  1              01,2026   02343 1           2CADR  PIKUP20
 0091   REF  1              01,2027   76066 0
R0092   ANY MORE GROUP 1.ODD RESTART VALUES SHOULD GO HERE

 0093   REF  2 LAST 212     01,2071                2.2SPOT EQUALS 1.2SPOT
R0094   ANY MORE GROUP 2.EVEN RESTART VALUES SHOULD GO HERE
```

```
 0095   REF   1              01,2030   02654 1  2.3SPOT  GENADR 600SECS
 0096   REF   1              01,2031   75150 1           -GENADR STATEINT
 0097   REF   3  LAST  209   E3,1554                     EBANK= RRECTCSM
 0098   REF   2  LAST  213   01,2032   26063 0           BBCON  STATEINT

 0099                        01,2033   05000 1  2.5SPOT  OCT    05000
 0100   REF   4  LAST  213   E3,1554                     EBANK= RRECTCSM
 0101   REF   1              01,2034   02636 0           2CADR  STATINT1
 0101   REF   1              01,2035   26063 0
 0102                        01,2036   10000 0  2.7SPOT  OCT    10000
 0103   REF   3  LAST  126   E7,1734                     EBANK= MRKBUF2
 0104   REF   1              01,2037   02630 0           2CADR  R22
 0104   REF   1              01,2040   70067 1
 0105                        01,2041   14000 1  2.11SPOT OCT    14000
 0106   REF   4  LAST  208   E5,1751                     EBANK= LANDMARK
 0107   REF   1              01,2042   02576 1           2CADR  V94ENTER
 0107   REF   1              01,2043   62065 0
 0108                        01,2044   10000 0  2.13SPOT OCT    10000
 0109   REF   4  LAST  213   E7,1734                     EBANK= MRKBUF2
 0110   REF   1              01,2045   02377 0           2CADR  REDOR22
 0110   REF   1              01,2046   58067 0
R0111   ANY MORE GROUP 2.000 RESTART VALUES SHOULD GO HERE
 0112   REF   2  LAST  212   01,2071                     3.2SPOT  EQUALS 4.2SPOT

R0113   ANY MORE GROUP 3.EVEN RESTART VALUES SHOULD GO HERE

 0114                        01,2047   20000 0  3.3SPOT  OCT    20000
 0115   REF   3  LAST  171   E7,1427                     EBANK= TGO
 0116   REF   1              01,2050   02427 1           2CADR  S40.13
 0116   REF   1              01,2051   34067 1
 0117                        01,2052   00000 1  3.5SPOT  DEC    0
 0118                        01,2053   00000 1           DEC    0
 0119                        01,2054   00000 1           DEC    0
 0120                        01,2055   22000 1  3.7SPOT  OCT    22000
 0121   REF   2  LAST   87   E3,1706                     EBANK= TEPHEM
 0122   REF   1              01,2056   02117 1           2CADR  MATRXJOB
 0122   REF   1              01,2057   70063 0
 0123                        01,2060   22000 1  3.11SPOT OCT    22000
 0124   REF   3  LAST  213   E3,1706                     EBANK= TEPHEM
 0125   REF   1              01,2061   02253 1           2CADR  REP11
 0125   REF   1              01,2062   70063 0
 0126                        01,2063   22000 1  3.13SPOT OCT    22000
 0127   REF   4  LAST  213   E3,1706                     EBANK= TEPHEM
 0128   REF   1              01,2064   02026 1           2CADR  REP11A
 0128   REF   1              01,2065   70063 0
 0129   REF   4  LAST  213   01,2066   76347 0  3.15SPOT-GENADR TGO +1
 0130   REF   5  LAST  213   E7,1427                     EBANK= TGO
 0131   REF   1              01,2067   75011 0          -2CADR  ENGINOFF
 0131   REF   1              01,2070   27710 1
```

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R0132   ANY MORE GROUP 3.000 RESTART VALUES SHOULD GO HERE

 0133                          01,2071   77777 0  4.2SPOT  OCT     77777
 0134   REF   7  LAST  208     E7,1412                     EBANK=  TIG
 0135   REF   1                01,2072   75207 0          -2CADR  PRECHECK
 0135   REF   1                01,2073   27710 1
 0136                          01,2074   30000 1          OCT     30000
 0137   REF   2  LAST  124     E7,1674                     EBANK=  DELVIMU
 0138   REF   1                01,2075   02534 1          2CADR   P47BODY
 0138   REF   1                01,2076   50067 0
 0139                          01,2077   77777 0  4.4SPOT  OCT     77777
 0140   REF   8  LAST  214     E7,1412                     EBANK=  TIG
 0141   REF   2  LAST  214     01,2100   75207 0          -2CADR  PRECHECK
 0141                          01,2101   27710 1
 0142                          01,2102   05664 0          DEC     2996
 0143   REF   7  LAST  212     E6,1466                     EBANK=  DAPDATR1
 0144   REF   1                01,2103   75443 0          -2CADR  TTG/0
 0144   REF   1                01,2104   27711 0
 0145                          01,2105   77777 0  4.6SPOT  OCT     77777
 0146   REF   9  LAST  214     E7,1412                     EBANK=  TIG
 0147   REF   3  LAST  214     01,2106   75207 0          -2CADR  PRECHECK
 0147                          01,2107   27710 1
 0148                          01,2110   04700 1          DEC     2496
 0149   REF  10  LAST  214     E7,1412                     EBANK=  TIG
 0150   REF   1                01,2111   75203 1          -2CADR  TIG-5
 0150   REF   1                01,2112   27710 1
R0163   ANY MORE GROUP 4.EVEN RESTART VALUES SHOULD GO HERE

 0164                          01,2113   00050 1  4.3SPOT  DEC     40
 0165   REF   4  LAST  205     E6,1423                     EBANK=  PACTOFF
 0166   REF   1                01,2114   75115 0          -2CADR  DOTVCON
 0166   REF   1                01,2115   27711 0
 0167                          01,2116   00240 1  4.5SPOT  DEC     160
 0168   REF   5  LAST  214     E6,1423                     EBANK=  PACTOFF
 0169   REF   1                01,2117   75064 1          -2CADR  DOSTRULL
 0169   REF   1                01,2120   27711 0
 0170                          01,2121   00764 1  4.7SPOT  DEC     500
 0171   REF   6  LAST  214     E6,1423                     EBANK=  PACTOFF
 0172   REF   1                01,2122   75165 1          -2CADR  TIG-0
 0172   REF   1                01,2123   27711 0
 0173                          01,2124   00372 1  4.11SPOT DEC     250
 0174   REF   8  LAST  214     E6,1466                     EBANK=  DAPDATR1
 0175   REF   1                01,2125   74235 0          -2CADR  V97E40.6
 0175   REF   1                01,2126   27711 0
 0176                          01,2127   00310 0  4.13SPOT DEC     200
 0177   REF   3  LAST  208     F7,1777                     EBANK=  WHOCARES
 0178   REF   1                01,2130   74270 1          -2CADR  R40ENABL
 0178   REF   1                01,2131   27710 1
 0179                          01,2132   16000 0  4.15SPOT OCT     16000          PRELAUNCH OPTICAL VERIFICATION
 0180   REF   3  LAST  173     E5,1757                     EBANK=  OGC
```

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```
0181   REF   1              01,2133   02000 0          2CADR  COMPVER        CALLS FOR OPTICS DATA AGAIN (STD LEADIN)
0181   REF   1              01,2134   66065 1
0182                        01,2135   16000 0 4.17SPOT OCT    16000          PRELAUNCH AZIMUTH CHANGE
0183   REF   3  LAST  95    E5,1671                   EBANK= XSM
0184   REF   1              01,2136   03742 0          2CADR  AZMTHCG1
0184   REF   1              01,2137   66065 1
0185   REF   5  LAST 208    01,2140   01672 0 4.21SPOT GENADR P40TMP         DELTA TIME USED IN SETTING UP
0186   REF   1              01,2141   75340 1         -GENADR TIGBLNK        LONG CALL OF TIGBLNK  BY P40,P41
0187   REF   6  LAST 215    E7,1672                   EBANK= P40TMP
0188   REF   2  LAST 215    01,2142   50067 0          BBCON  TIGBLNK
0189                        01,2143   12000 1 4.23SPOT OCT    12000          PROTECT  P40S/SV BY P40 P41
0190   REF  11  LAST 214    E7,1412                   EBANK= TIG
0191   REF   1              01,2144   02204 0          2CADR  P40S/SV
0191   REF   1              01,2145   50067 0

0192                        01,2146   24000 1 4.25SPOT OCT    24000
0193   REF   5  LAST 208       0302                   EBANK= BESTI
0194   REF   2  LAST 206    01,2147   02000 0          2CADR  PROG52
0194                        01,2150   32060 0

0195                        01,2151   00372 1 4.27SPOT DEC    250
0196   REF   7  LAST 214    E6,1423                   EBANK= PACTOFF
0197   REF   1              01,2152   74775 1         -2CADR  DOTVCRCS
0197   REF   1              01,2153   27711 0
0198                        01,2154   13000 0 4.31SPOT OCT    13000
0199   REF   2  LAST  95    E5,1765                   EBANK= STAR
0200   REF   1              01,2155   02533 0          2CADR  R51 +1
0200   REF   1              01,2156   30065 1
0201                        01,2157   04064 1 4.33SPOT DEC    2100           PROTECT CONTINUING JOB TO START P63
0202   REF   5  LAST 212    E6,1661                   EBANK= AOG
0203   REF   1              01,2160   75403 1         -2CADR  WAKEP62
0203   REF   1              01,2161   23711 1
0204                        01,2162   12000 1 4.35SPOT OCT    12000
0205   REF   9  LAST 214    E6,1466                   EBANK= DAPDATR1
0206   REF   1              01,2163   02246 0          2CADR  POSTBURN
0206   REF   1              01,2164   50066 1
0207                        01,2165   00764 1 4.37SPOT DEC    500
0208   REF  12  LAST 215    E7,1412                   EBANK= TIG
0209   REF   1              01,2166   75222 1         -2CADR  TIGAVEG
0209   REF   1              01,2167   27710 1
0210                        01,2170   17000 1 4.41SPOT OCT    17000          PROTECT DISPLAY JOB IN P67
0211   REF   6  LAST 215    E6,1661                   EBANK= AOG
0212   REF   1              01,2171   02512 0          2CADR  P67.1
0212   REF   1              01,2172   54066 0
0213   REF   1              01,2173   76003 0 4.43SPOT-GENADR S61DT          PROTECT TASK TO START PREREAD,ENTRY
0214   REF   2  LAST 215    E6,1774                   EBANK= S61DT           S61.1C WILL CHANGE EBANK=EB7 FOR PREREAD
0215   REF   1              01,2174   75212 1         -2CADR  S61.1C
0215   REF   1              01,2175   23711 1
0216                        01,2176   13000 0 4.45SPOT OCT    13000          PROTECT CONTINUING JOB S61.1
0217   REF   7  LAST 215    E6,1661                   EBANK= AOG             (ENTRY IMU ALIGNMENT)
```

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0218   REF   1              01,2177   02603 0          2CADR  S61.1A -1
0218   REF   1              01,2200   54066 0
0219                        01,2201   17000 1  4.47SPOT OCT    17000          PROTECT HUNTEST ITERATION.
0220   REF   8  LAST  215   E6,1661                    EBANK= AOG
0221   REF   1              01,2202   03014 1          2CADR  PRE-HUNT
0221   REF   1              01,2203   52066 0
0222                        01,2204   77777 0  4.51SPOT OCT    77777          PROTECT FDAI ATTITUDE
0223   REF   2  LAST  115   E6,1704                    EBANK= BODY3           ERROR DISPLAY IN P11
0224   REF   1              01,2205   75457 0         -2CADR  ATERTASK
0224   REF   1              01,2206   07711 1
0225                        01,2207   77777 0  4.53SPOT DEC    -0
0226   REF   1              E7,1777                    EBANK= END-E7          EBANK7 FOR TIG
0227   REF   1              01,2210   74254 1         -2CADR  V97ETASK
0227   REF   1              01,2211   27710 1
0228                        01,2212   13000 0  4.55SPOT OCT    13000          PROTECT  P65 RESPONSIVE DISPLAY.
0229   REF   2  LAST  118   E7,1451                    EBANK= RTINIT
0230   REF   1              01,2213   02457 0          2CADR  P65.1
0230   REF   1              01,2214   54067 1
0231   REF   7  LAST  215   01,2215   76105 1  4.57SPOT-GENADR P40TMP
0232   REF   8  LAST  216   E7,1672                    EBANK= P40TMP
0233   REF   1              01,2216   75277 1         -2CADR  TIGON
0233   REF   1              01,2217   27710 1
0234                        01,2220   77777 0  4.61SPOT OCT    77777
0235   REF   3  LAST  215   E6,1423                    EBANK= PACTOFF
0236   REF   1              01,2221   75152 0         -2CADR  IGNITION
0236   REF   1              01,2222   27711 0
0237                        01,2223   77777 0  4.63SPOT OCT    77777
0238   REF   9  LAST  216   E6,1423                    EBANK= PACTOFF
0239   REF   1              01,2224   75003 0         -2CADR  DOSPSOFF
0239   REF   1              01,2225   27711 0
0240                        01,2226   00012 1  4.65SPOT DEC    10
0241   REF  13  LAST  215   E7,1412                    EBANK= TIG
0242   REF   2  LAST  214   01,2227   75203 1         -2CADR  TIG-5
0242                        01,2230   27710 1
02421                       01,2231   77777 0  4.67SPOT DEC    -0
024211 REF   2  LAST  198   E6,1474                    EBANK= CSMMASS
024212 REF   1              01,2232   74336 1         -2CADR  V97TTASK
024212 REF   1              01,2233   27711 0
02422                       01,2234   00372 1  4.71SPOT DEC    250
024221 REF  10  LAST  215   E6,1466                    EBANK= DAPDATR1        (FOR RCSDAPON)
024222 REF   1              01,2235   74321 1         -2CADR  V97TRCS
024222 REF   1              01,2236   27711 0
02423                       01,2237   77777 0  4.73SPOT DEC    -0
024231 REF   1              E6,1444                    EBANK= V97VCNTR
024232 REF   1              01,2240   74304 0         -2CADR  V97PTASK
024232 REF   1              01,2241   27711 0
024233                      01,2242   77777 0  4.75SPOT DEC    -0
024234 REF  11  LAST  216   E6,1466                    EBANK= DAPDATR1
024235 REF   1              01,2243   74242 0         -2CADR  SPSOFF97
024235 REF   1              01,2244   27711 0
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 024236                          01,2245   77777 0  4.77SPOT DEC     -0
 024237 REF  10  LAST  216       E6,1423                     EBANK=  PACTOFF
 024238 REF   2  LAST  214       01,2246   75165 1           -2CADR  TIG-0
 024239                          01,2247   27711 0
R0243   ANY MORE GROUP 4.ODD RESTART VALUES SHOULD GO HERE

 0244                            01,2250   32000 0  5.2SPOT  OCT     32000
 0245   REF   6  LAST  117       E7,1431                     EBANK=  DVCNTR
 0246   REF   1                 01,2251   03236 0           2CADR   NORMLIZE
 0246   REF   1                 01,2252   76067 1
 0247                            01,2253   00310 0           DEC     200
 0248   REF   9  LAST  216       E6,1661                     EBANK=  ADG
 0249   REF   1                 01,2254   74472 0           -2CADR  REREADAC
 0249   REF   1                 01,2255   01711 1
 0250                            01,2256   20000 0  5.4SPOT  OCT     20000
 0251   REF   7  LAST  217       E7,1431                     EBANK=  DVCNTR
 0252   REF   1                 01,2257   03104 1           2CADR   SERVICER
 0252   REF   1                 01,2260   76067 1
 0253                            01,2261   00310 0           DEC     200
 0254   REF  10  LAST  217       E6,1661                     EBANK=  ADG
 0255   REF   2  LAST  217       01,2262   74472 0           -2CADR  REREADAC
 0255                            01,2263   01711 1
R0256   ANY MORE GROUP 5.EVEN RESTART VALUES SHOULD GO HERE

 0257                            01,2264   00310 0  5.3SPOT  DEC     200
 0258   REF  11  LAST  217       E6,1661                     EBANK=  ADG
 0259   REF   3  LAST  217       01,2265   74472 0           -2CADR  REREADAC
 0259                            01,2266   01711 1
 0260                            01,2267   77777 0  5.5SPOT  OCT     77777
 0261   REF  12  LAST  217       E6,1661                     EBANK=  ADG
 0262   REF   1                 01,2270   75026 1           -2CADR  REDO5.5
 0262   REF   1                 01,2271   01711 1
 0263                            01,2272   20000 0  5.7SPOT  OCT     20000          USED BY PRELAUNCH
 0264   REF   4  LAST  215       E5,1671                     EBANK=  XSM
 0265   REF   1                 01,2273   02456 1           2CADR   RSTGTS1
 0265   REF   1                 01,2274   66065 1
 0266                            01,2275   77777 0  5.11SPOT OCT     77777
 0267   REF   5  LAST  217       E5,1671                     EBANK=  XSM
 0268   REF   1                 01,2276   75175 0           -2CADR  ALLOOP1
 0268   REF   1                 01,2277   11712 0
 0269                            01,2300   20000 0  5.13SPOT OCT     20000
 0270   REF   6  LAST  217       E5,1671                     EBANK=  XSM
 0271   REF   1                 01,2301   02527 0           2CADR   WTLISTNT
 0271   REF   1                 01,2302   66065 1
 0272                            01,2303   20000 0  5.15SPOT OCT     20000
 0273   REF   7  LAST  217       E5,1671                     EBANK=  XSM
 0274   REF   1                 01,2304   03324 1           2CADR   RESTEST1
 0274   REF   1                 01,2305   66065 1
 0275                            01,2306   20000 0  5.17SPOT OCT     20000
 0276   REF   8  LAST  217       E5,1671                     EBANK=  XSM
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 0277   REF   1              01,2307   05217 0          2CADR  GEOSTRT4
 0277   REF   1              01,2310   04065 0
 0278                        01,2311   22000 1  5.21SPOT OCT   22000
 0279   REF   9  LAST  217   E5,1671                   EBANK= XSM
 0280   REF   1              01,2312   02636 0          2CADR  ALFLT1
 0280   REF   1              01,2313   66065 1
 0281                        01,2314   77777 0  5.23SPOT OCT   77777
 0282   REF  10  LAST  218   E5,1671                   EBANK= XSM
 0283   REF   1              01,2315   75152 0         -2CADR  SPECSTS
 0283   REF   1              01,2316   11712 0
 0284                        01,2317   20000 0  5.25SPOT OCT   20000
 0285   REF  11  LAST  218   E5,1671                   EBANK= XSM
 0286   REF   1              01,2320   03335 1          2CADR  RESTEST3
 0286   REF   1              01,2321   66065 1
 0287                        01,2322   20000 0  5.27SPOT OCT   20000
 0288   REF  12  LAST  218   E5,1671                   EBANK= XSM
 0289   REF   1              01,2323   03303 1          2CADR  RESTAIER
 0289   REF   1              01,2324   66065 1
 0290                        01,2325   00000 1  5.31SPOT DEC   0
 0291                        01,2326   00000 1          DEC    0
 0292                        01,2327   00000 1          DEC    0
 0293                        01,2330   20000 0  5.33SPOT OCT   20000
 0294   REF  13  LAST  218   E5,1671                   EBANK= XSM
 0295   REF   1              01,2331   03360 1          2CADR  RESCHNG
 0295   REF   1              01,2332   66065 1
 0296                        01,2333   00000 1  5.35SPOT DEC   0
 0297                        01,2334   00000 1          2DEC   0
 0297                        01,2335   00000 1
 0298                        01,2336   77777 0  5.37SPOT OCT   77777
 0299   REF  13  LAST  217   E5,1661                   EBANK= ADG
 0300   REF   1              01,2337   74744 0         -2CADR  CHEKAVEG
 0300   REF   1              01,2340   01711 1
 0301                        01,2341   77777 0  5.41SPOT OCT   77777          TO PROTECT PREREAD AT TIG-30A
 0302   REF   8  LAST  217   E7,1431                   EBANK= DVCNTR             TIG-15 T+60
 0303   REF   1              01,2342   75076 1         -2CADR  PREREAD
 0303   REF   1              01,2343   01710 0
R0304   ANY MORE GROUP 5.000 RESTART VALUES SHOULD GO HERE

 0305                        01,2344   77777 0  6.2SPOT  OCT   77777          USED BY P40 AFTER GIMB DR TST TO REPOS'N
 0306   REF   4  LAST  177   E6,1476                   EBANK=    AK            ENGINE UNTIL TVCDAPON
 0307   REF   1              01,2345   75536 0         -2CADR  PRE40.6
 0307   REF   1              01,2346   37711 1

 0308                        01,2347   00144 0          DEC    100
 0309   REF   2  LAST  123   E7,1560                   EBANK= TTOGO
 0310   REF   1              01,2350   74517 1         -2CADR  CLOKTASK
 0310   REF   1              01,2351   27710 1

R0311   ANY MORE 6.000 RESTART VALUES SHOULD GO HERE
```

```
0312                                01,2352  00144 0  6.3SPOT  DEC     100
0313  REF  14  LAST  216           E7,1412                    EBANK=  TIG
0314  REF   2  LAST  218           01,2353  74517 1           -2CADR  CLOKTASK
0314                                01,2354  27710 1
0315                                01,2355  30000 1  6.5SPOT  OCT     30000          PROTECT INCREMENTING OF TIME2,TIME1 BY
0316  REF   5  LAST  213           E3,1706                    EBANK=  TEPHEM         P27NUPDATE PROGRAM)
0317  REF   1                     01,2356  03573 0           2CADR   TIMEDIDR
0317  REF   1                     01,2357  56063 1
0318                                01,2360  00000 1  6.7SPOT  OCT     0
0319                                01,2361  00000 1           OCT     0
0320                                01,2362  00000 1           OCT     0

0321  REF   2  LAST  112           01,2363  76052 1  6.11SPOT-GENADR  CM/GYMDT       PROTECT TASK TO READ CDUS.
0322  REF   3  LAST  219           E6,1725                    EBANK=  CM/GYMDT       FOR ENTRY DAP
0323  REF   1                     01,2364  75343 1           -2CADR  READGYMB
0323  REF   1                     01,2365  45711 1
0324                                01,2366  00000 1  6.13SPOT DEC     0
0325                                01,2367  00000 1           DEC     0
0326                                01,2370  00000 1           DEC     0
```

```
R0330   PROGRAM DESCRIPTION: NEWPHASE                                  DATE: 11 NOV 1966
R0332   MOD: 1                                                         ASSEMBLY: SUNBURST REV
R0334   MOD BY: COPPS                                                  LOG SECTION: PHASE TABLE MAINTENANCE
R0336   FUNCTIONAL DESCRIPTION:
R0337                NEWPHASE IS THE QUICK WAY TO MAKE A NON VARIABLE PHASE CHANGE. IT INCLUDES THE OPTION OF SETTING
R0339           TBASE OF THE GROUP. IF TBASE IS TO BE SET,  -C(TIME1) IS STORED IN THE TBASE TABLE AS FOLLOWS:

R0341                   (L-1) TBASE0
R0342                   (L)   TBASE1 (IF GROUP=1)
R0343                   (L+1)
R0344                   (L+2) TBASE2 (IF GROUP=2)
R0345                   -----
R0346                   (L+6) TBASE4 (IF GROUP=4)
R0347                   (L+7)
R0348                   (L+8) TBASE5 (IF GROUP=5)

R0349           IN ANY CASE, THE NEGATIVE OF THE PHASE, FOLLOWED (IN THE NEXT REGISTER)  BY THE PHASE, IS STORED IN THE
R0351           PHASE TABLE AS FOLLOWS:

R0352                   (L)   -PHASE1 (IF GROUP=1)
R0353                   (L+1) PHASE1
R0354                   (L+2) -PHASE2 (IF GROUP=2)
R0355                   (L+3) PHASE2
R0356                   -----
R0357                   (L+7) PHASE4
R0358                   (L+8) -PHASE5 (IF GROUP=5)
R0359                   (L+9) PHASE5

R0360   CALLING SEQUENCE:
R0361                EXAMPLE IS FOR PLACING A PHASE OF FIVE INTO GROUP THREE:

R0362           1) IF TBASE IS NOT TO BE SET:
A0363                                       L-1     CA      FIVE
A0364                                       L       TC      NEWPHASE
A0365                                       L+1     OCT     00003

R0366           2) IF TBASE IS TO BE SET:
A0367                                       L-1     CS      FIVE
A0368                                       L       TC      NEWPHASE
A0369                                       L+1     OCT     00003

R0370   SUBROUTINES CALLED: NONE

R0371   NORMAL EXIT MODE: AT L+2 OF CALLING SEQUENCE

R0372   ALARM OR ABORT EXITS: NONE

R0373   OUTPUT: PHASE TABLE AND TBASE TABLE UPDATED

R0374   ERASABLE INITIALIZATION REQ.D: NONE
```

```
R0375   DEBRIS: A,L,TEMPG

R0376   ***WARNING*** THIS PROGRAM IS TO BE PLACED IN FIXED-FIXED AND UNSWITCHED ERASABLE.

 0378                           4114                    BLOCK  02
 0379   REF   1                 4000                    SETLOC FFTAGI
 0380                           4114                    BANK

 0381   REF   1                                         COUNT* $$/PHASE

 0382                           4114  0 0004 0  NEWPHASE INHINT

 0383   REF  14  LAST  202      4115  54 001 1          TS     L              SAVE FOR FURTHER USE

 0384   REF  19  LAST  192      4116  50 002 0          NDX    Q              OBTAIN THE GROUP NUMBER
 0385                           4117  3 0000 1          CA     0
 0386   REF  20  LAST  221      4120  24 002 0          INCR   Q              OBTAIN THE RETURN ADDRESS
 0387                           4121  6 0000 1          DOUBLE                SAVE THE GROUP IN A FORM USED FOR
 0388   REF   1                 4122  54 061 1          TS     TEMPG          INDEXING

 0389   REF  15  LAST  221      4123  10 001 1          CCS    L              SEE IF WE ARE TO SET TBASE
 0390                           4124  1 4133 0          TCF    +7             NO, THE DELTA T WAS POSITIVE
 0391                           4125  1 4133 0          TCF    +6

 0392   REF  53  LAST  203      4126  24 000 1  NUFAZ+10 INCR   A              SET TBASE AND STORE PHASE CORRECTLY
 0393   REF  16  LAST  221      4127  54 001 1          TS     L

 0394   REF   3  LAST  132      4130  4 0025 1          CS     TIME1          SET TBASE
 0395   REF   2  LAST  221      4131  50 061 0          NDX    TEMPG
 0396   REF   1                 4132  55*051 0          TS     TBASE1 -2

 0397   REF  17  LAST  221      4133  4 0001 1          CS     L              NOW PUT THE PHASE IN THE RIGHT TABLE LOC
 0398   REF   3  LAST  221      4134  50 061 0          NDX    TEMPG
 0399   REF   4  LAST  201      4135  52 751 0          DXCH   -PHASE1 -2

 0400                           4136  0 0003 1          RELINT
 0401   REF  21  LAST  221      4137  0 0002 0          TC     Q              NOW RETURN TO CALLER
```

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```
R0001   PROGRAM NAME - SXTMARK                          DATE- 5 APRIL 1967
R0002   PROGRAM MODIFIED BY 258/278 PROGRAMMERS        LOG SECTION SXTMARK
R0003   MOD BY- R. MELANSON TO ADD DOCUMENTATION       ASSEMBLY SUNDISK REV. 116

R0004   FUNCTIONAL DESCRIPTION-
R0005      SXTMARK IS CALLED FROM INTERNAL ROUTINES WHICH MAY REQUIRE STAR OR LANDMARK MARKINGS BY THE ASTRONAUT. IF
R0007      THE MARK SYSTEM IS NOT IN USE, SXTMARK RESERVES A VAC AREA FOR MARKING AND REQUESTS EXECUTION OF THE MKVB51
R0009      ROUTINE VIA THE EXECUTIVE JOB PRIORITY LIST. R21 USES THIS ROUTINE TO DETERMINE IF THE MARK SYSTEM CAN BE
R0011      USED. IF YES, SXTMARK RETURNS TO R21 TO PERFORM ITS OWN MARK REQUESTS VIA THE V51 FLASH.

R0013   CALLING SEQUENCE-
R0014
R0015      CAF    (NO. MARK REQUESTS IN BITS 1-3 OF A)
R0016      TC     BANKCALL
R0017      CADR   SXTMARK

R0018   NORMAL EXIT MODE-
R0019      SWRETURN

R0020   ALARM OR ABORT EXIT MODE-
R0021      ABORT

R0022   OUTPUT-
R0023      1) MARKSTAT CONTAINS MARK VALUE (BITS 14-12) AND VAC AREA ADDRESS
R0024      2) QPRET = VAC AREA POINTER VALUE
R0025      3) 1ST WORD OF RESERVED VAC AREA SET TO +0
R0026      4) PRIO32 PLACED IN A REGISTER

R0027   ERASABLE INITIALIZATION-
R0028      1) BITS 1-3 OF A = NO. MARKS REQUESTED
R0029      2) BITS 2,3 OF EXTVBACT =0
R0030      3) A VAC AREA MUST BE AVAILABLE (WORD 1 = ADDRESS OF VAC AREA)

R0031   DEBRIS-
R0032      A,Q,L,RUPTREG1,MARKSTAT,QPRET,BIT2 OF EXTVBACT

 0033                          13,2036                    BANK   13
 0034   REF   1                07,2000                    SETLOC SXTMARKE
 0035                          07,2002                    BANK

 0036   REF   5  LAST  132     E7,1725                    EBANK= MRKBUF1
 0037   REF   1                                          COUNT  07/SXTMK

 0038                          07,2002  0 0004 0  SXTMARK  INHINT
 0039   REF  15  LAST  160     07,2003  54 070 1          TS     RUPTREG1        NUMBER OF MARKS WANTED

 0040   REF   6  LAST  187     07,2004  3 6211 0          CAF    SIX             BIT2 = MARKING SYSTEM IN USE
 0041   REF   4  LAST  192     07,2005  7 1044 1          MASK   EXTVBACT        BIT3 = EXTENDED VERB IN PROGRESS
 0042   REF  54  LAST  221     07,2006  10 000 0          CCS    A
 0043   REF   1                07,2007  0 2013 1          TC     MKABORT         SET THEREFORE ABORT
```

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```
0044   REF  19  LAST  169   07,2010  3 5016 0          CAF    BIT2          NOT SET
0045   REF   5  LAST  222   07,2011  27'044 1          ADS    EXTVBACT      SET IT, RESET IN ENDMARK
0046   REF   1               07,2012  0 2015 1          TC     MARKOK        YES, FIND VAC AREA

0047   REF   1               07,2013  0 7755 1 MKABORT  TC     BAILOUT
0048                         07,2014   01211 1          OCT    01211
0049   REF   3  LAST  193   07,2015  10 400 1 MARKOK    CCS    VAC1USE       FIND VAC AREA
0050   REF   1               07,2016  0 2031 1          TC     MKVACFND
0051   REF   2  LAST  191   07,2017  10 454 0          CCS    VAC2USE
0052   REF   2  LAST  223   07,2020  0 2031 1          TC     MKVACFND
0053   REF   2  LAST  191   07,2021  10 530 0          CCS    VAC3USE
0054   REF   3  LAST  223   07,2022  0 2031 1          TC     MKVACFND
0055   REF   2  LAST  191   07,2023  10 604 1          CCS    VAC4USE
0056   REF   4  LAST  223   07,2024  0 2031 1          TC     MKVACFND
0057   REF   2  LAST  191   07,2025  10 660 0          CCS    VAC5USE
0058   REF   5  LAST  223   07,2026  0 2031 1          TC     MKVACFND
0059   REF   2  LAST  223   07,2027  0 7755 1          TC     BAILOUT
0060                         07,2030   01207 0          OCT    01207

0061   REF   2  LAST  205   07,2031  6 5016 0 MKVACFND AD     TWO           ADDRESS OF VAC AREA
0062   REF   2  LAST  192   07,2032  55'330 1          TS     MARKSTAT
0063   REF  55  LAST  222   07,2033  50 000 1          INDEX  A
0064   REF   1               07,2034  54 052 1          TS     QPRET         STORE NEXT AVAILABLE MARK SLOT

0065   REF  20  LAST  209   07,2035  3 5021 1          CAF    ZERO          SHOW VAC AREA OCCUPIED
0066   REF   3  LAST  223   07,2036  51'330 0          INDEX  MARKSTAT
0067                         07,2037  53'777 0          TS     0 -1

0068   REF   1               07,2040  0 5364 0          TC     CHECKMM       BACKUP MARK ROUTINE USES SXTMARK
0069                         07,2041   00065 1          MM     53
0070                         07,2042  1 2044 1          TCF    +2
0071   REF   2  LAST  205   07,2043  1 4675 0          TCF    SWRETURN
0072   REF   2  LAST  223   07,2044  0 5364 0          TC     CHECKMM
0073                         07,2045   00066 1          MM     54
0074                         07,2046  1 2050 1          TCF    +2
0075   REF   3  LAST  223   07,2047  1 4675 0          TCF    SWRETURN
0076   REF  13  LAST  191   07,2050  3 5004 0          CAF    BIT12         DESIRED NUMBER OF MARKS IN 12-14
0077                         07,2051  0 0006 1          EXTEND
0078   REF  16  LAST  222   07,2052  7 0070 1          MP     RUPTREG1
0079   REF  18  LAST  221   07,2053  56 001 0          XCH    L
0080   REF   4  LAST  223   07,2054  27'330 1          ADS    MARKSTAT

0081   REF   1               07,2055  3 7667 1          CAF    PRIO32        ENTER MARK JOB
0082   REF   2  LAST  136   07,2056  0 5134 1          TC     NOVAC
0083   REF   5  LAST  223      1330                     EBANK= MARKSTAT
0084   REF   1               07,2057   02347 0          2CADR  MKV851
0084   REF   1               07,2060   16062 1
0085                         07,2061  0 0003 1          RELINT
0086   REF   4  LAST  223   07,2062  1 4675 0          TCF    SWRETURN      SAME AS MODEEXIT
```

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R0087   PROGRAM NAME - MKRELEAS                          DATE- 5 APRIL 1967
R0088   PROGRAM MODIFIED BY 258/278 PROGRAMMERS         LOG SECTION SXTMARK
R0089   MOD BY- R. MELANSON TO ADD DOCUMENTATION       ASSEMBLY SUNDISK REV. 116

R0090   FUNCTIONAL DESCRIPTION-
R0091      MKRELEAS IS EXECUTED BY INTERNAL ROUTINES TO RELEASE THE MARK SYSTEM TO MAKE IT AVAILABLE TO OTHER INTERNAL
R0093      SYSTEM ROUTINES. IT ALSO CLEARS THE COARSE OPTICS FLAG BIT AND DISABLES THE OPTICS ERROR COUNTER.

R0095   CALLING SEQUENCE-

R0096      TC    BANKCALL
R0097      CADR MKRELEAS

R0098   NORMAL EXIT MODE-
R0099      SWRETURN

R0100   ALARM OR ABORT EXIT MODE- NONE

R0101   OUTPUT-
R0102      1) BIT9 OPTMODES SET TO 0
R0103      2) OPTIND SET TO -1
R0104      3) 1ST WORD OF VAC AREA SET TO VAC ADDRESS TO SIGNIFY AVAILABILITY.
R0105      4) MARKSTAT CLEARED
R0106      5) BIT2 CHANNEL 12 SET TO 0

R0107   ERASABLE INITIALIZATION- NONE

R0108   DEBRIS-
R0109      A,MARKSTAT,BIT9 OPTMODES,OPTIND,BIT2 CHANNEL 12

 0110   REF  21  LAST  223   07,2063  3 5021 1  MKRELEAS CAF    ZERO          SHOW MARK SYSTEM NOW AVAILABLE
 0111   REF   6  LAST  223   07,2064  57'330 0           XCH    MARKSTAT
 01111  REF   1              07,2065  7 5046 1           MASK   LOW9
 0112   REF  56  LAST  223   07,2066  10 000 0           CCS    A
 0113   REF  57  LAST  224   07,2067  50 000 1           INDEX  A
 0114                        07,2070  54 000 0           TS     0
 0115                        07,2071  0 0004 0  MKRLEES   INHINT
 0116   REF  16  LAST  163   07,2072  4 5007 1           CS     BIT9          COARSE OPTICS RETURN FLAG.
 0117   REF  31  LAST  187   07,2073  7 1331 0           MASK   OPTMODES
 0118   REF  32  LAST  224   07,2074  55'331 0           TS     OPTMODES

 0119   REF   6  LAST  203   07,2075  3 7716 0           CA     NEGONE
 0120   REF  17  LAST  203   07,2076  55'303 1           TS     OPTIND        KILL COARS OPTICS

 0121   REF  20  LAST  223   07,2077  4 5016 1           CS     BIT2          DISABLE OPTICS ERROR COUNTER
 0122                        07,2100  0 0006 1           EXTEND
 0123   REF  20  LAST  184   07,2101  03 012 1           WAND   CHAN12

 0124                        07,2102  0 0003 1           RELINT
 0125   REF   5  LAST  223   07,2103  0 4675 1           TC     SWRETURN
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```
R0126   PROGRAM NAME - MARKRUPT                              DATE- 5 APRIL 1967
R0127   PROGRAM MODIFIED BY 258/278 PROGRAMMERS             LOG SECTION SXTMARK
R0128   MOD BY- R. MELANSON TO ADD DOCUMENTATION       ASSEMBLY SUNDISK REV. 116

R0129   FUNCTIONAL DESCRIPTION-
R0130      MARKRUPT STORES CDUS,OPTICS AND TIME AND TRANSFERS CONTROL TO THE MARKIT,MARK REJECT OR KEYCOM ROUTINES IF
R0132      BITS IN CHANNEL 16 ARE SET AS REQUIRED.

R0133   CALLING SEQUENCE-
R0134      ROUTINE ENTERED VIA KEYRUPT2 WHEN MARK,MARK REJECT OR DSKY KEYS DEPRESSED BY THE OPERATOR.

R0136   NORMAL EXIT MODE-
R0137      MARKIT, MKREJECT OR POSTJUMP ROUTINES (MARK,MARK REJECT OR DSKY CODE)

R0138   ALARM OR ABORT EXIT MODE-
R0139      ALARM AND RESUME

R0140   OUTPUT-
R0141      RUPTSTOR+5 = CDUT, RUPTSTOR+3 = CDUS, RUPTSTOR+2 = CDUY,
R0142      RUPTREG3 = CDUZ, RUPTSTOR+6 = CDUX, RUPTSTOR+1 AND SAMPTIME+1 =TIME1,
R0143      RUPTSTOR AND SAMPTIME = TIME2

R0144   ERASABLE INITIALIZATION-
R0145      CDUT,CDUS,CDUY,CDUZ,CDUX,TIME2,TIME1,CHANNEL 16 BITS 6,7 OR 1-5

R0146   DEBRIS-
R0147      A,QRUPT,RUPTREG3,SAMPTIME,SAMPTIME+1,RUPTSTOR TO RUPTSTOR+6 EXCEPT RUPTSTOR+4 (LOCATION 67)

 0149   REF   2  LAST  133   07,2104  54 016 1  MARKRUPT TS     BANKRUPT        STORE  CDUS AND OPTICS NOW
 0150   REF   5  LAST  168   07,2105  3 0035 1            CA     CDUT
 0151   REF   1              07,2106  54 362 1            TS     MKCDUT
 0152   REF   6  LAST  172   07,2107  3 0036 1            CA     CDUS
 0153   REF   1              07,2110  54 360 0            TS     MKCDUS
 0154   REF   1              07,2111  3 0033 1            CA     CDUY
 0155   REF   1              07,2112  54 357 1            TS     MKCDUY
 0156   REF   3  LAST  171   07,2113  3 0034 0            CA     CDUZ
 0157   REF   1              07,2114  54 361 1            TS     MKCDUZ
 0158   REF   2  LAST  172   07,2115  3 0032 0            CA     CDUX
 0159   REF   1              07,2116  54 363 0            TS     MKCDUX
 0160                        07,2117  0 0006 1            EXTEND
 0161   REF   6  LAST  179   07,2120  3 0025 0            DCA    TIME2           GET TIME
 0162   REF   1              07,2121  52 356 0            DXCH   MKT2T1
 0163                        07,2122  0 0006 1            EXTEND
 0164   REF   2  LAST  225   07,2123  3 0356 1            DCA    MKT2T1
 0165   REF   1              07,2124  52 014 0            DXCH   SAMPTIME        RUPT TIME FOR NOUN 65.

 0166   REF  22  LAST  221   07,2125  56 002 0            XCH    Q
 0167   REF   2  LAST  133   07,2126  54 012 0            TS     QRUPT

 0168   REF  22  LAST  197   07,2127  3 5012 1            CAF    BIT6            SEE IF MARK OR MKREJECT
```

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0169                                07,2130  0 0006 1           EXTEND
0170   REF   3  LAST  189           07,2131  02 016 1           RAND   NAVKEYIN
0171   REF  58  LAST  224           07,2132  10 000 0           CCS    A
0172   REF   1                      07,2133  0 2430 1           TC     MARKIT          ITS A MARK

0173   REF  18  LAST  189           07,2134  3 5011 1           CAF    BIT7            NOT A MARK, SEE IF MKREJECT
0174                                07,2135  0 0006 1           EXTEND
0175   REF   4  LAST  226           07,2136  02 016 1           RAND   NAVKEYIN
0176   REF  59  LAST  226           07,2137  10 000 0           CCS    A
0177   REF   1                      07,2140  0 2301 1           TC     MKREJECT        ITS A MARK REJECT

0178   REF   2  LAST  189           07,2141  3 4362 1  KEYCALL  CAF    OCT37           NOT MARK OR MKREJECT, SEE IF KEYCODE
0179                                07,2142  0 0006 1           EXTEND
0180   REF   5  LAST  226           07,2143  02 016 1           RAND   NAVKEYIN
0181                                07,2144  0 0006 1           EXTEND
0182                                07,2145  1 2150 0           BZF    +3              IF NO INBITS
0183   REF   6  LAST  201           07,2146  0 4701 0           TC     POSTJUMP
0184   REF   1                      07,2147   17702 1           CADR   KEYCOM          IT,S A KEY CODE, NOT A MARK.

0185   REF  12  LAST  198           07,2150  0 5650 1  +3       TC     ALARM           ALARM IF NO INBITS
0186                                07,2151   00113 1           OCT    113
0187   REF  18  LAST  169           07,2152  0 5333 1           TC     RESUME
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R0188   PROGRAM NAME - MARKCONT                          DATE- 19 SEPT 1967

R0189   PROGRAM MODIFIED BY 258/278 PROGRAMMERS              LOG SECTION SXTMARK
R0190   MOD BY- R. MELANSON TO ADD DOCUMENTATION       ASSEMBLY SUNDISK REV. 116

R0191   FUNCTIONAL DESCRIPTION-
R0192    MARKCONT IS USED TO PERFORM A SPECIAL MARK FUNCTION FOR R21, TO EXECUTE A SPECIAL DISPLAY OF OPTICS AND TIME OR
R0194      TO PERFORM A MARK OF A STAR OR LAND SIGHTING BASED UPON FLASHING V-N.

R0195   CALLING SEQUENCE-
R0196      FROM MARKDIF

R0197   NORMAL EXIT MODE-
R0198      TASKOVER

R0199   ALARM OR ABORT EXIT MODE-
R0200      ALARM AND TASKOVER

R0201   OUTPUT-
R0202      1) FOR R21-
R0203         EBANK=EBANK7
R0204         MRKBUF1 TO MRKBUF1+6 = TIME2,TIME1,COUY,OPTICX,COUZ,OPTICSY,COUX OF CURRENT R21 MARK FUNCTION.
R0206         MRKBUF2 TO MRKBUF2+6 CONTAINS PREVIOUS R21 MARK VALUES.
R0207      2) FOR SPECIAL DISPLAY JOB-
R0208         RUPTREG1 AND MRKBUF1 = COUS,RUPTREG2 AND MRKBUF1 +1 = COUT,
R0209         RUPTREG3 AND MRKBUF1 +2 = TIME2,RUPTREG4 AND MRKBUF1 +3 = TIME1
R0210      3) FOR NORMAL MARKING-
R0211         DECREMENT BITS14-12 OF MARKSTAT BY 1,
R0212         BIT10 MARKSTAT SET TO 1,INCREMENT OPRET BY 7,
R0213         STORE TIME2,TIME1,COUY,COUS,COUZ,COUT AND COUX IN VAC+1 TO VAC+7

R0214   ERASABLE INITIALIZATION-
R0215      1) FOR R21-
R0216         BIT14 OF STATE+2 =1, MRKBUF1 TO MRKBUF1+6, ITEMP1, RUPTREG3,
R0217         RUPTSTOR TO RUPTSTOR+6 EXCEPT RUPTSTOR+4
R0218      2) FOR SPECIAL DISPLAY JOB-
R0219         BIT14 OF STATE+2 =0,MARKSTAT =+0,RUPTREG1,RUPTREG2,RUPTREG3
R0220         RUPTREG4,RUPTSTOR,RUPTSTOR+1,RUPTSTOR+3,RUPTSTOR+5,
R0221         BIT12 OF STATE+5 (V59 FLAG),MRKBUF1 THRU MRKBUF1+3
R0222      3) FOR NORMAL MARKING-
R0223         BIT14 OF STATE+2 =0,MARKSTAT =VAC ADDRESS,A REG,ITEMP1,RUPTREG3,
R0224         RUPTSTOR TO RUPTSTOR+6 EXCEPT RUPTSTOR+4

R0225   DEBRIS-
R0226      1) FOR R21-
R0227         A,ITEMP1,MRKBUF1,MRKBUF2
R0228      2) FOR SPECIAL DISPLAY JOB-
R0229         A,RUPTREG1,RUPTREG2,RUPTREG3,RUPTREG4,MPAC TO MPAC+3
R0230      3) FOR NORMAL MARKING-
R0231         A,MARKSTAT,ITEMP1,OPRET,VAC+1 TO VAC+7 OF VAC AREA IN USE
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0232   REF  24  LAST  192   07,2153  3 5002 0  MARKCONT CAF    BIT14
0233   REF  30  LAST  185   07,2154  7 0076 1           MASK   STATE +2        R21 MARK (SPECIAL MARKING FOR R21)
0234                        07,2155  0 0006 1           EXTEND
0235   REF   1              07,2156  1 2170 1           BZF    MARKET         NOT SET THEREFORE REGULAR MARKING
0236   REF   7  LAST  222   07,2157  3 6211 0  MARKIT1  CAF    SIX            SPECIAL FOR R21
0237   REF   2  LAST  204   07,2160  0 5606 1           TC     GENTRAN        TRANSFER MRKBUF1 TO MRKBUF2
0238   REF   6  LAST  222   07,2161   01725 0           ADRES  MRKBUF1
0239   REF   5  LAST  213   07,2162   01734 0           ADRES  MRKBUF2

0240   REF   8  LAST  228   07,2163  3 6211 0           CAF    SIX            TRANSFER CURRENT MARK DATA TO MARKBUF1
0241   REF   3  LAST  228   07,2164  0 5606 1           TC     GENTRAN
0242   REF   3  LAST  225   07,2165   00355 1           ADRES  MKT2T1
0243   REF   7  LAST  228   07,2166   01725 0           ADRES  MRKBUF1

0244   REF   4  LAST  164   07,2167  1 5324 0           TCF    TASKOVER

0245   REF   7  LAST  224   07,2170  11'330 1  MARKET   CCS    MARKSTAT       SEE IF MARKS CALLED FOR
0246   REF   1              07,2171  0 2225 0           TC     MARK2          COLLECT MARKS

0255   REF   3  LAST  223   07,2172  3 5016 0           CAF    TWO            IS MARKING SYSTEM IN USE (BIT2)
0256   REF   6  LAST  223   07,2173  7 1044 1           MASK   EXTVBACT
0257                        07,2174  0 0006 1           EXTEND
0258   REF   1              07,2175  1 2217 0           BZF    MARKET3        MARKING NOT CALLED FOR
0259   REF  14  LAST  223   07,2176  3 5004 0           CAF    BIT12
0260   REF  31  LAST  228   07,2177  7 0101 0           MASK   STATE +5        V59FLAG
0261                        07,2200  0 0006 1           EXTEND
0262   REF   2  LAST  228   07,2201  1 2217 0           BZF    MARKET3        IF V59FLAG NOT SET-MARK UNCALLED FOR
0263   REF   2  LAST  200   07,2202  3 5061 0           CAF    PRIO5          CALIBRATION MARK (SET) FOR P23
0264   REF   3  LAST  223   07,2203  0 5134 1           TC     NOVAC          SPECIAL DISPLAY JOB
0265   REF   8  LAST  228   E7,1725                     EBANK= MRKBUF1
0266   REF   1              07,2204   02426 0           2CADR  MARKDISP
0266   REF   1              07,2205   76067 1

02661  REF   9  LAST  228   07,2206  3 6211 0           CAF    SIX
02662  REF   4  LAST  228   07,2207  0 5606 1           TC     GENTRAN        TRANSFER MARK DATA TO MARKDOWN
02663  REF   4  LAST  228   07,2210   00355 1           ADRES  MKT2T1
02664  REF   6  LAST  175   07,2211   01674 0           ADRES  MARKDOWN
02665  REF  10  LAST  228   07,2212  3 6211 0           CAF    SIX
02666  REF   5  LAST  228   07,2213  0 5606 1           TC     GENTRAN        TRANSFER MARK DATA TO MRKBUF1 FOR
02667  REF   5  LAST  228   07,2214   00355 1           ADRES  MKT2T1         SPECIAL DISPLAY OF SHAFT AND TRUNNION
02668  REF   9  LAST  228   07,2215   01725 0           ADRES  MRKBUF1         IF V59 ACTING
0267   REF   5  LAST  228   07,2216  1 5324 0           TCF    TASKOVER
0268   REF  13  LAST  226   07,2217  0 5650 1  MARKET3  TC     ALARM
0269                        07,2220   00122 0           OCT    122            MARKING NOT CALLED FOR
0270   REF   6  LAST  228   07,2221  1 5324 0           TCF    TASKOVER
0271   REF  14  LAST  228   07,2222  0 5650 1  114ALM   TC     ALARM          MARK NOT WANTED
0272                        07,2223   00114 0           OCT    114
0273   REF   7  LAST  228   07,2224  1 5324 0           TCF    TASKOVER
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P0274 STORE MARK DATA IN MKVAC AND INCREMENT POINTER

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0275  REF   1                 07,2225  6 7711 1  MARK2    AD      74K          SEE IF MARKS WANTED-REDUCE MARKS WANTED
0276                          07,2226  0 0006 1            EXTEND
0277  REF   1                 07,2227  6 2222 1            BZMF    114ALM       MARK NOT WANTED-ALARM
0278  REF   8  LAST  228       07,2230  55'330 1            TS      MARKSTAT
0279                          07,2231  4 0000 0            COM
0280  REF  15  LAST  166       07,2232  7 5006 0            MASK    BIT10        SET BIT10 TO ENABLE REJECT
0281  REF   9  LAST  229       07,2233  27'330 1            ADS     MARKSTAT

0282  REF   2  LAST  224       07,2234  7 5046 1            MASK    LOW9
0283  REF  14  LAST  205       07,2235  54 061 1            TS      ITEMP1
0284  REF  60  LAST  226       07,2236  50 000 1            INDEX   A
0285  REF   2  LAST  223       07,2237  56 052 0            XCH     QPRET        PICK UP MARK SLOT-POINTER
0286  REF  12  LAST  205       07,2240  54 062 1            TS      ITEMP2       SAVE CURRENT POINTER
0287  REF   3  LAST  163       07,2241  6 5023 0            AD      SEVEN        INCREMENT POINTER
0288  REF  15  LAST  229       07,2242  50 061 0            INDEX   ITEMP1
0289  REF   3  LAST  229       07,2243  54 052 1            TS      QPRET        STORE ADVANCED POINTER

0290                          07,2244  0 0006 1  VACSTOR   EXTEND
0291  REF   6  LAST  228       07,2245  3 0356 1            DCA     MKT2T1
0292  REF  13  LAST  229       07,2246  50 062 0            INDEX   ITEMP2
0293                          07,2247  52 001 1            DXCH    0
0294  REF   2  LAST  225       07,2250  3 0357 0            CA      MKCDUY
0295  REF  14  LAST  229       07,2251  50 062 0            INDEX   ITEMP2
0296                          07,2252  54 002 1            TS      2
0297  REF   2  LAST  225       07,2253  3 0360 1            CA      MKCDUS
0298  REF  15  LAST  229       07,2254  50 062 0            INDEX   ITEMP2
0299                          07,2255  54 003 0            TS      3
0300  REF   2  LAST  225       07,2256  3 0361 0            CA      MKCDUZ
0301  REF  16  LAST  229       07,2257  50 062 0            INDEX   ITEMP2
0302                          07,2260  54 004 1            TS      4
0303  REF   2  LAST  225       07,2261  3 0362 0            CA      MKCDUT
0304  REF  17  LAST  229       07,2262  50 062 0            INDEX   ITEMP2
0305                          07,2263  54 005 0            TS      5
0306  REF   2  LAST  225       07,2264  3 0363 1            CA      MKCDUX
0307  REF  18  LAST  229       07,2265  50 062 0            INDEX   ITEMP2
0308                          07,2266  54 006 0            TS      6

0309  REF   1                 07,2267  3 7671 0            CAF     PRIO34       IF ALL MARKS MADE FLASH VB50
0310  REF  10  LAST  229       07,2270  7 1330 1            MASK    MARKSTAT
0311                          07,2271  0 0006 1            EXTEND
0312                          07,2272  1 2274 0            BZF     +2
0313  REF   8  LAST  228       07,2273  1 5324 0            TCF     TASKOVER
0314  REF   2  LAST  223       07,2274  3 7667 1            CAF     PRIO32
0315  REF   4  LAST  228       07,2275  0 5134 1            TC      NOVAC
0316  REF  11  LAST  229          1330                     EBANK=  MARKSTAT
0317  REF   1                 07,2276   02422 1            2CADR   MKV350
0317  REF   1                 07,2277   16062 1
0318  REF   9  LAST  229       07,2300  1 5324 0            TCF     TASKOVER
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R0319   PROGRAM NAME - MKREJECT                              DATE- 5 APRIL 1967
R0320   PROGRAM MODIFIED BY 258/278 PROGRAMMERS             LOG SECTION SXTMARK
R0321   MOD BY- R. MELANSON TO ADD DOCUMENTATION       ASSEMBLY SUNDISK REV. 116

R0322   FUNCTIONAL DESCRIPTION-
R0323      ROUTINE ALLOWS OPERATOR TO REJECT MARK MADE PRIOR TO ACCEPTANCE AND ALLOWS A NEW MARK TO BE MADE BY ASTRONAUT

R0325   CALLING SEQUENCE-
R0326      FROM MARKRUPT IF BIT7 OF CHANNEL 16 IS 1.

R0327   NORMAL EXIT MODE-
R0328      RESUME

R0329   ALARM OR ABORT EXIT MODE-
R0330      ALARM AND RESUME

R0331   OUTPUT-
R0332      1) FOR R21-
R0333        MRKBUF1 SET TO -1
R0334      2) FOR NORMAL MARKING-
R0335         BIT10 MARKSTAT =0,INCREMENT NO. MARKS BY 1,DECREMENT QPRET BY 7

R0336   ERASABLE INITIALIZATION-
R0337      1) FOR R21-
R0338         BIT14 OF STATE+2 SET TO 1
R0339      2) FOR NORMAL MARKING-
R0340         BIT14 OF STATE+2 SET TO 0,MARKSTAT,QPRET

R0341   DEBRIS-
R0342      1) FOR R21-
R0343         A,MARKSTAT,EBANK
R0344      2) FOR NORMAL MARKING-
R0345         A,MARKSTAT,ITEMP1,QPRET

 0346   REF  25  LAST  228   07,2301  3 5002 0  MKREJECT CAF    BIT14
 0347   REF  32  LAST  228   07,2302  7 0076 1           MASK   STATE +2        R21 MARK (SPECIAL MARKING FOR R21)
 0348                        07,2303  0 0006 1           EXTEND
 0349   REF   1              07,2304  1 2310 0           BZF    MRKREJCT        NOT SET THEREFORE REGULAR REJECT
 0350   REF   7  LAST  224   07,2305  3 7716 0           CA     NEGONE          -1 (FOR R22)
 0351   REF  10  LAST  228   07,2306  55'725 1           TS     MRKBUF1         -0 IN TIME IS FLAG TO R22 SIGNIFYING A
 0352   REF  19  LAST  226   07,2307  0 5333 1           TC     RESUME          REJECTED MARK
 0353   REF  12  LAST  229   07,2310  11'330 1  MRKREJCT CCS    MARKSTAT        SEE IF MARKS BEING ACCEPTED
 0354   REF   1              07,2311  0 2315 1           TC     REJECT2
 0355   REF  15  LAST  228   07,2312  0 5650 1           TC     ALARM           MARKS NOT BEING ACCEPTED
 0356                        07,2313   00112 0           OCT    112
 0357   REF  20  LAST  230   07,2314  0 5333 1           TC     RESUME

 0358   REF  16  LAST  229   07,2315  4 5006 0  REJECT2  CS     BIT10           SEE IF MARK HAD BEEN MADE SINCE LAST
 0359   REF  13  LAST  230   07,2316  7 1330 1           MASK   MARKSTAT        REJECT, AND SET BIT10 TO ZERO TO
 0360   REF  14  LAST  230   07,2317  57'330 0           XCH    MARKSTAT        SHOW MARK REJECT
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0361   REF  17  LAST  230   07,2320  7 5006 0          MASK   BIT10
0362   REF  61  LAST  229   07,2321  10 000 0          CCS    A
0363   REF   1               07,2322  0 2326 1         TC     REJECT3

0364   REF  16  LAST  230   07,2323  0 5650 1          TC     ALARM          DONT ACCEPT TWO REJECTS TOGETHER
0365                         07,2324   00110 1         OCT    110
0366   REF  21  LAST  230   07,2325  0 5333 1          TC     RESUME

0367   REF   3  LAST  229   07,2326  3 5046 0 REJECT3  CAF    LOW9           DECREMENT POINTER TO REJECT MARK
0368   REF  15  LAST  230   07,2327  7 1330 1          MASK   MARKSTAT
0369   REF  16  LAST  229   07,2330  54 061 1          TS     ITEMP1
0370   REF   4  LAST  229   07,2331  4 5023 1          CS     SEVEN
0371   REF  17  LAST  231   07,2332  50 061 0          INDEX  ITEMP1
0372   REF   4  LAST  229   07,2333  26 052 1          ADS    QPRET          NEW POINTER

0373   REF  15  LAST  228   07,2334  3 5004 0          CAF    BIT12          INCREMENT MARKS WANTED AND IF FIELD
0374   REF  16  LAST  231   07,2335  6 1330 0          AD     MARKSTAT       IS NOW NON-ZERO, CHANGE TO V851 TO
0375   REF  17  LAST  231   07,2336  57'330 0          XCH    MARKSTAT       INDICATE MORE MARKS WANTED
0376   REF   2  LAST  229   07,2337  7 7671 1          MASK   PRIO34         INDICATE MORE MARKS WANTED
0377   REF  62  LAST  231   07,2340  10 000 0          CCS    A
0378   REF  22  LAST  231   07,2341  0 5333 1          TC     RESUME
0379   REF   3  LAST  229   07,2342  3 7667 1          CAF    PRIO32
0380   REF   5  LAST  229   07,2343  0 5134 1          TC     NOVAC
0381   REF  18  LAST  231        1330                  EBANK= MARKSTAT
0382   REF   2  LAST  223   07,2344   02347 0          2CADR  MKVB51
0382                         07,2345   16062 1
0383   REF  23  LAST  231   07,2346  0 5333 1          TC     RESUME
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R0384   PROGRAM DESCRIPTION MKVB51 AND MKVB50

R0385   AUTHOR-BARNERT DATE-2-15-67 MOD-0
R0386   PURPOSE  FLASH V51N70,V51N43, OR V51 TO REQUEST MARKING,
R0387            AND V50N25 R1=16 TO REQUEST TERMINATE MARKING

R0388   CALLING SEQUENCE   AS JOB WITHIN SXTMARK

R0389   EXIT TO ENDMARK UPON RECEIPT OF V33, V34 CAUSES GOTOPOOH, ENTER
R0390            RECYCLES THE DISPLAY

R0391   NOTE- SXTMARK AUTOMATICALLY CHANGES FROM CALLING MKVB51 TO MKVB50 WHEN
R0392            SUFFICIENT MARKS HAVE BEEN MADE, AND THE REVERSE WHEN A MARK
R0393            REJECT REDUCES THE NUMBER MADE BELOW THAT REQUIRED

R0394   SUBROUTINES CALLED- BANKCALL, GOMARK2,GOODEND,ENDMARK,WAITLIST

R0395   ALARM OR ABORT MODES - NONE

R0396   ERASABLE USED-VERBREG,MARKSTAT,QPRET,DSPTEM1

R0397   OUTPUT  MARKSTAT=VAC ADDRESS

R0398           QPRET=   NO.MARKS
 0401   REF   7  LAST  203   07,2347  0 4662 1  MKVB51   TC     BANKCALL        CLEAR DISPLAY FOR MARK VERB
 0402   REF   1                07,2350   20560 0          CADR   KLEENEX
 0403   REF   1                07,2351  3 2427 1          CAF    VB51            DISPLAY MARK VB51
 0404   REF   8  LAST  232   07,2352  0 4662 1          TC     BANKCALL
 0405   REF   1                07,2353   20572 0          CADR   GOMARK4
 0406   REF   1                07,2354  1 2357 0          TCF    TERMSXT         VB34-TERMINATE
 0407   REF   1                07,2355  1 2370 0          TCF    ENTANSWR        V33-PROCEED-MARKING DONE
 0408   REF   1                07,2356  1 2416 1          TCF    MKVB5X          ENTER-RECYCLE TO INITIAL MARK DISPLAY

 0409   REF   3  LAST  199   07,2357  0 5536 1  TERMSXT  TC     CLEARMRK        CLEAR MARK ACTIVITY.

04095   REF   3  LAST  223   07,2360  0 5364 0          TC     CHECKMM
 0410                         07,2361   00003 1          MM     03
 0411                         07,2362  1 2364 0          TCF    +2
 0412   REF   1                07,2363  0 2366 0          TC     TERMP03
 0414   REF   7  LAST  226   07,2364  0 4701 0          TC     POSTJUMP
04145   REF   1                07,2365   30205 0          CADR   TERM52

04146   REF   2  LAST  203   07,2366  0 5546 0  TERMP03  TC     UPFLAG
04147   REF   1                07,2367   00032 0          ADRES  TRM03FLG
 0415   REF   4  LAST  231   07,2370  3 5046 0  ENTANSWR CAF    LOW9            PUT VAC ADR IN MARKSTAT AND NO. OF
 0416   REF  19  LAST  231   07,2371  7 1330 1          MASK   MARKSTAT        MARKS MADE IN QPRET BEFORE LEAVING
 0417   REF  20  LAST  232   07,2372  55'330 1          TS     MARKSTAT        SXTMARK
 0418                         07,2373  4 0000 0          COM
 0419   REF  21  LAST  232   07,2374  51'330 0          INDEX  MARKSTAT
 0420   REF   5  LAST  231   07,2375  6 0052 0          AD     QPRET
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0421                          07,2376  0 0006 1           EXTEND
0422  REF   1                 07,2377  6 2403 1           BZMF    JAMIT          NO MARKS MADE, SHOW IT IN OPRET, R53
0423                          07,2400  0 0006 1           EXTEND                   WILL PICK IT UP AND RECYCLE
0424  REF  16 LAST  231       07,2401  7 5004 1           MP      BIT12          THIS PUTS NUMBER MARKS-1 IN A
0425  REF   8 LAST  168       07,2402  6 5017 1           AD      ONE
0426  REF  22 LAST  232       07,2403  51'330 0 JAMIT     INDEX   MARKSTAT       STORE NO OF MARKS MADE
0427  REF   6 LAST  232       07,2404  54 052 1           TS      OPRET
0434                          07,2405  0 0004 0           INHINT                 SERVICE OPTSTALL INTERFACE WITH
0435  REF   5 LAST  205       07,2406  3 5022 1           CAF     FIVE
0436  REF   8 LAST  188       07,2407  0 5245 1           TC      WAITLIST
0437  REF  23 LAST  233          1330                    EBANK=  MARKSTAT
0438  REF   1                 07,2410   02413 0          2CADR   ENDMARKS
0438  REF   1                 07,2411   16062 1
0439  REF   1                 07,2412  0 5534 0           TC      ENDMARK        KNOCKS DOWN MARKING FLAG + DOES ENDOFJOB

0440  REF   9 LAST  233       07,2413  3 5017 1 ENDMARKS  CAF     ONE
0441  REF  14 LAST  201       07,2414  0 4740 0           TC      IBNKCALL
0442  REF   1                 07,2415   17550 1          CADR    GOODEND
0443  REF   3 LAST  231       07,2416  3 7671 0 MKVB5X    CAF     PRIO34
0444  REF  24 LAST  233       07,2417  7 1330 1           MASK    MARKSTAT       RE-DISPLAY V85I IF MORE MARKS WANTED
0445  REF  63 LAST  231       07,2420  10 000 0           CCS     A              AND V85O IF ALL IN
0446  REF   3 LAST  231       07,2421  1 2347 1           TCF     MKVB5I
0447  REF   1                 07,2422  3 4333 0 MKVB5O    CAF     R1D1           OCT 16
0448  REF   2 LAST   76       07,2423  55'045 0           TS      DSPTEM1
0449  REF   1                 07,2424  3 2426 0           CAF     V50N25
0450  REF   4 LAST  233       07,2425  1 2352 0           TCF     MKVB5I +3

0451                          07,2426   14431 1 V50N25    VN      5025
0452                          07,2427   14600 1 VB5I      VN      5100
0454  REF   1                    4362                    OCT37   =       LOW5

R0455  PROGRAM NAME - MARKIT                                  DATE- 19 SEPT 1967

R0456  CALLING SEQUENCE
R0457     FROM MARKRUPT IF CHAN 16 BIT 6 = 1

R0458  EXIT
R0459     RESUME

R0460  INPUT
R0461     COUCHKWD. ALSO ALL INITIALIZATION FOR MARKCONT

R0462  OUTPUT
R0463     MKT2T1,MKCDUX,MKCDUY,MKCDUZ,MKCDUS,MKCDUT

R0464  ALARM EXIT
R0465     NONE

0466  REF   1                 07,2430  11'341 1 MARKIT    CCS     COUCHKWD
0467                          07,2431  1 2434 1           TCF     +3             DELAY OF COUCHKWD CS IF PNZ
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 0468                          07,2432  1 2434 1          TCF     +2
 0469   REF  22  LAST  224     07,2433  3 5021 1          CAF     ZERO
 0470   REF  10  LAST  233     07,2434  6 5017 1          AD      ONE             10 MS IF NO CHECK
 0471   REF   9  LAST  233     07,2435  0 5245 1          TC      WAITLIST
 0472   REF  11  LAST  230     E7,1725                    EBANK=  MRKBUF1
 0473   REF   1                07,2436   02203 1         2CADR   MARKDIF
 0473   REF   1                07,2437   20067 1
 0474   REF  24  LAST  231     07,2440  1 5333 0          TCF     RESUME

 0475   REF   1                10,2000                    SETLOC  SXTMARK1
 0476                          10,2203                    BANK

 0477   REF   1                                           COUNT   10/SXTMK

R0478   PROGRAM NAME - MARKDIF                                DATE- 19 SEPT 1967

R0479   CALLING SEQUENCE
R0480      WAITLIST FROM MARKIT

R0481   EXIT
R0482      TASKOVER OT IBNKCALL TO MARKCONT

R0483   INPUT
R0484      OUTPUT FROM MARKIT, INPUT TO MARKCONT, CDUCHKWD

R0485   OUTPUT
R0486      RUPTSTOR - RUPTSTOR+3,RUPTREG3,RUPTSTOR+5 - RUPTSTOR +6

R0487   ALARM EXIT
R0488      ALARM AND TASKOVER

 0489   REF   2  LAST  233     10,2203  3 1341 0  MARKDIF  CA      CDUCHKWD        IF DELAY CHECK IS ZERO OR NEG,ACP MARK
 0490                          10,2204  0 0006 1           EXTEND
 0491   REF   1                10,2205  6 2216 0           BZMF    MKACPT
 0492   REF  22  LAST  165     10,2206  4 5017 0           CS      BIT1
 0493   REF   1                10,2207  54 354 1           TS      MKNDX           SET INDEX -1
 0494   REF   3  LAST  229     10,2210  3 0363 1           CA      MKCDUX
 0495   REF   1                10,2211  0 2220 0           TC      DIFCHK          SEE IF VEHICLE RATE  TO MUCH AT MARK
 0496   REF   3  LAST  229     10,2212  3 0357 0           CA      MKCDUY
 0497   REF   2  LAST  234     10,2213  0 2220 0           TC      DIFCHK
 0498   REF   3  LAST  229     10,2214  3 0361 0           CA      MKCDUZ
 0499   REF   3  LAST  234     10,2215  0 2220 0           TC      DIFCHK

 0500   REF  15  LAST  233     10,2216  0 4740 0  MKACPT   TC      IBNKCALL
 0501   REF   1                10,2217   16153 1          CADR    MARKCONT        MARK DATA OK, WHAT DO WE DO WITH IT

 0503   REF   2  LAST  234     10,2220  24 354 0  DIFCHK   INCR    MKNDX           INCREMENT INDEX

 0504                          10,2221  0 0006 1           EXTEND
 0505   REF   3  LAST  234     10,2222  5 0354 0           INDEX   MKNDX
```

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0505   REF   3  LAST  225   10,2223  20 032 1        MSU     COUX        GET MARK(ICDU) - CURRENT(ICDU)
0507   REF  64  LAST  233   10,2224  10 000 0        CCS     A
0508                        10,2225  1 2231 1        TCF     +4
0509   REF  23  LAST  225   10,2226  0 0002 0        TC      Q
0510                        10,2227  1 2231 1        TCF     +2
0511   REF  24  LAST  235   10,2230  0 0002 0        TC      Q
0512   REF   1              10,2231  6 7715 0        AD      NEG2        SEE IF DIFFERENCE GREATER THAN 3 BITS
0513                        10,2232  0 0006 1        EXTEND
0514                        10,2233  6 2230 1        BZMF    -3          NOT GREATER

0518   REF  17  LAST  231   10,2234  0 5650 1        TC      ALARM       COUPLED WITH PROGRAM ALARM
0519                        10,2235   00121 0        OCT     00121

0520   REF  10  LAST  229   10,2236  1 5324 0        TCF     TASKOVER    DO NOT ACCEPT
```

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 0001                        07,2441                    BANK   7
 0002   REF   1              43,2000                    SETLOC EXTVERBS
 0003                        43,2000                    BANK

 0004   REF   4  LAST  214   E5,1757                    EBANK= DGC

 0005   REF   1                                         COUNT* $$/EXTVB
R0006   FAN-OUT

 0007   REF  25  LAST  205   43,2000  50 154 1  GOEXTVB  INDEX  MPAC          VERB-40 IS IN MPAC
 0008   REF   1              43,2001  0 2002 1           TC     LST2FAN       FAN AS BEFORE.

 0009   REF   1              43,2002  0 2124 1  LST2FAN  TC     VBZERO        VB40 ZERO (USED WITH NOUN 20 ONLY).
 0010   REF   1              43,2003  0 2150 1           TC     VBCOARK       VB41 COARSE ALIGN (USED WITH NOUN 20 OR
A0011                                                                        91 ONLY)
 0012   REF   1              43,2004  0 2240 0           TC     IMUFINEK      VB42 FINE ALIGN IMU
 0013   REF   1              43,2005  0 2420 0           TC     IMUATTCK      VB43  LOAD IMU ATTITUDE ERROR METERS.
 0014   REF   1              43,2006  0 3207 1           TC     SETSURF       VB44 SET SURFACE FLAG
 0015   REF   1              43,2007  0 3212 0           TC     RESTSRF       VB45 RESET SURFACE FLAG
 0016   REF   1              43,2010  0 2524 0           TC     STABLISH      VB46 ESTABLISH G+C CONTROL.
 0017   REF   1              43,2011  0 3102 1           TC     LMTOCMSV      VB47 MOVE LM STATE VECTOR INTO CM
 0018   REF   1              43,2012  0 2552 1           TC     DAPDISP       VB48 LOAD A/P DATA.
 0019   REF   1              43,2013  1 2543 0           TCF    CREWMANU      VB 49  START AUTOMATIC ATTITUDE MANEUVER
 0020   REF   1              43,2014  0 2275 0           TC     GOLOADLV      VB50 PLEASE PERFORM
 0021   REF   2  LAST  236   43,2015  0 2275 0           TC     GOLOADLV      VB51 PLEASE MARK
 0022   REF   1              43,2016  0 3157 1           TC     V52           VB52 SET OFFSET NO. FOR P22
 0023   REF   3  LAST  236   43,2017  0 2275 0           TC     GOLOADLV      VB 53 PLEASE PERFORM COAS MARK
 0024   REF   1              43,2020  0 2612 0           TC     GOTOR23       V54 START R23 (R21-BACKUP)
 0025   REF   1              43,2021  0 2326 1           TC     ALINTIME      VB55 ALIGN TIME
 0026   REF   1              43,2022  0 2653 0           TC     TRACKTRM      VB56 TERMINATE TRACKING (P20 +P25)
 0027   REF   1              43,2023  0 2607 1           TC     GOTOR21       V57 START R21 REND TRACK SIGHT MARK ROUT
 0028   REF   1              43,2024  0 2510 1           TC     ENATMA        VB58 ENABLE AUTOMATIC ATTITUDE MANEUVER
 0029   REF   4  LAST  236   43,2025  0 2275 0           TC     GOLOADLV      VB59 PLEASE CALIBRATE
 0030   REF   1              43,2026  0 2303 0           TC     V60           VB60 SET CPHIX (N17) EQUAL TO CDU
 0031   REF   1              43,2027  0 2311 0           TC     V61           VB61 SELECT MODE I
 0032   REF   1              43,2030  0 2314 0           TC     V62           VB62 SELECT MODE II, ERROR WRT N22
 0033   REF   1              43,2031  0 2321 0           TC     V63           VB63 SELECT MODE III, ERROR WRT N17
 0034   REF   1              43,2032  0 2500 0           TC     VB64          VB64 CALCULATE,DISPLAY S-BAND ANT ANGLES
 0035   REF   1              43,2033  0 2375 1           TC     CKOPTVB       V 65 E OPTICAL VERIFICATION FOR PRELAUNC
 0036   REF   1              43,2034  0 3034 0           TC     ATTACHED      VB 66 ATTACHED. MOVE THIS TO OTHER STATE
 0037   REF   1              43,2035  0 3201 1           TC     V67           VB67 WMATRIX MONITOR
 0038   REF   1              43,2036  0 2513 1           TC     STROKON       VB68 CSM STROKE TEST ON.
 0039   REF   1              43,2037  0 2037 1  VER869   TC     VER869        VB 69 CAUSE RESTART
 0040   REF   1              43,2040  0 3726 1           TC     V70UPDAT      VB70 UPDATE LIFTOFF TIME.
 0041   REF   1              43,2041  0 3730 0           TC     V71UPDAT      VB71 UNIVERSAL UPDATE - BLOCK ADDRESS.
 0042   REF   1              43,2042  0 3732 1           TC     V72UPDAT      VB72 UNIVERSAL UPDATE - SINGLE ADDRESS.
 0043   REF   1              43,2043  0 3734 1           TC     V73UPDAT      VB73 UPDATE AGC TIME (OCTAL).
 0044   REF   1              43,2044  0 2721 1           TC     ONEDUMP       VB74 INITIALIZE DOWN-TELEMETRY PROGRAM
A0045                                                                              FOR ERASABLE DUMP.
 0046   REF   1              43,2045  0 2725 0           TC     LFTFLGON      VB75 SET LIFTOFF FLAG.
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 0047   REF   1                43,2046  0 3015 0          TC     SETPRFLG       VB76 SET PREFERRED ATTITUDE FLAG
 0048   REF   1                43,2047  0 3020 0          TC     RESETPRF       VB77 RESET PREFERRED ATT. FLAG
 0049   REF   1                43,2050  0 2406 1          TC     CHAZFDGC       CHANGE GYROCOMPASS LAUNCH AZIMUTH V78
 0050   REF   1                43,2051  0 2120 0          TC     ALM/END        V79 SPARE
 0051   REF   1                43,2052  0 2713 0          TC     LEMVEC         VB80 UPDATE LEM STATE VECTOR
 0052   REF   1                43,2053  0 2716 0          TC     CSMVEC         VB81 UPDATE CSM STATE VECTOR
 0053   REF   1                43,2054  0 2562 1          TC     V82PERF        VB82 REQUEST ORBIT PARAM DISPLAY (R30)
 0054   REF   1                43,2055  0 2567 1          TC     V83PERF        VB83 RANGE, RANGE RATE, +X AXIS  (R31)
 0055   REF   2  LAST  237     43,2056  0 2120 0          TC     ALM/END        V84 SPARE
 0056   REF   1                43,2057  0 2601 1          TC     V85PERF        VB85 RANGE, RANGE RATE, SLOS     (R34)
 0057   REF   1                43,2060  0 2646 1          TC     V86PERF        VB86 BACKUP MARK REJECT
 0058   REF   1                43,2061  0 3023 0          TC     SETVHFLG       VB87 SET VHF RANGE FLAG
 0059   REF   1                43,2062  0 3027 1          TC     RESETVHF       VB88 RESET VHF RANGE FLAG
 0060   REF   1                43,2063  0 2745 0          TC     V89PERF        V89-ALIGN X OR PRF CSM AXIS TO LOS (R63)
 0061   REF   1                43,2064  0 3142 0          TC     V90PERF        VB90-OUT OF PLANE PARAMETERS %R36"
 0062   REF   1                43,2065  0 2762 0          TC     GOSHOSUM       VB91 TEMP FOR HYBRID AND STG.
 0063   REF   1                43,2066  0 2360 0          TC     SYSTEST        VB92 OPERATE IMU PERFORMANCE TEST
 0064   REF   1                43,2067  0 2755 1          TC     WMATRXNG       VB93 CLEAR RENDWFLG
 0065   REF   1                43,2070  0 3126 1          TC     VERB94         VB94 DO R64
 0066   REF   3  LAST  237     43,2071  0 2120 0          TC     ALM/END        VB95 SPARE
 0067   REF   1                43,2072  1 3150 1          TCF    VERB96         VB96 SET QUITFLAG TO STOP INTEGRATION
 0068   REF   5  LAST  236     43,2073  0 2275 0          TC     GOLOADLV       V97 PLEASE PERFORM ENGINE-FAIL (R41)
 0069   REF   4  LAST  237     43,2074  0 2120 0          TC     ALM/END        VB98 SPARE
 0070   REF   6  LAST  237     43,2075  0 2275 0          TC     GOLOADLV       VB99 PLEASE ENABLE ENGINE

R0071   END OF EXTENDED VERB FAN


 0072   REF   7  LAST  228     43,2076  11'044 1  TESTXACT CCS    EXTVBACT
 0073   REF   5  LAST  237     43,2077  0 2120 0          TC     ALM/END        YES. TURN ON OPERATOR ERROR LIGHT
 00731  REF   2  LAST  192     43,2100  3 0100 0          CA     FLAGWRD4       ARE PPIOS USING DSKY
 00732  REF   1                43,2101  7 2123 1          MASK   OC24100
 00733  REF  65  LAST  235     43,2102  10 000 0          CCS    A
 00734  REF   6  LAST  237     43,2103  0 2120 0          TC     ALM/END

 0074   REF   3  LAST  201     43,2104  3 4112 1          CAF    OCT24          SET BITS 3 AND 5
 0075   REF   8  LAST  237     43,2105  55'044 1  SETXTACT TS     EXTVBACT       NO. SET FLAG TO SHOW EXT VERB DISPLAY
A0076                                                                           SYSTEM BUSY

 0077   REF  25  LAST  235     43,2106  3 0002 0          CA     Q
 0078   REF  26  LAST  236     43,2107  54 155 1          TS     MPAC +1

 0083   REF   4  LAST  228     43,2110  4 5016 1          CS     TWO            BLANK EVERYTHING EXCEPT MM AND VERB
 0084   REF   1                43,2111  0 4170 0          TC     NVSUB
 0085                          43,2112  0 2113 0          TC     +1
 0086   REF  27  LAST  237     43,2113  0 0155 0          TC     MPAC +1

 0087   REF   2  LAST  202     43,2114  0 4400 1  XACTALM  TC     FALTON         TURN ON OPERATOR ERROR LIGHT.
 0088   REF   1                43,2115  0 5534 0          TC     ENDEXT         RELEASE MARK AND EXT. VERB DISPLAY SYS.
```

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0089   REF   2  LAST  237      5534            TERMEXTV EQUALS ENDEXT
0090   REF   3  LAST  238      5534            ENDEXTV8 EQUALS ENDEXT

0091   REF  23  LAST  234   43,2116  3 5021 1  XACTO    CAF     ZERO          RELEASE MARK AND EXT. VERB DISPLAY SYS.
0092   REF   1               43,2117  0 2105 1           TC      SETXTACT

0093   REF   3  LAST  237   43,2120  0 4400 1  ALM/END  TC      FALTON        TURN ON OPERATOR ERROR LIGHT
0094   REF   8  LAST  232   43,2121  0 4701 0  GOPIN    TC      POSTJUMP
0095   REF   2  LAST  198   43,2122   21272 0           CADR    PINBRNCH

00955                        43,2123   24100 0  OC24100  OCT     24100
```

```
P0096           VBZERO      VERB 40          DESCRIPTION
R0097               ZERO
R0098               1. REQUIRE NOUN 20 (ICDU ANGLES)
R0099               2. REQUIRE AVAILABILITY OF EXT VERB DISPLAY SYSTEM
R0100               3. IF EITHER OF ABOVE CONDITIONS NOT PRESENT, TURN ON OPERATOR ERROR LIGHT AND GO TO PINBRNCH.
R0102               4. SET EXT VERB DISPLAY ACTIVE FLAG.
R0103               5. EXECUTE IMUZERO (ZERO IMU CDU ANGLES).
R0104               6. EXECUTE IMUSTALL (ALLOW TIME FOR DATA TRANSFER).
R0105               7. RELEASE EXT. VERB DISPLAY SYSTEM.

 0106   REF   1              43,2124  0 2136 1  VBZERO   TC     OP/INERT
 0107   REF   1              43,2125  0 2127 1           TC     IMUZEROK        RETURN HERE IF NOUN = ICDU(20)
 0108   REF   7  LAST  237   43,2126  0 2120 0           TC     ALM/END         RETURN HERE IF NOUN = OCDU(91)
A0109                                                                           (NOT IN USE YET)

 0110   REF   1              43,2127  0 2271 1  IMUZEROK TC     CKMODCAD        KEYBOARD REQUEST FOR ISS CDU ZERO
 01101  REF   9  LAST  232   43,2130  0 4662 1           TC     BANKCALL
 0111   REF   1              43,2131   16577 0           CADR   IMUZERO

 0112   REF  10  LAST  239   43,2132  0 4662 1           TC     BANKCALL        STALL
 0113   REF   1              43,2133   17577 1           CADR   IMUSTALL
 0114                        43,2134  0 2135 1           TC     +1

 0115   REF   1              43,2135  0 2121 1           TC     GOPIN

 0116   REF   4  LAST  237   43,2136  4 4112 0  OP/INERT CS     OCT24
 0117   REF   2  LAST  192   43,2137  6 1002 1           AD     NOUNREG
 0118                        43,2140  0 0006 1           EXTEND
 0119   REF   1              43,2141  1 2476 1           BZF    XACTOQ          IF = 20.

 0120   REF  26  LAST  237   43,2142  24 002 0           INCR   Q
 0121   REF   1              43,2143  6 2147 1           AD     OPIMDIFF        -71
 0122                        43,2144  0 0006 1           EXTEND
 0123   REF   2  LAST  239   43,2145  1 2476 1           BZF    XACTOQ

 0124   REF   8  LAST  239   43,2146  0 2120 0           TC     ALM/END         ILLEGAL.

 0125                        43,2147   77670 0  OPIMDIFF DEC    -71
```

```
P0126            VBCOARK      VERB 41            DESCRIPTION
R0127                COURSE ALIGN IMU OR OPTICS
R0128                1. REQUIRE NOUN 20 OR NOUN 91 OR TURN ON OPERATOR ERROR
R0129                2. REQUIRE EXT VERB DISPLAY SYS AVAILABLE OR TURN ON OPERATOR ERROR LIGHT AND GO TO PINBRNCH.
R0131                CASE 1     NOUN 20     (ICDU ANGLES)
R0132                3. SET EXT VERB DISPLAY ACTIVE FLAG.
R0133                4. DISPLAY FLASHING V25,N22 (LOAD NEW ICDU ANGLES).
R0134                   RESPONSES
R0135                     A. TERMINATE
R0136                        1. RELEASE EXT VERB DISPLAY SYSTEM
R0137                     B. PROCEED
R0138                        1. DISPLAY FLASHING V25,N23 (LOAD DELTA ICDU ANGLES).
R0140                            RESPONSES
R0141                              A. TERMINATE
R0142                                 1. RELEASE EXT VERB DISPLAY SYSTEM.
R0143                              B. PROCEED
R0144                                 1. EXECUTE ICORK2.
R0145                              C. ENTER
R0146                                 1. INCREMENT CDU ANGLES
R0147                                 2. EXECUTE ICORK2.
R0148                     C. ENTER
R0149                        1. EXECUTE ICORK2.
R0150                ICORK2
R0151                   1. RE-DISPLAY VERB 41.
R0152                   2. EXECUTE IMUCOARS (IMU COARSE ALIGN).
R0153                   3. EXECUTE IMUSTALL (ALLOW TIME FOR DATA TRANSFER).
R0154                   4. RELEASE EXT VERB DISPLAY SYSTEM.
R0155                CASE 2     NOUN 91     (OCDU ANGLES)
R0156                5. (REQUIRE OPTICS SWITCH TO BE AT COMPUTER OR TURN ON OPERATOR ERROR AND ALARM 115) AND (REQUIRE
R0158                   OPTICS AVAILABLE AND DISPLAY FLASHING V24,N92....LOAD NEW OPTICS ANGLES....OR TURN ON ALARM 117
R0160                   AND RELEASE EXT VERB DISPLAY SYSTEM).
R0161                6. RESPONSES TO V29,N92.
R0162                   A. TERMINATE
R0163                      RELEASE EXT VERB DISPLAY SYSTEM
R0164                   B. PROCEED OR ENTER
R0165                      RE-DISPLAY V41,    SET SWITCH TO INDICATE COURSE ALIGN OPTICS WORKING.
R0167                      RELEASE EXT VERB DISPLAY SYSTEM.

 0168  REF   2  LAST  239   43,2150  0 2136 1  VBCOARK  TC     DP/INERT
 0169  REF   1              43,2151  0 2153 1           TC     IMUCOARK       RETURN HERE IF NOUN = ICDU(20)
 0170  REF   1              43,2152  0 2175 0           TC     OPTCOARK       RETURN HERE IF NOUN = OCDU(91)
R0171          RETURN TO L+1 IF NOUN 20 - TO L+2 IF NOUN 91.
 0172  REF   2  LAST  239   43,2153  0 2271 1  IMUCOARK TC     CKMODCAD       COARSE ALIGN FROM KEYBOARD
 01721 REF   1              43,2154  0 2076 1           TC     TESTXACT
 0173  REF   1              43,2155  3 2173 0           CAF    VNLODCDU       CALL FOR THETAD LOAD
 0174  REF  11  LAST  239   43,2156  0 4662 1           TC     BANKCALL
 0175  REF   1              43,2157   20561 1           CADR   GOXDSPF
 0176  REF   1              43,2160  0 5534 0           TC     TERMEXTV
 0177                       43,2161  1 2162 1           TCF    +1
```

```
0178   REF   1              43,2162  3 2174 1  ICORK2   CAF    IMUCOARV      RE-DISPLAY COARSE ALIGN VERB.
0179   REF  12  LAST  240   43,2163  0 4662 1            TC     BANKCALL
0180   REF   1              43,2164   21042 1            CADR   EXDSPRET

0181   REF  13  LAST  241   43,2165  0 4662 1            TC     BANKCALL      CALL MODE SWITCHING PROG
0182   REF   1              43,2166   16663 0            CADR   IMUCOARS

0183   REF  14  LAST  241   43,2167  0 4662 1            TC     BANKCALL      STALL
0184   REF   2  LAST  239   43,2170   17577 1            CADR   IMUSTALL
0185   REF   1              43,2171  0 5534 0            TC     ENDEXTVB
0186   REF   2  LAST  241   43,2172  0 5534 0            TC     ENDEXTVB

0187                        43,2173   06226 1  VNLODCDU VN     2522
0188                        43,2174   12200 0  IMUCOARV VN     4100
```

P0189 TEMPORARY ROUTINE TO RUN THE OPTICS COUS FROM THE KEYBOARD

```
 0190   REF   2  LAST  192   43,2175  3 1323 1  OPTCOARK CA     OPTCADR
 019001 REF   3  LAST  240   43,2176  0 2272 1            TC     CKMODCAD +1
 019002 REF   2  LAST  240   43,2177  0 2076 1            TC     TESTXACT
 01901  REF   1              43,2200  3 5056 1            CAF    EBANK5
 01902  REF   8  LAST  204   43,2201  54 003 0            TS     EBANK

 0191   REF   7  LAST  166   43,2202  11'314 1            CCS    SWSAMPLE        SEE IF SWITCH AT COMPUTER
 0192                        43,2203  0 2210 0            TC     +5              SWITCH AT COMPUTER
 0193                        43,2204  0 2205 1            TC     +1              NOT ON COMPUTER
 0194   REF   4  LAST  238   43,2205  0 4400 1            TC     FALTON          TURN ON OPERATOR ERR
 0195   REF  18  LAST  235   43,2206  0 5650 1            TC     ALARM           AND ALARM
 0196                        43,2207   00115 1            OCT    00115

 0197   REF  18  LAST  224   43,2210  11'303 1            CCS    OPTIND          SEE IF OPTICS AVAILABLE
 0198   REF   1              43,2211  0 2217 1            TC     OPTC1           IN USE
 0199   REF   2  LAST  242   43,2212  0 2217 1            TC     OPTC1           IN USE
 0200   REF   3  LAST  242   43,2213  0 2217 1            TC     OPTC1           IN USE

 0201   REF  19  LAST  242   43,2214  0 5650 1            TC     ALARM           OPTICS RESERVED (OPTIND=-0)
 0202                        43,2215   00117 0            OCT    00117
 0203   REF   4  LAST  238   43,2216  0 5534 0            TC     ENDEXT

 0204   REF   1              43,2217  3 2237 0  OPTC1     CAF    VNLOOCOU        VERB-NOUN TO LOAD OPTICS COUS
 0205   REF  15  LAST  241   43,2220  0 4662 1            TC     BANKCALL
 0206   REF   2  LAST  240   43,2221   20561 1            CADR   GOXDSPF
 0207   REF   2  LAST  240   43,2222  0 5534 0            TC     TERMEXTV
 0208                        43,2223  0 2224 1            TC     +1              PROCEED

 02082  REF   2  LAST   95   43,2224  3 1773 0            CA     SAC
 02084  REF   3  LAST  167   43,2225  55'161 1            TS     DESOPTS
 02086  REF   2  LAST   95   43,2226  3 1775 0            CA     PAC
 02088  REF   4  LAST  168   43,2227  55'160 0            TS     DESOPTT
 0209   REF   1              43,2230  3 2174 1            CAF    OPTCOARV        RE-DISPLAY OUR OWN VERB
 0210   REF  16  LAST  242   43,2231  0 4662 1            TC     BANKCALL
 0211   REF   2  LAST  241   43,2232   21042 1            CADR   EXDSPRET

 0212   REF  11  LAST  234   43,2233  3 5017 1            CAF    ONE
 0213   REF  19  LAST  242   43,2234  55'303 1            TS     OPTIND          SET COARS WORKING

 0214   REF   3  LAST  241   43,2235  0 5534 0            TC     ENDEXTVB
 0215   REF   4  LAST  242   43,2236  0 5534 0            TC     ENDEXTVB

 0216                        43,2237   06134 1  VNLOOCOU  VN     2492
 0217   REF   2  LAST  241   43,2174           OPTCOARV  EQUALS IMUCOARV        DIFFERENT NOUNS.
```

```
P0213            IMUFINEK     VERB 42            DESCRIPTION
R0219                FINE ALIGN IMU
R0220                1. REQUIRE EXT VERB DISPLAY AVAILABLE AND SET BUSY FLAG OR TURN ON OPER ERROR AND GO TO PINBRNCH.
R0222                2. DISPLAY FLASHING V25.N93....LOAD DELTA GYRO ANGLES....
R0223                   RESPONSES
R0224                   A. TERMINATE
R0225                      1. RELEASE EXT VERB DISPLAY SYSTEM.
R0226                   B. PROCEED OR ENTER
R0227                      1. RE-DISPLAY VERB 42
R0228                      2. EXECUTE IMUFINE (IMU FIVE ALIGN MODE SWITCHING).
R0229                      3. EXECUTE IMUSTALL (ALLOW FOR DATA TRANSFER)
R0230                         A. FAILED
R0231                            1. RELEASE EXT VERB DISPLAY SYSTEM.
R0232                         B. GOOD
R0233                            1. EXECUTE IMUPULSE (TORQUE IRIGS).
R0234                            2. EXECUTE IMUSTALL AND RELEASE EXT VERB DISPLAY SYSTEM.

 0236   REF   4  LAST  242   43,2240  0 2271 1  IMUFINEK TC     CKMODCAD        FINE ALIGN WITH GYRO TORQUING
 02361  REF   3  LAST  242   43,2241  0 2076 1           TC     TESTXACT
 0237   REF   1               43,2242  3 2267 0           CAF    VNLODGYR        CALL FOR LOAD OF GYRO COMMANDS
 0238   REF  17  LAST  242   43,2243  0 4662 1           TC     BANKCALL
 0239   REF   3  LAST  242   43,2244   20561 1           CADR   GOXDSPF
 0240   REF   3  LAST  242   43,2245  0 5534 0           TC     TERMEXTV
 0241                         43,2246  0 2247 1           TC     +1              PROCEED WITHOUT A LOAD

 0242   REF   1               43,2247  3 2270 0           CAF    IMUFINEV        RE-DISPLAY OUR OWN VERB
 0243   REF  18  LAST  243   43,2250  0 4662 1           TC     BANKCALL
 0244   REF   3  LAST  242   43,2251   21042 1           CADR   EXDSPRET

 0245   REF  19  LAST  243   43,2252  0 4662 1           TC     BANKCALL        CALL MODE SWITCH PROG
 0246   REF   1               43,2253   17073 0           CADR   IMUFINE

 0247   REF  20  LAST  243   43,2254  0 4662 1           TC     BANKCALL        HIBERNATION
 0248   REF   3  LAST  241   43,2255   17577 1           CADR   IMUSTALL
 0249   REF   5  LAST  242   43,2256  0 5534 0           TC     ENDEXTVB

 0250   REF   1               43,2257  3 2266 1  FINEK2   CAF    LGYROBIN        PINBALL LEFT COMMANDS IN OGC REGISTERS
 0251   REF  21  LAST  243   43,2260  0 4662 1           TC     BANKCALL
 0252   REF   1               43,2261   17206 0           CADR   IMUPULSE

 0253   REF  22  LAST  243   43,2262  0 4662 1           TC     BANKCALL        WAIT FOR PULSES TO GET OUT.
 0254   REF   4  LAST  243   43,2263   17577 1           CADR   IMUSTALL
 0255   REF   6  LAST  243   43,2264  0 5534 0           TC     ENDEXTVB
 0256   REF   7  LAST  243   43,2265  0 5534 0           TC     ENDEXTVB

 0257   REF   5  LAST  236   43,2266   02757 0  LGYROBIN ECADR  OGC
 0258                         43,2267   06335 1  VNLODGYR VN     2593
 0259                         43,2270   12400 0  IMUFINEV VN     4200            FINE ALIGN VERB

 02591  REF   4  LAST   81   43,2271  3 1322 0  CKMODCAD CA     MODECADR
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 02592                          43,2272  0 0006 1           EXTEND
 02593  REF   2  LAST  165      43,2273  1 6711 1           BZF     TCQ
 02594  REF   9  LAST  239      43,2274  0 2120 0           TC      ALM/END         SOMEBODY IS USING MODECADR SO EXIT
R0260           GOLOADLV    VERB 50              DESCRIPTION
R0261                        AND OTHER PLEASE
R0262                        DO SOMETHING VERBS
R0263                PLEASE PERFORM, MARK, CALIBRATE, ETC.
R0264                1. PRESSING ENTER ON DSKY INDICATES REQUESTED ACTION HAS BEEN  PERFORMED, AND THE PROGRAM DOES THE
R0266                   SAME RECALL AS A COMPLETED LOAD.
R0267                2. THE EXECUTION OF A VERB 33 (PROCEED WITHOUT DATA) INDICATES THE REQUESTED ACTION IS NOT DESIRED.

 0269   REF   1                 43,2275  0 4447 1  GOLOADLV TC      FLASHOFF
 0270   REF   1                 43,2276  3 4215 0           CAF     PINSUPBT
 0271                           43,2277  0 0006 1           EXTEND
 0272   REF   2  LAST  186      43,2300  01 007 1           WRITE   SUPERBNK        TURN ON FE7
 0273   REF   9  LAST  238      43,2301  0 4701 0           TC      POSTJUMP
 0274   REF   1                 40,2000                     SBANK=  PINSUPER
 0275   REF   1                 43,2302   62001 1           CADR    LOADLVI
R0276           V60     VERB 60

 0277                           43,2303  0 0006 1  V60      EXTEND                  SET ASTRONAUT TOTAL ATTITUDE (N17) EQUAL
 0278   REF   4  LAST  235      43,2304  3 0033 1           DCA     CDUX            TO PRESENT ATTITUDE
 0279   REF   1                 43,2305  53'334 0           DXCH    CPHIX
 0280   REF   4  LAST  225      43,2306  3 0034 0           CA      CDUZ
 0281   REF   2  LAST  244      43,2307  55'335 1           TS      CPHIX +2
 0282   REF   2  LAST  239      43,2310  0 2121 1           TC      GOPIN

R0283           V61     VERB 61

 0284   REF   5  LAST  202      43,2311  0 5560 1  V61      TC      DOWNFLAG        SET NEEDLFLG TO 0 (FLAGWRD0,BIT9), PHASE
 0285   REF   1                 43,2312   00006 1           ADRES   NEEDLFLG        PLANE A/P FOLLOWING ERROR DISPLAYED
 0286   REF   3  LAST  244      43,2313  0 2121 1           TC      GOPIN

R0287           V62     VERB 62

 0288   REF   3  LAST  232      43,2314  0 5546 0  V62      TC      UPFLAG          SET NEEDLFLG TO 1 (FLAGWRD0,BIT9),
 0289   REF   2  LAST  244      43,2315   00006 1           ADRES   NEEDLFLG        TOTAL ATTITUDE ERROR DISPLAYED

 0290   REF   4  LAST  244      43,2316  0 5546 0           TC      UPFLAG          SET N22ORN17 TO 1 (FLAGWRD9,BIT6),
 02902  REF   1                 43,2317   00220 1           ADRES   N22ORN17        COMPUTE TOTAL ATTITUDE ERROR WRT N22
 02904  REF   4  LAST  244      43,2320  0 2121 1           TC      GOPIN

R02905          V63     VERB 63

 02906  REF   5  LAST  244      43,2321  0 5546 0  V63      TC      UPFLAG          SET NEEDLFLG TO 1 (FLAGWRD0,BIT9),
 02907  REF   3  LAST  244      43,2322   00006 1           ADRES   NEEDLFLG        TOTAL ATTITUDE ERROR DISPLAYED

 02908  REF   6  LAST  244      43,2323  0 5560 1           TC      DOWNFLAG        SET N22ORN17 TO 0 (FLAGWRD9,BIT6,
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 02909  REF   2  LAST  244    43,2324   00220 1          ADRES  N22ORN17       COMPUTE TOTAL ASTRONAUT ATTITUDE ERROR
 029093 REF   5  LAST  244    43,2325   0 2121 1         TC     GOPIN
```

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P0291           ALINTIME     VERB 55            DESCRIPTION
R0292               1. SET EXT VERB DISPLAY BUSY FLAG.
R0293               2. DISPLAY FLASHING V25,N24 (LOAD DELTA TIME FOR AGC CLOCK.
R0294               3. REQUIRE EXECUTION OF VERB 23.
R0295               4. ADD DELTA TIME, RECEIVED FROM INPUT REGISTER, TO THE COMPUTER TIME.
R0297               5. RELEASE EXT VERB DISPLAY SYSTEM

 0298   REF   1                                                 COUNT  04/R33

 0299   REF   4  LAST  243   43,2326  0 2076 1  ALINTIME TC     TESTXACT

 0300   REF   1               43,2327  3 2357 1           CAF    VNLODDT
 0301   REF  23  LAST  243    43,2330  0 4662 1           TC     BANKCALL
 0302   REF   1               43,2331   20561 1           CADR   GOMARKF
 0303   REF   5  LAST  242    43,2332  0 5534 0           TC     ENDEXT          TERMINATE
 0304   REF   6  LAST  246    43,2333  0 5534 0           TC     ENDEXT          PROCEED
 0305   REF   1               43,2334  4 2356 1           CS     DEC23           DATA IN OR RESEQUENCE(UNLIKELY)
 0306   REF  28  LAST  237    43,2335  6 0154 1           AD     MPAC            RECALL LEFT VERB IN MPAC
 0307                         43,2336  0 0006 1           EXTEND
 0308   REF   1               43,2337  1 2341 1           BZF    UPDATIME        GO AHEAD WITH UPDATE ONLY IF RECALL
 0309   REF   7  LAST  246    43,2340  0 5534 0           TC     ENDEXT            WITH V23 (DATA IN).
 0310                         43,2341  0 0004 0  UPDATIME INHINT                 DELTA TIME IS IN DSPTEM1, +1.
 0311   REF  24  LAST  238    43,2342  3 5021 1           CAF    ZERO
 0312   REF  29  LAST  246    43,2343  54 156 1           TS     MPAC     +2     NEEDED FOR TP AGREE
 0313   REF  19  LAST  223    43,2344  54 001 1           TS     L               ZERO T1 & 2 WHILE ALIGNING.
 0314   REF   7  LAST  225    43,2345  52 025 1           DXCH   TIME2
 0315   REF  30  LAST  246    43,2346  52 155 1           DXCH   MPAC
 0316   REF   2  LAST   76    43,2347  53'052 0           DXCH   DSPTEM2 +1      INCREMENT
 0317   REF  31  LAST  246    43,2350  20 155 1           DAS    MPAC

 0318   REF   1               43,2351  0 7226 0           TC     TPAGREE         FORCE SIGN AGREEMENT.
 0319   REF  32  LAST  246    43,2352  52 155 1           DXCH   MPAC            NEW CLOCK.
 0320   REF   8  LAST  246    43,2353  20 025 1           DAS    TIME2
 0321                         43,2354  0 0003 1           RELINT
 0322   REF   8  LAST  246    43,2355  0 5534 0  UPDTMEND TC     ENDEXT
 0323                         43,2356   00027 1  DEC23    DEC    23              V 23

 0324                         43,2357   06230 0  VNLODDT  VN     2524            V25N24 FOR LOAD DELTA TIME
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P0325           SYSTEST     VERB 92              DESCRIPTION
R0326               OPERATE SELECTED SYSTEM TEST
R0327               1. REQUIRE POO OR POO- OR TURN ON OPERATOR ERROR.
R0328               2. TURN OFF DAP IF IT IS ON.
R0329               3. DISPLAY FLASHING V21,N01 (LOAD TEST NUMBER 1 THRU 17).
R0330               4. UPON ENTRY OF TEST NUMBER, SCHEDULE TSELECT WITH PRIORITY 20.
R0332               TSELECT
R0333                  1. IF LOADED TEST NUMBER IS VALID, GO TO THAT TEST ROUTINE, OTHERWISE TURN ON OPERATOR ERROR AND
R0335                     REPEAT LOAD REQUEST DISPLAY. (NO. 3 ABOVE)

 0336   REF   2 LAST  208   E5,1425                        EBANK= QPLACE

 0337   REF   1                                           COUNT  04/EXTVB

 0338   REF   1             43,2360  0 2730 1  SYSTEST   TC     CHKPOOH
 03382  REF   9 LAST  201   43,2361  3 0075 0            CA     FLAGWRD1      IS NODOP01 FLAGBIT ON? (SET BY P11)
 03384  REF   2 LAST  184   43,2362  7 5004 1            MASK   NOP01BIT
 03385                      43,2363  0 0006 1            EXTEND
 03388  REF   1             43,2364  1 2367 0            BZF    V92CONT       IF IT'S NOT YET SET, CONTINUE
 0339   REF   1             43,2365  0 5721 0            TC     PODOOO        IT'S ON, SEND NODO ALARM FOR P07
 03393                      43,2366   01521 0            OCT    1521
 03395  REF   1             43,2367  0 2734 0  V92CONT   TC     EXDAPOFF      TURN DAP OFF IT IT'S ON
 0340   REF   1             43,2370  3 5002 0            CAF    PRIO20
 0342   REF   2 LAST  183   43,2371  0 5147 0            TC     FINDVAC
 0343   REF   3 LAST  247   E5,1425                      EBANK= QPLACE
 0344   REF   1             30,2000                      SBANK= IMUSUPER
 0345   REF   1             43,2372   02002 1            2CADR  REDO
 0345   REF   1             43,2373   66065 1

 0346   REF   6 LAST  245   43,2374  0 2121 1            TC     GOPIN


R0347   REDO AND TSELECT ARE NOW IN SYSTEM TEST.

 0348   REF   2 LAST  236 TO  246:   214   214*          COUNT* $$/EXTVB
R0349           CKOPTVB     VERB 65              DESCRIPTION
R0350               OPTICAL VERIFICATION FOR PRELAUNCH.
R0351               1. SCHEDULE GCOMPVER, OPTICAL VERIFICATION SUBPROGRAM, WITH PRIORITY 17.

 0353   REF   4 LAST  232   43,2375  0 5364 0  CKOPTVB   TC     CHECKMM
 0354                      43,2376   00002 0            MM     02                I WONDER IF PRELAUNCH IS RUNNING
 0355   REF  10 LAST  244   43,2377  0 2120 0            TC     ALM/END       NOT RUNNING OPERATOR ERROR
 0356                      43,2400  0 0004 0            INHINT
 0357   REF   3 LAST  193   43,2401  3 5070 0            CAF    PRIO16         PRELAUNCH OPTICAL VERIFICATION
 0358   REF   3 LAST  247   43,2402  0 5147 0            TC     FINDVAC
 0359   REF   4 LAST  247   E5,1425                      EBANK= QPLACE
 0360   REF   2 LAST  215   43,2403   02000 0            2CADR  COMPVER       STANDARD LEADIN TO GCOMPVER.
 0360                      43,2404   66065 1
 0361   REF   7 LAST  247   43,2405  0 2121 1            TC     GOPIN
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R0362   V 78....          TO CHANGE GYROCOMPASS AZIMUTH

 0363   REF   5  LAST  247   43,2406  0 5364 0  CHAZFOGC TC      CHECKMM          IS IT PRELAUNCH
 03631                      43,2407   00002 0            MM      02
 03632  REF  11  LAST  247   43,2410  0 2120 0           TC      ALM/END          NO - OPERA TOR ERROR

 0364   REF   4  LAST  247   43,2411  3 5070 0           CAF     PRIO16           PRELAUNCH AZIMUTH CHANGE
 0365   REF   4  LAST  247   43,2412  0 5147 0           TC      FINDVAC
 0366   REF  14  LAST  218   E5,1671                     EBANK=  XSM
 0367   REF   2  LAST  215   43,2413   03742 0           2CADR   AZMTHCG1
 0367                      43,2414   66065 1
 0368   REF   3  LAST  199   43,2415  0 5412 0           TC      PHASCHNG
 0369                      43,2416   00174 0            OCT     00174
 0370   REF   8  LAST  247   43,2417  0 2121 1           TC      GOPIN
```

```
P0371            IMUATTCK     VERB 43            DESCRIPTION
R0372                LOAD IMU ATTITUDE ERROR METERS
R0373                1. REQUIRE PROGRAM 00 ACTIVE, COARSE ALIGN ENABLE BIT OFF  AND ZERO ICDU BIT OFF.
R0375                2. IF GUID REF RELEASE OR LIFTOFF HAS OCCURRED  REQUIRE EXT VERB DISPLAY AVAILABLE AND SET BUSY
R0377                   FLAG. OTHERWISE ALLOW CURRENT EXT VERB DISPLAY TO BE OVER-RIDDEN.
R0379                3.  REMOVE COARSE ALIGN ENABLE AND IMU ERROR COUNTER ENABLE
R0380                4. DISPLAY FLASHING V25,N22 (LOAD NEW ICDU ANGLES).
R0381                5. UPON PROCEED OR ENTER RESPONSE, INITIALIZE CURRENT DAC AND COMMAND VALUES, ENABLE ERROR COUNTERS
R0383                   TRANSFER LOADED VALUES TO REGISTERS, AND SEND COMMANDS.
R0384                6. IF BUSY FLAG SET, RESET IT TO RELEASE EXT VERB DISPLAY.

 0385   REF   2  LAST  247   43,2420  0 2730 1  IMUATTCK TC     CHKPOOH

 0386   REF   1              43,2421  3 2477 1           CA     OCTAL30         CHECK IF IMU ZERO AND IMU COARSE ARE ON
 0387                        43,2422  0 0006 1           EXTEND
 0388   REF  21  LAST  224   43,2423  02 012 0           RAND   CHAN12
 0389   REF  66  LAST  237   43,2424  10 000 0           CCS    A
 0390   REF  12  LAST  248   43,2425  1 2120 1           TCF    ALM/END         NOT ALLOWED IF IMU COARSE OR IMU ZERO ON

 0391   REF   1              43,2426  0 2465 1           TC     CKLFTBTS        IS IT BEFORE OR AFTER LIFTOFF
 0392   REF   5  LAST  246   43,2427  0 2076 1           TC     TESTXACT        AFTER
 0393   REF   1              43,2430  4 5033 0           CS     OCT50           REMOVE COARSE AND ECTR ENABLE.
 0394                        43,2431  0 0006 1           EXTEND
 0395   REF  22  LAST  249   43,2432  03 012 1           WAND   CHAN12

 0396   REF   2  LAST  240   43,2433  3 2173 0           CAF    VNLOADCDU
 0397   REF  24  LAST  246   43,2434  0 4662 1           TC     BANKCALL
 0398   REF   4  LAST  243   43,2435   20561 1           CADR   GOXDSPF
 0399   REF   1              43,2436  1 2452 1           TCF    TRMATTCK
 0400                        43,2437  0 2440 0           TC     +1
 0401   REF   4  LAST  203   43,2440  3 5057 0           CAF    EBANK6
 0402   REF   9  LAST  242   43,2441  54 003 0           TS     EBANK           SET E6 FOR NEEDLES.

 0403   REF   5  LAST  218   E6,1476                     EBANK= AK

 0404   REF  25  LAST  249   43,2442  0 4662 1           TC     BANKCALL        INITIALIZE CURRENT DAC AND
 0405   REF   1              43,2443   42443 1           CADR   NEEDLE11        COMMAND VALUES

 0406   REF  26  LAST  249   43,2444  0 4662 1           TC     BANKCALL        ENABLE ERROR COUNTERS.
 0407   REF   1              43,2445   42462 1           CADR   NEEDLER2

 0408   REF   5  LAST  237   43,2446  3 5016 0           CAF    TWO             4 MS MIN.
 0410   REF  10  LAST  234   43,2447  0 5245 1           TC     WAITLIST
 0411   REF   6  LAST  249   E6,1476                     EBANK= AK
 0412   REF   1              43,2450   02455 1           2CADR  ATTCK1
 0412   REF   1              43,2451   66106 0
 0413   REF   2  LAST  249   43,2452  0 2465 1  TRMATTCK TC     CKLFTBTS        IS IT BEFORE OR AFRER LIFTOFF
 0414   REF   9  LAST  246   43,2453  1 5534 1           TCF    ENDEXT          AFTER
 0415   REF   9  LAST  248   43,2454  0 2121 1           TC     GOPIN
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0416                              43,2455  0 0006 1  ATTCK1   EXTEND              TRANSFER LOADED VALUES TO DESIRED REGS.
0417   REF   5  LAST   79         43,2456  3 1156 1            DCA     THETAD
0418   REF   7  LAST  249         43,2457  53'477 0            DXCH    AK
0419   REF   6  LAST  250         43,2460  31'157 0            CAE     THETAD +2
0420   REF   8  LAST  250         43,2461  55'500 1            TS      AK +2

0421   REF  16  LAST  234         43,2462  0 4740 0            TC      IBNKCALL    SENDS COMMANDS LIMITED TO +.- 384 PULSES
0422   REF   1                   43,2463   42476 1            CADR    NEEDLES     AND LEAVES ERROR COUNTERS ENABLED.

0423   REF  11  LAST  235         43,2464  0 5324 1            TC      TASKOVER

0424   REF   1                   43,2465  3 5013 0  CKLFTBTS  CAF     GRRBKBIT    HAS LIFTOFF OCCURRED
0425   REF   3  LAST  187         43,2466  7 0101 0            MASK    FLAGWRD5
0426   REF  67  LAST  249         43,2467  10 000 0            CCS     A
0427   REF  27  LAST  239         43,2470  0 0002 0            TC      Q           YES
0428   REF  12  LAST  160         43,2471  3 5013 0            CAF     BIT5
0429                              43,2472  0 0006 1            EXTEND
0430   REF   4  LAST  165         43,2473  02 030 0            RAND    CHAN30
0431   REF  68  LAST  250         43,2474  10 000 0            CCS     A
0432   REF   2  LAST  135         43,2475  1 6706 1            TCF     0+1
0433   REF  28  LAST  250         43,2476  0 0002 0  XACTOQ    TC      Q           YES

0434                              43,2477   00030 1  OCTAL30   OCT     30

0435   REF   3  LAST  249         43,2500  0 2730 1  VB64      TC      CHKPOOH     DEMAND PROGRAM 00.
0436   REF   6  LAST  249         43,2501  0 2076 1            TC      TESTXACT    IF DISPLAY SYS. NOT BUSY,MAKE IT BUSY.
0437                              43,2502  0 0004 0            INHINT
0438   REF   1                   43,2503  3 5004 0            CAF     PRIO4
0439   REF   5  LAST  248         43,2504  0 5147 0            TC      FINOVAC
0440   REF   2  LAST   90         E4,1720                      EBANK=  RHOSB
0441   REF   1                   43,2505   03652 0            2CADR   SBANDANT    CALC.,DISPLAY S-BAND ANTENNA ANGLES.
0441   REF   1                   43,2506   64104 0
0442   REF   3  LAST  203         43,2507  0 5217 0            TC      ENDOFJOB

R0443          ENATMA    VERB 58              DESCRIPTION
R0444              ENABLE AUTOMATIC ATTITUDE MANEUVER

R0445      VERB58 RESETS STIKFLAG TO ENABLE R61 TO PERFORM AUTOMATIC TRACKING MANEUVERS, AFTER INTERUPTIONS BY RHC ACT-
R0447      IVITY.

0448   REF   7  LAST  244         43,2510  0 5560 1  ENATMA    TC      DOWNFLAG    RESET STIKFLAG.
0449   REF   2  LAST  199         43,2511   00020 0            ADRES   STIKFLAG    BIT 14  FLAG 1
0450   REF  10  LAST  249         43,2512  0 2121 1            TC      GOPIN
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P0451            STROKON     VERB 68            DESCRIPTION

R0452                STROKE TEST SETUP/ENABLE
R0453                1. SET EXT VERB DISPLAY BUSY FLAG
R0454                2. SCHEDULE STRKTST1 WITH PRIORITY 30.
R0455                3. RELEASE EXT VERB DISPLAY.

 0456   REF   2  LAST  105   E6,1625                          EBANK= T5TVCDT
 0457   REF   5  LAST  197   43,2513  4 0102 0  STROKON  CS     FLAGWRD6      V68   PERMITTED ONLY DURING TVC
 0458   REF   4  LAST  197   43,2514  7 4105 0           MASK   OCT60000
 0459                       43,2515  0 0006 1           EXTEND
 0460   REF  13  LAST  249   43,2516  6 2120 0           BZMF   ALM/END       NOT TVC....FLASH OP ERROR LIGHT
 0461   REF   4  LAST  197   43,2517  3 4371 0           CAF    PRIO30        JOB REQUEST, TO SET UP STROKE TEST,
 0463   REF   6  LAST  231   43,2520  0 5134 1           TC     NOVAC              INCLUDING INITIALIZATIONS
 0464   REF   2  LAST  105   E6,1574                      EBANK= STROKER
 0465   REF   1              43,2521   03501 0           2CADR  STRKTST1
 0465   REF   1              43,2522   40106 1
 0466   REF  11  LAST  250   43,2523  0 2121 1           TC     GOPIN


R0467            STABLISH    VERB 46            DESCRIPTION
R0468                ESTABLISH G & N AUTOPILOT CONTROL
R0469                1. SETS UP EITHER RCS, ENTRY, OR SATURN
R0470                2. IF TVC IS ON, SETS UP CSM/LM SWITCH-OVER
R0471                     FROM HIGH BW TO LOW BW

 0473   REF   5  LAST  249   43,2524  3 5057 0  STABLISH CAF    EBANK6        V46  -  SET EBANK TO E6
 0474   REF  10  LAST  249   43,2525  54 003 0           TS     EBANK

 0475   REF   6  LAST  251   43,2526  4 0102 0           CS     FLAGWRD6           TEST FOR TVC
 0476   REF   5  LAST  251   43,2527  7 4105 0           MASK   OCT60000
 0477                       43,2530  0 0006 1           EXTEND
 0478                       43,2531  6 2541 0           BZMF   +8

 04781  REF  12  LAST  216   43,2532  31'466 1           CAE    DAPDATR1           TEST FOR CSM/LM
 04782  REF  26  LAST  230   43,2533  7 5002 1           MASK   BIT14
 04783                      43,2534  0 0006 1           EXTEND
 04784                      43,2535  6 2540 1           BZMF   +3

 0479   REF  10  LAST  244   43,2536  0 4701 0           TC     POSTJUMP      CSM/LM, SO PERFORM HB TO LB SWITCH-OVER
 0480   REF   1              43,2537   36351 0           CADR   PRESWTCH

 04801  REF  14  LAST  251   43,2540  0 2120 0    +3     TC     ALM/END       CSM, SO ALARM AND EXIT

 04802  REF  11  LAST  251   43,2541  0 4701 0    +8     TC     POSTJUMP      SET UP RCS, ENTRY, OR SATURN-STICK DAP
 0481   REF   1              43,2542   65606 1           CADR   DAPFIG
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P0482            CREWMANU     VERB 49            DESCRIPTION
R0483                START AUTOMATIC ATTITUDE MANEUVER
R0484                1. REQUIRE PROGRAM 00 ACTIVE.
R0485                2. SET EXT VERB DISPLAY BUSY FLAG.
R0486                3. SCHEDULE R62DISP WITH PRIORITY 10.
R0487                4. RELEASE EXT VERB DISPLAY.

R0488             R62DISP
R0489                1. DISPLAY FLASHING V06,N22 (DECIMAL DISPLAY NEW ICDU ANGLES). UPON IMMEDIATE RETURN, SET-UP GROUP
R0491                   4 FOR RESTART OF DISPLAY SEQUENCE.
R0492                   RESPONSES
R0493                   A. TERMINATE
R0494                      1. GO TO GOTOPOOH.
R0495                   B. PROCEED
R0496                      1. SET 3AXISFLG TO INDICATE MANEUVER IS SPECIFIED BY 3 AXIS.
R0498                      2. EXECUTE R60CSM (ATTITUDE MANEUVER).
R0499                      3. ZERO GROUP 4 (END R62).
R0500                   C. ENTER
R0501                      1. REPEAT FLASHING V06,N22.

 0502  REF   4  LAST  250   43,2543  0 2730 1  CREWMANU TC     CHKPOOH         DEMAND POO

 0503  REF   7  LAST  250   43,2544  0 2076 1           TC     TESTXACT

 05031 REF   1              43,2545  3 5003 1           CAF    PRIO10
 05032 REF   6  LAST  250   43,2546  0 5147 0           TC     FINDVAC
 0504  REF   1               1155                      EBANK= CPHI
 0505  REF   1              43,2547   02330 0           2CADR  R62DISP
 0505  REF   1              43,2550   56102 1
 0506  REF   4  LAST  250   43,2551  0 5217 0           TC     ENDOFJOB
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P0513           DAPDISP     VERB 48              DESCRIPTION
R0514               LOAD AUTOPILOT DATA (ROUTINE R03)
R0515               0. CHECKFAIL AND RETURN IF TVC.
R0516               1. REQUIRE EXT VERB DISPLAY AVAILABLE AND SET BUSY FLAG.
R0517               2. LOWER PRIORITY TO 10.
R0518               3. DISPLAY FLASHING V04,N46 (DISPLAY AUTOPILOT CONFIGURATION)
R0520               4. UPON PROCEED RESPONSE, EXECUTE S41.2.
R0521               5. DISPLAY FLASHING V06,N47 (DISPLAY CSM WGT., LEM WGT.)
R0522               6. UPON PROCEED RESPONSE EXECUTE S40.14.
R0523               7. DISPLAY FLASHING V06,N48 (DISPLAY PITCH TRIM, YAW TRIM)
R0525               8. UPON PROCEED RESPONSE, RELEASE EXTENDED VERB DESPLAY SYSTEM
 0527   REF   3 LAST  247 TO  253:   109   323*          COUNT* $$/EXTVB
 0528   REF   7 LAST  251   43,2552  4 0102 0  DAPDISP  CS     FLAGWRD6
 0529   REF   6 LAST  251   43,2553  7 4105 0           MASK   OCT60000
 0530                       43,2554  0 0006 1           EXTEND
 0531                       43,2555  6 2557 1           BZMF   +2              TVC = 10, CS YIELDS 01, BZMF TO CONTINUE
 0532   REF  15 LAST  251   43,2556  0 2120 0           TC     ALM/END         RETURN IF TVC

 0533   REF   8 LAST  252   43,2557  0 2076 1           TC     TESTXACT
 05331  REF  27 LAST  249   43,2560  0 4662 1           TC     BANKCALL
 05332  REF   1             43,2561   64000 0          CADR   DAPDISP1
 0536                       42,2000                    BANK   42
 0537   REF   1             42,2000                    SETLOC EXTVBS
 0538                       42,2000                    BANK
 0539   REF   1                                        COUNT  24/R03

 0540   REF   6 LAST  251   42,2000  3 5057 0  DAPDISP1 CAF    EBANK6
 0541   REF  11 LAST  251   42,2001  54 003 0           TS     EBANK

 05415  REF   2 LAST  252   42,2002  3 5003 1           CAF    PRIO10
 05416  REF   1             42,2003  0 5210 1           TC     PRIOCHNG

 0542   REF   1             42,2004  3 2061 1  DONOUN46 CAF    V04N46            R1          R2
 0543   REF  28 LAST  253   42,2005  0 4662 1           TC     BANKCALL        DAPDATR1    DAPDATR2
 0544   REF   5 LAST  249   42,2006   20561 1           CADR   GOXDSPF       GOXDSP ROUTINES USED FOR EXTENDED VERBS.

 0545   REF  10 LAST  249   42,2007  0 5534 0           TC     ENDEXT          EXT. VBS GO TO ENDEXT, NOT ENDOFJOB.
 0546                       42,2010  0 2012 0           TC     +2
 0547   REF   1             42,2011  0 2004 1           TC     DONOUN46

 05471  REF  13 LAST  251   42,2012  3 1466 1           CA     DAPDATR1
 05472  REF  17 LAST  202   42,2013  7 5014 0           MASK   BIT4
 05473  REF  69 LAST  250   42,2014  10 000 0           CCS    A
 05474  REF   1             42,2015  1 2054 0           TCF    MAXIN
 05475  REF   8 LAST  250   42,2016  0 5560 1           TC     DOWNFLAG
 05476  REF   1             42,2017   00212 0          ADRES  MAXDBFLG
 0548   REF  29 LAST  253   42,2020  0 4662 1  MAXOUT   TC     BANKCALL
 0549   REF   1             42,2021   40347 0          CADR   S41.2

 0550   REF   1             42,2022  3 2060 0  DONOUN47 CAF    V06N47            R1          R2          R3
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 0551   REF  30  LAST  253   42,2023  0 4662 1            TC     BANKCALL        CSM WGT.   LEM WGT.     BLANK
 0552   REF   6  LAST  253   42,2024   20561 1            CADR   GOXDSPF

 0553   REF  11  LAST  253   42,2025  0 5534 0            TC     ENDEXT
 0554                        42,2026  0 2030 0            TC     +2
 0555   REF   1              42,2027  0 2022 0            TC     DONOUN47
 055501 REF  14  LAST  253   42,2030  31'466 1            CAE    DAPDATR1        DO MASS PROPERTIES CALCULATION ONLY IF
 055502 REF   5  LAST  251   42,2031  7 4371 1            MASK   PRIO30          CONFIG = 1(CSM), 2(CSM/LM), 6(CSM/LMA)
 055503                      42,2032  0 0006 1            EXTEND
 055504 REF   1              42,2033  1 2046 0            BZF    DONOUN48        SKIP IF 0, 4
 055505                      42,2034  4 0000 0            COM
 055506 REF   6  LAST  254   42,2035  7 4371 1            MASK   PRIO30
 055507                      42,2036  0 0006 1            EXTEND
 055508 REF   2  LAST  254   42,2037  1 2046 0            BZF    DONOUN48        SKIP IF 3, 7
 055509                      42,2040  0 0004 0            INHINT
 05551  REF  17  LAST  250   42,2041  0 4740 0            TC     IBNKCALL
 05552  REF   2  LAST  198   42,2042   13366 0            CADR   MASSPROP        UPDATE IXX, IAVG, IAVG/TLX

 055525                      42,2043  0 0003 1            RELINT
 0556   REF  31  LAST  254   42,2044  0 4662 1            TC     BANKCALL
 0557   REF   1              42,2045   40500 0            CADR   S40.14          COMPUTE RCS DAP STUFF

 0558   REF   1              42,2046  3 2057 1  DONOUN48  CAF    V0648             R1         R2         R3
 0559   REF  32  LAST  254   42,2047  0 4662 1            TC     BANKCALL        PTRIM      YTRIM      BLANK
 0560   REF   7  LAST  254   42,2050   20561 1            CADR   GOXDSPF

 0561   REF  12  LAST  254   42,2051  0 5534 0            TC     ENDEXT
 0562   REF  13  LAST  254   42,2052  0 5534 0            TC     ENDEXT
 0563   REF   3  LAST  254   42,2053  0 2046 1            TC     DONOUN48

 0564   REF   6  LAST  244   42,2054  0 5546 0  MAXIN     TC     UPFLAG
 0565   REF   2  LAST  253   42,2055   00212 0            ADRES  MAXOBFLG
 0566   REF   1              42,2056  0 2020 1            TC     MAXOUT

 05661                       42,2057   01460 1  V0648     VN     0648
 056611                      42,2060   01457 0  V06N47    VN     0647
 056612                      42,2061   01056 0  V04N46    VN     0446
 05662                       43,2562                     BANK   43
 05664  REF   2  LAST  236   43,2000                     SETLOC EXTVERBS
 05666                       43,2562                     BANK

 0570   REF   4 LAST  253 TO  253:      8   331*         COUNT* $$/EXTVB
R0571            V82PERF     VERB 82              DESCRIPTION
R0572                REQUEST ORBIT PARAMETERS DISPLAY (R30)
R0574   1. IF AVERAGE G IS OFF:
R0575            FLASH DISPLAY V04N06. R2 INDICATES WHICH SHIP'S STATE VECTOR IS
R0576             TO BE UPDATED. INITIAL CHOICE IS THIS SHIP (R2=1). ASTRONAUT
R0577             CAN CHANGE TO OTHER SHIP BY V22EXE, WHERE X NOT EQ 1.
R0578            SELECTED STATE VECTOR UPDATED BY THISPREC (OTHPREC).
R0579            CALLS SR30.1 (WHICH CALLS TFFCONMU + TFFRP/RA) TO CALCULATE
```

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R0580              RPER (PERIGEE RADIUS), RAPO (APOGEE RADIUS), HPER (PERIGEE
R0581              HEIGHT ABOVE LAUNCH PAD OR LUNAR LANDING SITE), HAPO (APOGEE
R0582              HEIGHT AS ABOVE), TPER (TIME TO PERIGEE), TFF (TIME TO
R0583              INTERSECT 300 KFT ABOVE PAD OR 35KFT ABOVE LANDING SITE).
R0584             FLASH MONITOR V16N44 (HAPO, HPER, TFF).TFF IS -59M59S IF IT WAS
R0585              NOT COMPUTABLE, OTHERWISE IT INCREMENTS ONCE PER SECOND.
R0586              ASTRONAUT HAS OPTION TO MONITOR TPER BY KEYING IN N 32 E.
R0587              DISPLAY IS IN HMS, IS NEGATIVE (AS WAS TFF), AND INCREMENTS
R0588              ONCE PER SECOND ONLY IF TFF DISPLAY WAS -59M59S.

R0589   2. IF AVERAGE G IS ON:
R0590             CALLS SR30.1 APPROX EVERY TWO SECS.  STATE VECTOR IS ALWAYS
R0591              FOR THIS VEHICLE. V82 DOES NOT DISTURB STATE VECTOR.  RESULTS
R0592              OF SR30.1 ARE RAPO, RPER, HAPO, HPER, TPER, TFF.
R0593             FLASH MONITOR V16N44 (HAPO, HPER, TFF).
R0594             IF MODE IS P11, THEN CALL DELRSPL SO ASTRONAUT CAN MONITOR
R0595              RESULTS BY N50E. SPLASH COMPUTATION DONE ONCE PER TWO SECS.


R05951  ADDENDUM: HAPO AND HPER SHOULD BE CHANGED TO READ HAPOX AND HPERX IN THE
R05952             ABOVE REMARKS.
 0596   REF   9  LAST  253   43,2562  0 2076 1  V82PERF  TC      TESTXACT
 0597   REF   1               43,2563  3 5063 1           CAF     PRIO7
 0598   REF   2  LAST  253   43,2564  0 5210 1           TC      PRIOCHNG
 0599   REF  12  LAST  251   43,2565  0 4701 0           TC      POSTJUMP
 0600   REF   1               43,2566   46332 1          CADR    V82CALL        ***** V82CALL MUST NOT BE A FINDVAC JOB.


R0601              V83PERF     VERB 83              DESCRIPTION
R0602                  REQUEST RENDEZVOUS PARAMETER DISPLAY (R31)
R0603                  1. SET EXT VERB DISPLAY BUSY FLAG.
R0604                  2. SCHEDULE V83CALL WITH PRIORITY 10.
R0605                     A. DISPLAY
R0606                           R1  RANGE
R0607                           R2  RANGE RATE
R0608                           R3  THETA

 0609   REF  10  LAST  255   43,2567  0 2076 1  V83PERF  TC      TESTXACT
 0610                         43,2570  0 0004 0           INHINT
 0611   REF   2  LAST  203   43,2571  4 0105 1           CS      FLAGWRD9       SET R31 FLAG-BIT 4 FLAGWRD9
 0612   REF   1               43,2572  7 5014 0           MASK    R31FLBIT
 0613   REF   3  LAST  255   43,2573  26 105 1           ADS     FLAGWRD9
 0614   REF   3  LAST  228   43,2574  3 5061 0           CAF     PRIO5
 0615   REF   7  LAST  251   43,2575  0 5134 1           TC      NOVAC
 0616   REF   8  LAST  208   E4,1770                     EBANK=  SUBEXIT
 0617   REF   1               43,2576   02000 0          2CADR   R31CALL
 0617   REF   1               43,2577   62064 1
 0618   REF   5  LAST  252   43,2600  0 5217 0           TC      ENDOFJOB
```

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0619   REF  11  LAST  255   43,2601  0 2076 1  V85PERF  TC      TESTXACT
0620                       43,2602  0 0004 0           INHINT
0621   REF   2  LAST  255   43,2603  4 5014 0           CS      R31FLBIT       RESET R31 FLAG TO INDICATE R34
0622   REF   4  LAST  255   43,2604  7 0105 1           MASK    FLAGWRD9
0623   REF   5  LAST  256   43,2605  54 105 1           TS      FLAGWRD9
0624   REF   2  LAST  237   43,2606  0 2574 0           TC      V83PERF +5
```

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R0625            GOTOR21  VERB 57
R0626            GOTOR23- VERB 54  DESCRIPTION
R0627        SET UP MARKING FOR R22(REND TRACK DATA PROC)
R0628        1. SET EXT VERB DISPLAY BUSY FLAG
R0629        2. IF REND (P20 RUNNING) + TRACK (TRACKING ALLOWED) FLAGS ARE SET,
R0630           SCHEDULE R21 OR R23 WITH PRIORITY 16, OTHERWISE TURN ON ALARM 406
R0631        3. RELEASE EXT VERB DISPLAY SYSTEM
 0632   REF   9  LAST  253   43,2607  0 5560 1  GOTOR21  TC      DOWNFLAG        CLEAR R23FLG
 0633   REF   1               43,2610   00025 0           ADRES   R23FLG          BIT 9  FLAG 1
 0634                         43,2611  0 2614 0           TC      +3
 0635   REF   7  LAST  254   43,2612  0 5546 0  GOTOR23  TC      UPFLAG          SET R23FLG
 0636   REF   2  LAST  257   43,2613   00025 0           ADRES   R23FLG          BIT 9  FLAG 1
 0637   REF  12  LAST  256   43,2614  0 2076 1           TC      TESTXACT
 0638   REF   8  LAST  203   43,2615  3 0074 1           CA      FLAGWRD0        V8 57 UNNACCEPTABLE UNLESS BOTH
 0639   REF   4  LAST  202   43,2616  7 5011 0           MASK    RNDVZBIT              RENDEZVOUS AND TRACK FLAGS ON
 0640                         43,2617  0 0006 1           EXTEND
 0641   REF   1               43,2620  1 2643 0           BZF     R22ALARM

 0642   REF  10  LAST  247   43,2621  3 0075 0           CA      FLAGWRD1
 0643   REF   1               43,2622  7 5013 1           MASK    TRACKBIT
 0644                         43,2623  0 0006 1           EXTEND
 0645   REF   2  LAST  257   43,2624  1 2643 0           BZF     R22ALARM

 0646   REF  11  LAST  257   43,2625  3 0075 0           CA      FLAGWRD1        TEST R23FLG
 0647   REF   1               43,2626  7 5007 1           MASK    R23BIT
 0648                         43,2627  0 0006 1           EXTEND
 0649   REF   1               43,2630  1 2636 1           BZF     REGR21          R21
 0650   REF   5  LAST  248   43,2631  3 5070 0           CAF     PRIO16
 0652   REF   8  LAST  255   43,2632  0 5134 1           TC      NOVAC
 0653   REF  12  LAST  234   E7,1725                     EBANK=  MRKBUF1
 0654   REF   1               43,2633   02470 0          2CADR   R23CSM
 0654   REF   1               43,2634   76067 1
 0655   REF   6  LAST  255   43,2635  0 5217 0           TC      ENDOFJOB
 0656   REF   6  LAST  257   43,2636  3 5070 0  REGR21   CAF     PRIO16
 0658   REF   9  LAST  257   43,2637  0 5134 1           TC      NOVAC
 0659   REF  13  LAST  257   E7,1725                     EBANK=  MRKBUF1
 0660   REF   1               43,2640   02466 1          2CADR   R21CSM
 0660   REF   1               43,2641   76067 1
 0661   REF   7  LAST  257   43,2642  0 5217 0           TC      ENDOFJOB
 0662   REF  20  LAST  242   43,2643  0 5650 1  R22ALARM TC      ALARM           VERB 57 WAS SELECTED AND NEITHER REND
 0663                         43,2644   00406 0          OCT     00406             NOR TRACK FLAG WERE ON.
 0664   REF  14  LAST  254   43,2645  0 5534 0           TC      ENDEXT
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P0665            VERB 86    DESCRIPTION
R0666              V86 IS TO R23 AS MARK REJECT IS TO R21
R0667              V86 IS THE MARK REJECT FOR R23(THE BACKUP MARKING ROUTINE)
 0668   REF  14  LAST  257   E7,1725                          EBANK= MRKBUF1
 0669   REF   1               43,2646   3 5060 1  V86PERF   CAF    EBANK7          BACKUP MARK REJECT (R23)
 0670   REF  12  LAST  253   43,2647   56 003 1              XCH    EBANK
 0671   REF   8  LAST  230   43,2650   3 7716 0              CA     NEGONE
 0672   REF  15  LAST  258   43,2651   55'725 1              TS     MRKBUF1
 0673   REF  12  LAST  251   43,2652   0 2121 1              TC     GOPIN
```

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P0689           TRACKTRM     VER8 56            DESCRIPTION
R0690               TERMINATE TRACKING (P20)
R0691               1. KNOCK DOWN RENDEZVOUS, TRACK, AND UPDATE FLAGS.
R0692               2. REQUIRE P20 NOT RUNNING ALONE OR GO TO GOTOPOOH (REQUEST PROGRAM 00).
R0694               3. REQUIRE R22 RUNNING OR GO TO PINBRNCH.
R0695               4. IF INTEGRATION RUNNING, STALL UNTIL IT IS COMPLETED, THEN ZERO GROUPS 2 AND 3 TO KILL R21 + R22.
R0697               3. KNOCK DOWN RENDEZVOUS, R22, R21, TRACK, UPDATE, AND TARGI FLAGS.
R0699               4. GO TO ENEMA (SOFTWARE RESTART).
R0700               REFERENCE
R0701                  P20 RENDEZVOUS  NAVIGATION.
R0702                  R21 RENDEZVOUS  TRACKING SIGHTING MARK.
R0703                  R22 RENDEZVOUS  TRACKING DATA PROCESSING.

 0704   REF   5  LAST  257   43,2653  3 5011 1  TRACKTRM CA     RNDVZBIT        IS REND FLAG ON
 0705   REF   9  LAST  257   43,2654  7 0074 0           MASK   FLAGWRD0
 0706                        43,2655  0 0006 1           EXTEND
 0707   REF  13  LAST  258   43,2656  1 2121 0           BZF    GOPIN           NO

 0708   REF  10  LAST  257   43,2657  0 5560 1           TC     DOWNFLAG
 0709   REF   1               43,2660   00010 0          ADRES  RNDVZFLG

 0710   REF   2  LAST  257   43,2661  3 5013 0           CA     TRACKBIT        IS TRACK FLAG ON
 0711   REF  12  LAST  257   43,2662  7 0075 1           MASK   FLAGWRD1
 0712                        43,2663  0 0006 1           EXTEND
 0713   REF  14  LAST  259   43,2664  1 2121 0           BZF    GOPIN           NO

 0714   REF  11  LAST  259   43,2665  0 5560 1           TC     DOWNFLAG
 0715   REF   1               43,2666   00031 0          ADRES  TRACKFLG

 07151  REF  12  LAST  259   43,2667  0 5560 1           TC     DOWNFLAG
 07152  REF   1               43,2670   00027 1          ADRES  UPDATFLG

 0716   REF  13  LAST  259   43,2671  0 5560 1           TC     DOWNFLAG
 0717   REF   2  LAST  202   43,2672   00007 0          ADRES  IMUSE

 07173  REF   7  LAST  253   43,2673  3 5057 0           CAF    EBANK6
 07174  REF  13  LAST  258   43,2674  54 003 0           TS     EBANK

 071749                      43,2675  0 0004 0           INHINT
 07175  REF   3  LAST  203   43,2676  0 4526 1           TC     STOPRATE

 07177  REF   9  LAST  258   43,2677  3 7716 0           CAF    NEGONE
 07178  REF  20  LAST  242   43,2700  55'303 1           TS     OPTIND

 0718   REF   2  LAST  199   43,2701  0 6006 1           TC     INTPRET
 0719                        43,2702   77624 1           CALL
 0720   REF   3  LAST  210   43,2703   27442 0                  INTSTALL        DONT INTERRUPT INTEGRATION
 0721                        43,2704   77776 1           EXIT

 0722   REF   1               43,2705  0 5372 1           TC     2PHSCHNG
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 0723                          43,2706   00002 0          OCT    2              KILL GROUP 2 TO HALT P20 ACTIVITY
 0724                          43,2707   00001 0          OCT    1              ALSO KILL GROUP 1

 0725                          43,2710   0 0004 0  CLEANOUT INHINT
 0726   REF  13  LAST  255     43,2711   0 4701 0          TC     POSTJUMP
 0727   REF   2  LAST  189     43,2712    12651 0          CADR   ENEMA          CAUSE RESTART


R0728            LEMVEC     VERB 80              DESCRIPTION
R0729                UPDATE LEM STATE VECTOR
R0730                  RESET VEHUPFLG TO 0

 0731   REF  14  LAST  259     43,2713   0 5560 1  LEMVEC   TC     DOWNFLAG
 0732   REF   1                43,2714    00026 0          ADRES  VEHUPFLG       VEHUPFLG DOWN INDICATES LEM

 0733   REF  15  LAST  259     43,2715   1 2121 0          TCF    GOPIN


R0734            CSMVEC     VERB 81              DESCRIPTION
R0735                UPDATE CSM STATE VECTOR
R0736                  SET   VEHUPFLG TO 1

 0737   REF   8  LAST  257     43,2716   0 5546 0  CSMVEC   TC     UPFLAG
 0738   REF   2  LAST  260     43,2717   00026 0          ADRES  VEHUPFLG       VEHUPFLG UP INDICATES CM.

 07383  REF  16  LAST  260     43,2720   1 2121 0          TCF    GOPIN

R0749            DNEDUMP    VERB 74              DESCRIPTION
R0750                INITIALIZE DOWN-TELEMETRY PROGRAM FOR ERASABLE MEMORY DUMP.
R0751                1. SET EXT VERB DISPLAY BUSY FLAG.
R0752                2. REPLACE CURRENT DOWNLIST WITH ERASABLE MEMORY.
R0753                3. RELEASE EXT VERB DISPLAY.

 0754                           0010                    EBANK= 10
 0756   REF   1                43,2721   3 2724 1  DNEDUMP  CAF    LDNDUMPI
 0757   REF   2  LAST  190     43,2722   54 335 0          TS     DNTMGOTO
 0758   REF  17  LAST  260     43,2723   0 2121 1          TC     GOPIN

 0759   REF   2  LAST  236     43,2721             V74      EQUALS DNEDUMP
 0760   REF   1                43,2724    03722 0  LDNDUMPI REMADR DNDUMPI


R0761            LFTFLGON    VERB 75              DESCRIPTION
R0762                SET LIFT-OFF FLAG
R0763                1. SETUP GRRBKFLG, GUIDANCE REFERENCE RELEASE BACK-UP FLAG.
R0764                2. RETURN VIA PINBRNCH

 0765   REF   9  LAST  260     43,2725   0 5546 0  LFTFLGON TC     UPFLAG        VB 75 - SET LIFTOFF FLAG BIT
 0766   REF   1                43,2726    00125 1          ADRES  GRRBKFLG       BIT 5  FLAG 5
 0767   REF  18  LAST  260     43,2727   0 2121 1          TC     GOPIN
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0768   REF   5  LAST  201    43,2730  3 1011 0  CHKPDOH  CA      MODREG
0769                         43,2731  0 0006 1           EXTEND
0770   REF   3  LAST  244    43,2732  1 6711 1           BZF     TCQ
0771   REF  16  LAST  253    43,2733  1 2120 1           TCF     ALM/END

0772                         43,2734  0 0006 1  EXDAPOFF EXTEND
0773   REF   1                43,2735  3 2744 1           DCA     IDLECADR        SET T5 TO IDLE.
0774   REF   4  LAST  187    43,2736  53'313 0           DXCH    T5LOC
0775   REF   7  LAST  253    43,2737  4 4105 0           CS      OCT60000
0776   REF   8  LAST  253    43,2740  7 0102 0           MASK    FLAGWRD6        RESET DAPBITS 1 AND 2.
0777   REF   9  LAST  261    43,2741  54 102 0           TS      FLAGWRD6
0778   REF  29  LAST  250    43,2742  0 0002 0           TC      Q

0779   REF  11  LAST  217    E6,1423                     EBANK=  PACTOFF
0780   REF   3  LAST  205    43,2743   03153 0  IDLECADR 2CADR   T5IDLOC
0780                         43,2744   12106 0
```

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R0781   VERB 89 DESCRIPTION     RENDEZVOUS FINAL ATTITUDE ROUTINE (R63)

R0782   CALLED BY VERB 89 ENTER DURING P00. PRIO 10 USED. CALCULATES AND
R0783   DISPLAYS FINAL GIMBAL ANGLES TO POINT CSM +X AXIS OR PREFERRED AXIS
R0784   (UNIT(Z)COS55 DEG + UNIT(X)SIN55 DEG) AT LM.

R0785   1. KEY IN V 89 E ONLY IF IN PROG 00. IF NOT IN P00, OPERATOR ERROR AND
R0786   EXIT R63. OTHERWISE CONTINUE.

R0787   2. IF IN P00, DO IMU STATUS CHECK (R02BOTH). IF IMU ON AND ITS
R0788   ORIENTATION KNOWN TO CGC, CONTINUE.

R0789   3. FLASH DISPLAY V 04 N 06. R2 INDICATES WHICH SPACECRAFT AXIS IS TO
R0790   BE POINTED AT LM.  INITIAL CHOICE IS PREFERRED AXIS. (R2=1).
R0791   ASTRONAUT CAN CHANGE TO (+X) AXIS (R2 NOT= 1) BY V 22 E 2 E. CONTINUE
R0792   AFTER KEYING IN PROCEED.

R0793   4. SET PREFERRED ATTITUDE FLAG ACCORDING TO OPTION DESIRED. SET FLAG
R0794   FOR PREFERRED AXIS. RESET FLAG FOR X AXIS.

R0795   5. CURRENT TIME IS STORED AND R63COMP IS CALLED

R0796        R63COMP JOB:
R0797        UPDATES CSM AND LM STATE VECTORS USING CONIC EQUATIONS

R0798        CALCULATES BOTH PREFERRED AND X AXIS TRACKING ATT FROM CSM TO LM.

R0799        DESIRED GIMBAL ANGLES AS INDICATED BY PREFERRED ATTITUDE FLAG
R0800        ARE STORED FOR LATER R60CSM CALL.

R0801   6. FLASH DISPLAY V 05 N18 AND AWAIT RESPONSE.

R0802   7. RECYCLE- RETURN TO STEP 5.
R0803      TERMINATE- EXIT R63 ROUTINE
R0804      PROCEED- RESET 3AXISFLG AND CALL R60CSM FOR ATTITUDE MANEUVER.


 0805   REF   5  LAST  252   43,2745  0 2730 1  V89PERF  TC      CHKPOOH         DEMAND P00
 0806   REF  13  LAST  257   43,2746  0 2076 1           TC      TESTXACT
 0807                        43,2747  0 0004 0           INHINT
 0808   REF   3  LAST  253   43,2750  3 5003 1           CAF     PRIO10
 0809   REF   7  LAST  252   43,2751  0 5147 0           TC      FINDVAC
 0810   REF   2  LAST   90   E4,1715                     EBANK=  P21TIME
 0811   REF   1              43,2752   03712 0          2CADR   V89CALL
 0811   REF   1              43,2753   70064 1
 0812   REF   8  LAST  257   43,2754  1 5217 1           TCF     ENDOFJOB

 0813   REF  15  LAST  260   43,2755  0 5560 1  WMATRXNG TC      DOWNFLAG        RESET RENDWFLG
 0814   REF   2  LAST  210   43,2756   00131 1           ADRES   RENDWFLG
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08164  REF  16  LAST  262   43,2757  0 5560 1          TC      DOWNFLAG        RESET ORBWFLAG
08166  REF   2  LAST  210   43,2760   00066 1          ADRES   ORBWFLAG
0817   REF  19  LAST  260   43,2761  0 2121 1          TC      GOPIN

0818   REF   1              43,2762           GOSHOSUM EQUALS  SHOWSUM

0819   REF   6  LAST  262   43,2762  0 2730 1 SHOWSUM  TC      CHKPOOH
0820   REF  14  LAST  262   43,2763  0 2076 1          TC      TESTXACT        *
0821   REF   1              43,2764  3 5017 1          CAF     S+1             *
0822   REF   2  LAST   82   43,2765  55'376 0          TS      SKEEP6          * SHOWSUM OPTION
0823   REF   1              43,2766  3 5021 1          CAF     S+ZERO          *
0824   REF   3  LAST  183   43,2767  55'362 0          TS      SMODE           * TURN OFF SELF-CHECK
0825   REF   1              43,2770  3 3247 0          CA      SELFADRS        *
0826   REF   3  LAST  192   43,2771  55'361 0          TS      SELFRET         *
0827   REF   1              43,2772  0 3524 1          TC      STSHOSUM        * ENTER ROPECHK

0828   REF   2  LAST   82   43,2773  23'372 0 SDISPLAY LXCH    SKEEP2          * BNK NO FOR DSP
0829   REF   2  LAST   82   43,2774  23'373 1          LXCH    SKEEP3          * BUGGER WORD FOR DSP
0830   REF   1              43,2775  3 3246 1 NOKILL   CA      ADRS1           *
0831   REF  33  LAST  246   43,2776  54 156 1          TS      MPAC +2         *
0832   REF   1              43,2777  3 3010 0          CA      VNCON           * 0501
0833   REF  33  LAST  254   43,3000  0 4662 1          TC      BANKCALL        *
0834   REF   8  LAST  254   43,3001   20561 1          CADR    GOXDSPF         *
0835                        43,3002  0 3005 1          TC      +3              *
0836   REF   1              43,3003  0 3635 1          TC      NXTBNK          *
0837   REF   1              43,3004  0 2775 0          TC      NOKILL          *
08375  REF   2  LAST  263   43,3005  3 3247 0          CA      SELFADRS
08376  REF   2  LAST   82   43,3006  55'371 1          TS      SKEEP1

0838   REF  15  LAST  257   43,3007  0 5534 0          TC      ENDEXT          *

0839                        43,3010   01201 0 VNCON     VN      501             *

0840   REF   3  LAST  263   43,3011  3 1376 1 ENDSUMS  CA      SKEEP6          *
0841                        43,3012  0 0006 1          EXTEND                  *
0842   REF   2  LAST  193   43,3013  1 3340 1          BZF     SELFCHK         * ROPECHK, START SELFCHK AGAIN.
0843   REF   2  LAST  263   43,3014  0 3524 1          TC      STSHOSUM        * START SHOWSUM AGAIN.

R0853           VB 76  SET PREFERRED ATTITUDE FLAG - DRIVE TO PREFERRED.

0854   REF  10  LAST  260   43,3015  0 5546 0 SETPRFLG TC      UPFLAG
0855   REF   1              43,3016   00120 1          ADRES   PRFTRKAT        BIT 10  FLAG 5
0856   REF  20  LAST  263   43,3017  0 2121 1          TC      GOPIN


R0857           VB 77  RESET PREFERRED ATTITUDE FLAG - DRIVE TO +X-AXIS ATT.

0858   REF  17  LAST  263   43,3020  0 5560 1 RESETPRF TC      DOWNFLAG
0859   REF   2  LAST  263   43,3021   00120 1          ADRES   PRFTRKAT        BIT 10  FLAG 5
0860   REF  21  LAST  263   43,3022  0 2121 1          TC      GOPIN
```

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R0861           VB 87  SET VHF RANGE FLAG - ALLOWS R22 TO ACCEPT RANGE DATA.

 0862   REF   3  LAST  259   43,3023  0 6006 1  SETVHFLG TC     INTPRET
 0863                        43,3024   77414 0           SET    EXIT
 0864   REF   2  LAST  200   43,3025   04466 1                  VHFRFLAG
 0865   REF  22  LAST  263   43,3026  0 2121 1           TC     GOPIN

R0866           VB 88  RESET VHF RANGE FLAG - STOPS ACCEPTANCE OF RANGE DATA.

 0867   REF   4  LAST  264   43,3027  0 6006 1  RESETVHF TC     INTPRET
 0868                        43,3030   77414 0           CLEAR  EXIT
 0869   REF   3  LAST  264   43,3031   04466 0                  VHFRFLAG
 08695  REF   1               43,3032  0 5631 0           TC     TRFAILOF        TRACKER FAIL LIGHT

 0870   REF  23  LAST  264   43,3033  0 2121 1           TC     GOPIN

R0871   VERB 66.  VEHICLES ARE ATTACHED.- MOVE THIS VEHICLE STATE VECTOR TO
R0872             OTHER VEHICLE STATE VECTOR.

R0873       USE SUBROUTINE GENTRAN.

 0874   REF   1               E3,1554                  EBANK= RRECTHIS
 0875   REF   4  LAST  262   43,3034  3 5003 1  ATTACHED CAF    PRIO10
 0876   REF   8  LAST  262   43,3035  0 5147 0           TC     FINDVAC
 08761  REF   2  LAST  264   E3,1554                  EBANK= RRECTHIS
 08762  REF   1               43,3036   03041 1           2CADR  ATTACHIT
 08762  REF   1               43,3037   66103 0
 08763  REF   9  LAST  262   43,3040  0 5217 0           TC     ENDOFJOB

 0877   REF   5  LAST  264   43,3041  0 6006 1  ATTACHIT TC     INTPRET
 0878                        43,3042   77624 1           CALL
 0879   REF   4  LAST  259   43,3043   27442 0                  INTSTALL
 08791                       43,3044   43014 0           SET    BON
 08792  REF   1               43,3045   04064 1                  MOONOTH
 08793  REF   1               43,3046   04303 0                  MOONTHIS
 08794                       43,3047   67052 1                  +3
 08795                       43,3050   77614 1           CLEAR
 08796  REF   2  LAST  264   43,3051   04264 0                  MOONOTH
 0880                        43,3052   77776 1           EXIT
 0881   REF   1               43,3053  3 3100 0           CAF    OCT51
 0882   REF   6  LAST  228   43,3054  0 5606 1           TC     GENTRAN
 0883   REF   3  LAST  264   43,3055   01554 1           ADRES  RRECTHIS        OUR STATE VECTOR INTO OTHER VIA GENTRAN
 0884   REF   1               43,3056   01626 1           ADRES  RRECTOTH

 08845                       43,3057  0 0003 1  TACHEXIT RELINT
 088455 REF   6  LAST  264   43,3060  0 6006 1           TC     INTPRET
 088457                      43,3061   77624 1           CALL                   UPDATE RN, VN, R-OTHER, V-OTHER
 088459 REF   1               43,3062   26731 0                  PTOACSM
```

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 088461                          43,3063   45154 0           LXA,2  CALL
 088463 REF   2  LAST   89       43,3064   02150 1                  PBODY
 088465 REF   1                  43,3065   20237 0                  SVDWN1
 088467                          43,3066   77624 1           CALL
 088469 REF   1                  43,3067   20263 1                  SVDWN2
 088471                          43,3070   77776 1           EXIT

 0885   REF   1                  43,3071  3 3101 1           CAF    TCPINAD
 0886   REF   1                  43,3072  50 120 1           INDEX  FIXLOC
 0887   REF   7  LAST  233       43,3073  54 052 1           TS     QPRET
 0888   REF  14  LAST  260       43,3074  0 4701 0           TC     POSTJUMP
 0889   REF   1                  43,3075   27457 1           CADR   INTWAKE

 0890                            43,3076   77634 0  TCPIN     RTB
 0891   REF   3  LAST  238       43,3077   21272 0                  PINBRNCH

 0892                            43,3100   00051 0  OCT51     OCT    51
 0893   REF   1                  43,3101   67076 1  TCPINAD   CADR   TCPIN

R089302 VERB 47  MOVE LM STATE VECTOR INTO CM STATE VECTOR.

 089304 REF   5  LAST  264       43,3102  3 5003 1  LMTOCMSV  CAF    PRIO10
 089305 REF   9  LAST  264       43,3103  0 5147 0            TC     FINDVAC
 089306 REF   4  LAST  264       E3,1554                     EBANK= RRECTHIS
 089307 REF   1                  43,3104   03107 1           2CADR  LMTOCM
 089307 REF   1                  43,3105   66103 0
 089308 REF  10  LAST  264       43,3106  0 5217 0           TC     ENDOFJOB

 089309 REF   7  LAST  264       43,3107  0 6006 1  LMTOCM    TC     INTPRET
 08931                           43,3110   77624 1           CALL
 089312 REF   5  LAST  264       43,3111   27442 0                  INTSTALL
 089314                          43,3112   43014 0           SET    BON
 089316 REF   2  LAST  264       43,3113   04063 0                  MOONTHIS
 089318 REF   3  LAST  264       43,3114   04304 1                  MOONOTH
 08932                           43,3115   67120 0                  +3
 089322                          43,3116   77614 1           CLEAR
 089324 REF   3  LAST  265       43,3117   04263 1                  MOONTHIS
 089328                          43,3120   77776 1           EXIT

 08933  REF   2  LAST  264       43,3121  3 3100 0           CAF    OCT51
 089332 REF   7  LAST  264       43,3122  0 5606 1           TC     GENTRAN
 089334 REF   2  LAST  264       43,3123   01626 1           ADRES  RRECTOTH       LM STATE VECTOR INTO CM VIA GENTRAN
 089336 REF   5  LAST  265       43,3124   01554 1           ADRES  RRECTHIS

 089338 REF   1                  43,3125  1 3057 1           TCF    TACHEXIT

R0894   VERB 94  DO R64 VIA ENEMA TO PICK UP IN P23.

 0895   REF   1                  43,3126  3 5005 1  VERB94    CAF    V94FLBIT
 0896   REF   6  LAST  256       43,3127  7 0105 1           MASK   FLAGWRD9       IS V94FLAG SET
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 0897                          43,3130  0 0006 1          EXTEND
 0898   REF  17 LAST  261      43,3131  1 2120 1          BZF     ALM/END         NO - OPERATOR ERROR

 0899   REF  18 LAST  263      43,3132  0 5560 1          TC      DOWNFLAG
 0900   REF   1                43,3133   00213 1          ADRES   V94FLAG

 0901   REF   6 LAST  248      43,3134  0 5364 0          TC      CHECKMM         IS IT P23
 0902                          43,3135   00027 1          MM      23
 0903   REF  18 LAST  266      43,3136  0 2120 0          TC      ALM/END         NO - OPERATOR ERROR
 0904   REF   4 LAST  248      43,3137  0 5412 0          TC      PHASCHNG
 0905                          43,3140   00112 0          OCT     112             SET GROUP 2 TO DO R64

 0906   REF   1                43,3141  0 2710 0          TC      CLEANOUT        CAUSE RESTART

R0907           V90PERF       VERB 90              DESCRIPTION
R0908               REQUEST RENDEZVOUS OUT-OF-PLANE DISPLAY (R36)
R0909               1. SET EXT VERB DISPLAY BUSY FLAG.
R0910               2. SCHEDULE R36 CALL WITH PRIORITY 10
R0911                  A. DISPLAY
R0912                      TIME OF EVENT - HOURS , MINUTES , SECONDS
R0913                      Y  OUT-OF-PLANE POSITION - NAUTICAL MILES
R0914                      YDOT  OUT-OF-PLANE VELOCITY - FEET/SECOND
R0915                      PSI  ANGLE BTW LINE OF SIGHT AND FORWARD
R0916                           DIRECTION VECTOR IN HORIZONTAL PLANE - DEGREES
 0917   REF  15 LAST  263      43,3142  0 2076 1 V90PERF  TC      TESTXACT
 0918   REF   2 LAST  255      43,3143  3 5063 1          CAF     PRIO7           R36.V90
 0920   REF  10 LAST  265      43,3144  0 5147 0          TC      FINDVAC
 09205  REF   1                42,2000                   SBANK=  R36LM1
 0921   REF   2 LAST   90      E4,1726                   EBANK=  RPASS36
 0922   REF   1                43,3145   02164 0          2CADR   R36
 0922   REF   1                43,3146   40104 0
 0923   REF  11 LAST  265      43,3147  1 5217 1          TCF     ENDOFJOB
R0924   VERB 96 SET QUITFLAG TO STOP INTEGRATION.

 0930   REF  11 LAST  263      43,3150  0 5546 0 VERB96   TC      UPFLAG          QUITFLAG WILL CAUSE INTEGRATION TO EXIT
 0931   REF   1                43,3151   00221 0          ADRES   QUITFLAG            AT NEXT TIMESTEP

 09315  REF  12 LAST  266      43,3152  0 5546 0          TC      UPFLAG
 09316  REF   1                43,3153   00204 1          ADRES   V96ONFLG
 0932   REF  25 LAST  246      43,3154  3 5021 1          CAF     ZERO
 0933   REF  15 LAST  265      43,3155  0 4701 0          TC      POSTJUMP
 0934   REF   1                43,3156   10011 0          CADR    V37             GO TO POO

 0949   REF   5 LAST  213      E5,1751                   EBANK=  LANDMARK
 0950   REF   7 LAST  266      43,3157  0 5364 0 V32      TC      CHECKMM         IS P22 OPERATING
 0951                          43,3160   00026 0          MM      22
 0952   REF  19 LAST  266      43,3161  0 2120 0          TC      ALM/END         NO
 09521  REF   1                43,3162  3 3200 0          CAF     LANDBANK
 09522  REF  14 LAST  259      43,3163  54 003 0          TS      EBANK
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 0953   REF   3  LAST  266   43,3164  4 5063 0          CS     PRIO7          YES  SET BITS 12,11,10 OF LANDMARK =
 0954   REF   6  LAST  266   43,3165  7 1751 1          MASK   LANDMARK             BITS 14,13,12 OF MARKSTAT AFTER
 0955   REF   7  LAST  267   43,3166  55'751 1          TS     LANDMARK             SUBT. THEM FROM 5 TO GET OFFSET
 0956   REF  25  LAST  233   43,3167  3 1330 0          CA     MARKSTAT             MARK NO.
 0957   REF   1              43,3170  54 021 0          TS     SR
 0958   REF   2  LAST  267   43,3171  3 0021 1          CA     SR
 0959   REF   3  LAST  267   43,3172  3 0021 1          CA     SR
 0960   REF   4  LAST  267   43,3173  7 5063 0          MASK   PRIO7
 09601  REF  70  LAST  253   43,3174  4 0000 0          CS     A
 0961   REF   4  LAST  255   43,3175  6 5061 0          AD     PRIO5
 0962   REF   8  LAST  267   43,3176  27'751 1          ADS    LANDMARK
 0963   REF  24  LAST  264   43,3177  0 2121 1          TC     GOPIN
 09631  REF   9  LAST  267   43,3200   02751 0  LANDBANK ECADR  LANDMARK
R2000

R20001  VERB 67  ASTRONAUT DISPLAY OF W MATRIX

 20002  REF  16  LAST  266   43,3201  0 2076 1  V67      TC     TESTXACT
 2001   REF   5  LAST  267   43,3202  3 5061 0           CAF    PRIO5
 2003   REF  11  LAST  266   43,3203  0 5147 0           TC     FINDVAC
 2004   REF   4  LAST   93   E5,1400                     EBANK= W
 2005   REF   1              43,3204   03624 1          2CADR  V67CALL
 2005   REF   1              43,3205   60105 0
 2006   REF  12  LAST  266   43,3206  0 5217 0           TC     ENDOFJOB
R2007   VB 44.   SET SURFACE FLAG.

 2008   REF  13  LAST  266   43,3207  0 5546 0  SETSURF  TC     UPFLAG
 2009   REF   2  LAST  210   43,3210   00177 0          ADRES  SURFFLAG
 2010   REF  25  LAST  267   43,3211  1 2121 0          TCF    GOPIN

R2011   VB 45.     RESET SURFACE FLAG.

 2012   REF  19  LAST  266   43,3212  0 5560 1  RESTSRF  TC     DOWNFLAG
 2013   REF   3  LAST  267   43,3213   00177 0          ADRES  SURFFLAG
 2014   REF  26  LAST  267   43,3214  1 2121 0          TCF    GOPIN
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L PINBALL NOUN TABLES USER'S PAGE NO. 1 E0 S4

P1000 THE FOLLOWING REFERS TO THE NOUN TABLES

R1001 COMPONENT CODE NUMBER INTERPRETATION

R1002 00000 1 COMPONENT
R1003 00001 2 COMPONENT
R1004 00010 3 COMPONENT
R1005 X1XXX BIT4 = 1. DECIMAL ONLY
R1006 1XXXX BIT5 = 1. NO LOAD
R1007 END OF COMPONENT CODE NUMBERS

R1008 SF ROUTINE CODE NUMBER INTERPRETATION

R1009 00000 OCTAL ONLY
R1010 00001 STRAIGHT FRACTIONAL
R1011 00010 CDU DEGREES (XXX.XX)
R1012 00011 ARITHMETIC SF
R1013 00100 ARITH DP1 OUT(MULT BY 2EXP14 AT END) IN(STRAIGHT)
R1014 00101 ARITH DP2 OUT(STRAIGHT) IN(SL 7 AT END)
R1015 00110 Y OPTICS DEGREES (XX.XXX MAX 89.999)
R1016 00111 ARITH DP3 OUT (SL 7 AT END) IN (STRAIGHT)
R1017 01000 WHOLE HOURS IN R1, WHOLE MINUTES (MOD 60) IN R2,
R1018 SECONDS (MOD 60) OXX.XX IN R3. *** ALARMS IF USED WITH OCTAL
R1019 01001 MINUTES (MOD 60) IN D1D2, D3 BLANK, SECONDS (MOD 60) IN D4D5
R1020 LIMITS TO 59859 IF MAG EXCEEDS THIS VALUE.
R1021 ALARMS IF USED WITH OCTAL ******** IN (ALARM)
R1022 01010 ARITH DP4 OUT (STRAIGHT) IN (SL 3 AT END)
R10221 01011 ARITH1 SF OUT(MULT BY 2EXP14 AT END) IN(STRAIGHT)
R10222 01100 2 INTEGERS IN D1D2, D4D5, D3 BLANK.
R10223 ALARMS IF USED WITH OCTAL ******** IN (ALARM)
R10224 01101 DP STRAIGHT FRACTIONAL
R1023 END OF SF ROUTINE CODE NUMBERS

R1024 SF CONSTANT CODE NUMBER INTERPRETATION

R1025 00000 WHOLE USE ARITH
R1026 00000 DP TIME SEC (XXX.XX SEC) USE ARITHDP1
R1027 00001 SPARE
R1028 00010 CDU DEGREES USE CDU DEGREES
R1029 00010 Y OPTICS DEGREES USE Y OPTICS DEGREES
R1030 00011 DP DEGREES (90) XX.XXX DEG USE ARITHDP3
R1031 00100 DP DEGREES (360) XXX.XX DEG USE ARITHDP4
R1032 00101 DEGREES (180) XXX.XX DEG USE ARITH
R1034 00110 WEIGHT2 (XXXXX. LBS) USE ARITH1
R1035 00111 POSITION5 (XXX.XX NAUTICAL MILES)
R10351 USE ARITHDP3
R1037 01000 POSITION4 (XXXX.X NAUTICAL MILES)

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R10371                                                  USE ARITHDP3
R1038   01001                   VELOCITY2 (XXXXX. FT/SEC)   USE ARITHDP4
R1039   01010                   VELOCITY3 (XXXX.X FT/SEC)   USE ARITHDP3
R1040   01011                   ELEVATION DEGREES(89.999MAX) USE ARITH
R10401  01100                   TRIM DEGREES (XXX.XX DEG)   USE ARITH
R10402  01101                   INERTIA (XXXXXBB. SLUG FT FT)  USE ARITH
R104025 01101                   THRUST MOMENT (XXXXXBB.FT LBS) USE ARITH
R10403  01110                   VELOCITY/2VS (XXXXX. FT/SEC)USE ARITHDP4
R10404  01111                   POSITION6 (XXXX.X NAUT MI)  USE ARITHDP3
R10405  10000                   DRAG ACCELERATION (XXX.XX G)USE ARITHDP2
R10406  10001                   POSITION8 (XXXX.X NAUT MI)  USE ARITHDP3
R10407  10010                   POSITION9 (XXXXX. FT)       USE ARITHDP3
R10408  10011                   VELOCITY4 (XXXX.X FT/SEC)   USE ARITHDP2
R1041   END OF SF CONSTANT CODE NUMBERS


R1042   FOR GREATER THAN SINGLE PRECISION SCALES, PUT ADDRESS OF MAJOR PART INTO
R1043   NOUN TABLES.
R1044   OCTAL LOADS PLACE +0 INTO MAJOR PART, DATA INTO MINOR PART.
R1045   OCTAL DISPLAYS SHOW MINOR PART ONLY.
R1046   TO GET AT BOTH MAJOR AND MINOR PARTS(IN OCTAL), USE NOUN 01.

R1047   A NOUN MAY BE DECLARED :DECIMAL ONLY: BY MAKING BIT4=1 OF ITS COMPONENT
R1048   CODE NUMBER. IF THIS NOUN IS USED WITH ANY OCTAL DISPLAY VERB, OR IF
R1049   DATA IS LOADED IN OCTAL, IT ALARMS.

R1050   IN LOADING AN :HOURS, MINUTES, SECONDS: NOUN, ALL 3 WORDS MUST BE
R1051   LOADED, OR ALARM.
R1052   ALARM IF AN ATTEMPT IS MADE TO LOAD :SPLIT MINUTES/SECONDS: (MMBSS).
R1053   THIS IS USED FOR DISPLAY ONLY.
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P1054   THE FOLLOWING ROUTINES ARE FOR READING THE NOUN TABLES AND THE SF TABLES
R1055   (WHICH ARE IN A SEPARATE BANK FROM THE REST OF PINBALL). THESE READING
R1056   ROUTINES ARE IN THE SAME BANK AS THE TABLES. THEY ARE CALLED BY DXCH Z.


R1057   LODNNTAB LOADS NNADTEM WITH THE NNADTAB ENTRY, NNTYPTEM WITH THE
R1058   NNTYPTAB ENTRY. IF THE NOUN IS MIXED, IDAD1TEM IS LOADED WITH THE FIRST
R1059   IDADDTAB ENTRY, IDAD2TEM THE SECOND IDADDTAB ENTRY, IDAD3TEM THE THIRD
R1060   IDADDTAB ENTRY, RUTMXTEM WITH THE RUTMXTAB ENTRY. MIXBR IS SET FOR
R1061   MIXED OR NORMAL NOUN.

 1200                          06,3262                          BANK   06
 120001 REF   1                42,2000                          SETLOC PINBALL3
 120002                        42,2062                          BANK

 12001  REF   1                                                 COUNT  42/NOUNS

 1201   REF   1                42,2062  52 152 0  LODNNTAB DXCH   IDAD2TEM       SAVE RETURN INFO IN IDAD2TEM, IDAD3TEM.
 1202   REF   3  LAST  239     42,2063  51'002 1           INDEX  NOUNREG
 1203   REF   1                42,2064  3 2133 1           CAF    NNADTAB
 1204   REF   1                42,2065  54 146 0           TS     NNADTEM
 1205   REF   4  LAST  270     42,2066  51'002 1           INDEX  NOUNREG
 1206   REF   1                42,2067  3 2277 1           CAF    NNTYPTAB
 1207   REF   1                42,2070  54 147 1           TS     NNTYPTEM
 1208   REF   5  LAST  270     42,2071  4 1002 0           CS     NOUNREG
 1209   REF   1                42,2072  6 5033 1           AD     MIXCON
 1210                          42,2073  0 0006 1           EXTEND
 1211   REF   1                42,2074  6 2100 1           BZMF   LODMIXNN        NOUN NUMBER G/E FIRST MIXED NOUN
 1212   REF   12 LAST  242     42,2075  3 5017 1           CAF    ONE             NOUN NUMBER L/ FIRST MIXED NOUN
 1213   REF   1                42,2076  54 140 0           TS     MIXBR           NORMAL.  +1 INTO MIXBR.
 1214   REF   1                42,2077  0 2116 0           TC     LODNLV
 1215   REF   6  LAST  249     42,2100  3 5016 0  LODMIXNN CAF    TWO             MIXED.  +2 INTO MIXBR.
 1216   REF   2  LAST  270     42,2101  54 140 0           TS     MIXBR
 1217   REF   6  LAST  270     42,2102  51'002 1           INDEX  NOUNREG
 1218   REF   1                42,2103  3 2777 1           CAF    RUTMXTAB -40D   FIRST MIXED NOUN = 40.
 1219   REF   1                42,2104  54 153 1           TS     RUTMXTEM
 1220   REF   3  LAST  202     42,2105  3 5054 0           CAF    LOW10
 1221   REF   2  LAST  270     42,2106  7 0146 0           MASK   NNADTEM
 1222   REF   30 LAST  261     42,2107  54 002 1           TS     Q               TEMP
 1223   REF   71 LAST  267     42,2110  50 000 1           INDEX  A
 1224   REF   1                42,2111  3 2563 0           CAF    IDADDTAB
 1225   REF   1                42,2112  54 150 1           TS     IDAD1TEM        LOAD IDAD1TEM WITH FIRST IDADDTAB ENTRY
 1226                          42,2113  0 0006 1           EXTEND
 1227   REF   31 LAST  270     42,2114  5 0002 0           INDEX  Q               LOAD IDAD2TEM WITH 2ND IDADDTAB ENTRY
 1228   REF   2  LAST  270     42,2115  3 2565 0           DCA    IDADDTAB +1     LOAD IDAD3TEM WITH 3RD IDADDTAB ENTRY.
 1229   REF   2  LAST  270     42,2116  52 152 0  LODNLV   DXCH   IDAD2TEM       PUT RETURN INFO INTO A, L.
 1230   REF   1                42,2117  52 006 0           DXCH   Z

 1231   REF   2  LAST  249       5033           MIXCON   =      OCT50           FIRST MIXED NOUN =40.  (DEC 40)
R1232   GTSFOUT LOADS SFTEMP1, SFTEMP2 WITH THE DP SFOUTAB ENTRIES.
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```
 1233   REF   1              42,2120  52 124 1  GTSFOUT  DXCH   SFTEMP1        2X(SFCONUM) ARRIVES IN SFTEMP1.
 1234                        42,2121  0 0006 1           EXTEND
 1235   REF  72  LAST  270   42,2122  5 0000 1           INDEX  A
 1236   REF   1              42,2123  3 2514 0           DCA    SFOUTAB
 1237   REF   2  LAST  271   42,2124  52 124 1  SFCOM    DXCH   SFTEMP1
 1238   REF   2  LAST  270   42,2125  52 006 0           DXCH   Z

R1239   GTSFIN LOADS SFTEMP1, SFTEMP2 WITH THE DP SFINTAB ENTRIES.

 1240   REF   3  LAST  271   42,2126  52 124 1  GTSFIN   DXCH   SFTEMP1        2X(SFCONUM) ARRIVES IN SFTEMP1.
 1241                        42,2127  0 0006 1           EXTEND
 1242   REF  73  LAST  271   42,2130  5 0000 1           INDEX  A
 1243   REF   1              42,2131  3 2444 1           DCA    SFINTAB
 1244   REF   1              42,2132  1 2124 0           TCF    SFCOM

A1400                                                                  NN  NORMAL NOUNS
 1401                        42,2133   00000 1  NNADTAB  OCT    00000          00 NOT IN USE
 1402                        42,2134   40000 0           OCT    40000          01 SPECIFY MACHINE ADDRESS (FRACTIONAL)
 1403                        42,2135   40000 0           OCT    40000          02 SPECIFY MACHINE ADDRESS (WHOLE)
 1404                        42,2136   40000 0           OCT    40000          03 SPECIFY MACHINE ADDRESS (DEGREES)
 1405                        42,2137   00000 1           OCT    0              04 SPARE
 1406   REF   3  LAST  233   42,2140   01045 1           ECADR  DSPTEM1        05 ANGULAR ERROR/DIFFERENCE
 1407   REF   1              42,2141   01131 0           ECADR  OPTION1        06 OPTION CODE
 1408   REF   1              42,2142   01003 0           ECADR  XREG           07 ECADR OF WORD TO BE MODIFIED
A14081                                                                            ONES FOR BITS TO BE MODIFIED
A14082                                                                            1 TO SET OR 0 TO RESET SELECTED BITS
 1409   REF   2  LAST   82   42,2143   01363 0           ECADR  ALMCADR        08 ALARM DATA
 1410   REF   4  LAST  183   42,2144   00375 0           ECADR  FAILREG        09 ALARM CODES
 1411                        42,2145   77776 1           OCT    77776          10 CHANNEL TO BE SPECIFIED
 1412   REF   2  LAST  101   42,2146   02636 0           ECADR  TCSI           11 TIG OF CSI (HRS,MIN,SEC)
 1413   REF   1              42,2147   01051 1           ECADR  OPTIONX        12 OPTION CODE
A14131                                                                                (USED BY EXTENDED VERBS ONLY)
 1414   REF   3  LAST  175   42,2150   02634 1           ECADR  TCDH           13 TIG OF CDH (HRS,MIN,SEC)
 1415                        42,2151   00000 1           OCT    0              14 SPARE
 1416                        42,2152   77777 0           OCT    77777          15 INCREMENT MACHINE ADDRESS
 1417   REF   2  LAST   76   42,2153   01051 1           ECADR  DSPTEMX        16 TIME OF EVENT (HRS,MIN,SEC)
 1418   REF   3  LAST  244   42,2154   01333 0           ECADR  CPHIX          17 ASTRONAUT TOTAL ATTITUDE
 1419   REF   7  LAST  250   42,2155   01155 1           ECADR  THETAD         18 AUTO MANEUVER BALL ANGLES
 1420   REF   8  LAST  271   42,2156   01155 1           ECADR  THETAD         19 BYPASS ATTITUDE TRIM MANEUVER
 1421   REF   5  LAST  244   42,2157   00032 0           ECADR  COUX           20 ICDU ANGLES
 1422   REF   1              42,2160   00037 0           ECADR  PIPAX          21 PIPAS
 1423   REF   9  LAST  271   42,2161   01155 1           ECADR  THETAD         22 NEW ICDU ANGLES
 1424                        42,2162   00000 1           OCT    00000          23 SPARE
 1425   REF   3  LAST  246   42,2163   01051 1           ECADR  DSPTEM2 +1     24 DELTA TIME FOR AGC CLOCK(HRS,MIN,SEC)
 1426   REF   4  LAST  271   42,2164   01045 1           ECADR  DSPTEM1        25 CHECKLIST
A14261                                                                                (USED WITH PLEASE PERFORM ONLY)
 1427   REF   5  LAST  271   42,2165   01045 1           ECADR  DSPTEM1        26 PRIO/DELAY, ADRES, BBCON
 1428   REF   4  LAST  263   42,2166   01362 1           ECADR  SMODE          27 SELF TEST ON/OFF SWITCH
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 1429                          42,2167   00000 1          OCT    0          28 SPARE
 1430   REF   6  LAST  271     42,2170   01045 1          ECADR  DSPTEM1     29 XSM LAUNCH AZIMUTH
 1431   REF   7  LAST  272     42,2171   01045 1          ECADR  DSPTEM1     30 TARGET CODES
 1432   REF   8  LAST  272     42,2172   01045 1          ECADR  DSPTEM1     31 TIME OF LANDING SITE (HRS,MIN,SEC)
 1433   REF   2  LAST   90     42,2173   02345 1          ECADR  -TPER       32 TIME TO PERIGEE (HRS,MIN,SEC)
 1434   REF  15  LAST  219     42,2174   03412 0          ECADR  TIG         33 TIME OF IGNITION (HRS,MIN(SEC)
 1435   REF   9  LAST  272     42,2175   01045 1          ECADR  DSPTEM1     34 TIME OF EVENT (HRS,MIN,SEC)
 1436   REF   3  LAST  218     42,2176   03660 1          ECADR  TTOGO       35 TIME TO GO TO EVENT (HRS,MIN,SEC)
 1437   REF   9  LAST  246     42,2177   00024 1          ECADR  TIME2       36 TIME OF AGC CLOCK (HRS,MIN,SEC)
 1438   REF   3  LAST  175     42,2200   03662 0          ECADR  TTPI        37 TIG OF TPI (HRS,MIN,SEC)
 1439   REF   2  LAST   85     42,2201   01516 1          ECADR  TET         38 TIME OF STATE VECTOR
 1440   REF   1                42,2202   02640 1          ECADR  T3TOT4      39 DELTA TIME TO TRANSFER (HRS,MIN,SEC)
R14401  END OF NNADTAB FOR NORMAL NOUNS

A14402                                                                      NN  MIXED NOUNS
 1441                          42,2203   64000 0          OCT    64000      40 TIME TO IGNITION/CUTOFF
A14411                                                                         VG
A14412                                                                         DELTA V (ACCUMULATED)
 1442                          42,2204   02003 0          OCT    02003      41 TARGET  AZIMUTH
A14421                                                                                  ELEVATION
 1443                          42,2205   24006 1          OCT    24006      42 APOGEE
A14431                                                                         PERIGEE
A14432                                                                         DELTA V (REQUIRED)
 1444                          42,2206   24011 1          OCT    24011      43 LATITUDE
A14441                                                                         LONGITUDE
A14442                                                                         ALTITUDE
 1445                          42,2207   64014 0          OCT    64014      44 APOGEE
A14451                                                                         PERIGEE
A14452                                                                         TFF
 1446                          42,2210   64017 0          OCT    64017      45 MARKS (VHF - OPTICS)
A14461                                                                         TTI OF NEXT BURN
A14462                                                                         MGA
 1447                          42,2211   02022 0          OCT    02022      46 AUTOPILOT CONFIGURATION
 1448                          42,2212   22025 0          OCT    22025      47 THIS VEHICLE WEIGHT
A14481                                                                         OTHER VEHICLE WEIGHT
 1449                          42,2213   22030 1          OCT    22030      48 PITCH TRIM
A14491                                                                         YAW TRIM
 1450                          42,2214   24033 1          OCT    24033      49 DELTA R
A14501                                                                         DELTA V
A14502                                                                         VHF OR OPTICS CODE
 1451                          42,2215   64036 0          OCT    64036      50 SPLASH ERROR
A14511                                                                         PERIGEE
A14512                                                                         TFF
 1452                          42,2216   22041 1          OCT    22041      51 S-BAND ANTENNA PITCH
A14521                                                                                  YAW
 1453                          42,2217   00044 1          OCT    00044      52 CENTRAL ANGLE OF ACTIVE VEHICLE
 1454                          42,2220   24047 1          OCT    24047      53 RANGE
A14541                                                                         RANGE RATE
A14542                                                                         PHI
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 1455                    42,2221   24052 0          OCT    24052          54 RANGE
A14551                                                                      RANGE RATE
A14552                                                                      THETA
 1458                    42,2222   24055 1          OCT    24055          55 PERIGEE CODE
A14581                                                                      ELEVATION ANGLE
A14582                                                                      CENTRAL ANGLE
 1459                    42,2223   22060 1          OCT    22060          56 REENTRY ANGLE,
A14591                                                                      DELTA V
 1460                    42,2224   20063 0          OCT    20063          57 DELTA R
 1461                    42,2225   24066 1          OCT    24066          58 PERIGEE ALT
A14611                                                                      DELTA V TPI
A14612                                                                      DELTA V TPF
 1462                    42,2226   24071 1          OCT    24071          59 DELTA VELOCITY LOS
 1463                    42,2227   24074 1          OCT    24074          60 GMAX
A14631                                                                      VPRED
A14632                                                                      GAMMA EI
 1464                    42,2230   24077 1          OCT    24077          61 IMPACT LATITUDE
A14641                                                                      IMPACT LONGITUDE
A14642                                                                      HEADS UP/DOWN
 1465                    42,2231   24102 1          OCT    24102          62 INERTIAL VEL MAG (VI)
A14651                                                                      ALT RATE CHANGE (HDOT)
A14652                                                                      ALT ABOVE PAD RADIUS (H)
 1466                    42,2232   64105 1          OCT    64105          63 RANGE  297,431 TO SPLASH (RTGO)
A14661                                                                      PREDICTED INERT VEL (VIO)
A14662                                                                      TIME TO GO TO 297,431 (TTE)
 1467                    42,2233   24110 1          OCT    24110          64 DRAG ACCELERATION
A14671                                                                      INERTIAL VELOCITY (VI)
A14672                                                                      RANGE TO SPLASH
 1468                    42,2234   24113 1          OCT    24113          65 SAMPLED AGC TIME (HRS,MIN,SEC)
A14681                                                                      (FETCHED IN INTERRUPT)
 1470                    42,2235   24116 1          OCT    24116          66 COMMAND BANK ANGLE (BETA)
A14701                                                                      CROSS RANGE ERROR
A14702                                                                      DOWN RANGE ERROR
 1471                    42,2236   24121 0          OCT    24121          67 RANGE TO TARGET
A14711                                                                      PRESENT LATITUDE
A14712                                                                      PRESENT LONGITUDE
 1472                    42,2237   24124 0          OCT    24124          68 COMMAND BANK ANGLE (BETA)
A14721                                                                      INERTIAL VELOCITY (VI)
A14722                                                                      ALT RATE CHANGE (RDOT)
 1473                    42,2240   24127 0          OCT    24127          69 BETA
A14731                                                                      DL
A14732                                                                      VL
 1474                    42,2241   04132 0          OCT    04132          70 STAR CODE
A14741                                                                      LANDMARK DATA
A14742                                                                      HORIZON DATA
 1475                    42,2242   04135 1          OCT    04135          71 STAR CODE
A14751                                                                      LANDMARK
A14752                                                                      HORIZON
 1476                    42,2243   24140 1          OCT    24140          72 DELT ANG
A14761                                                                      DELT ALT
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A14762                                                          SEARCH OPTION
 1477                  42,2244   04143 0        OCT    04143   73 ALTITUDE
A14771                                                          VELOCITY
A14772                                                          FLIGHT PATH ANGLE
 1478                  42,2245   04145 0        OCT    04146   74 COMMAND BANK ANGLE (BETA)
A14781                                                          INERTIAL VELOCITY (VI)
A14782                                                          DRAG ACCELERATION
 1479                  42,2246   64151 0        OCT    64151   75 DELTA ALTITUDE CDH
A14791                                                          DELTA TIME (CDH-CSI OR TPI-CDH)
A14792                                                          DELTA TIME (TPI-CDH OR TPI-NOMTPI)
 1480                  42,2247   00000 1        OCT    0       76 SPARE
 1481                  42,2250   00000 1        OCT    0       77 SPARE
 1482                  42,2251   00000 1        OCT    0       78 SPARE
 1483                  42,2252   00000 1        OCT    0       79 SPARE
 1484                  42,2253   64170 0        OCT    64170   80 TIME TO IGNITION/CUTOFF
A14841                                                          VG
A14842                                                          DELTA V (ACCUMULATED)
 1485                  42,2254   24173 1        OCT    24173   81 DELTA V (LV)
 1486                  42,2255   24176 1        OCT    24176   82 DELTA V (LV)
 1487                  42,2256   24201 1        OCT    24201   83 DELTA V (BODY)
 1488                  42,2257   24204 1        OCT    24204   84 DELTA V (OTHER VEHICLE)
 1489                  42,2260   24207 1        OCT    24207   85 VG (BODY)
 1490                  42,2261   24212 0        OCT    24212   86 DELTA V (LV)
 1491                  42,2262   02215 0        OCT    02215   87 MARK DATA  SHAFT
A14911                                                                TRUNION
 1492                  42,2263   24220 1        OCT    24220   88 HALF UNIT SUN OR PLANET VECTOR
 1493                  42,2264   24223 1        OCT    24223   89 LANDMARK  LATITUDE
A14931                                                                LONGITUDE/2
A14932                                                                ALTITUDE
 1494                  42,2265   24226 1        OCT    24226   90 Y
A14941                                                          Y DOT
A14942                                                          PSI
 1495                  42,2266   02231 0        OCT    02231   91 OCDU ANGLES  SHAFT
A14951                                                                TRUNION
 1496                  42,2267   02234 0        OCT    02234   92 NEW OPTICS ANGLES  SHAFT
A14961                                                                TRUNION
 1497                  42,2270   04237 0        OCT    04237   93 DELTA GYRO ANGLES
 1498                  42,2271   02242 1        OCT    02242   94 NEW OPTICS ANGLES  SHAFT
A14981                                                                TRUNNION
 1499                  42,2272   04245 0        OCT    04245   95 PREFERRED ATTITUDE ICDU ANGLES
 1500                  42,2273   04250 1        OCT    04250   96 +X-AXIS ATTITUDE ICDU ANGLES
 1501                  42,2274   04253 1        OCT    04253   97 SYSTEM TEST INPUTS
 1502                  42,2275   04256 1        OCT    04256   98 SYSTEM TEST RESULTS
 1503                  42,2276   24261 1        OCT    24261   99 RMS IN POSITION
A15031                                                          RMS IN VELOCITY
A15032                                                          RMS OPTION
R1504   END OF NNADTAB FOR MIXED NOUNS


A1800                                                   NN      NORMAL NOUNS
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 1801                    42,2277   00000 1  NNTYPTAB OCT    00000          00 NOT IN USE
 1802                    42,2300   04040 1           OCT    04040          01 3COMP  FRACTIONAL
 1803                    42,2301   04140 0           OCT    04140          02 3COMP  WHOLE
 1804                    42,2302   04102 0           OCT    04102          03 3COMP  CDU DEGREES
 1805                    42,2303   00000 1           OCT    0              04 SPARE
 1806                    42,2304   00504 0           OCT    00504          05 1COMP  DPDEG(360)
 1807                    42,2305   02000 0           OCT    02000          06 2COMP  OCTAL ONLY
 1808                    42,2306   04000 0           OCT    04000          07 3COMP  OCTAL ONLY
 1809                    42,2307   04000 0           OCT    04000          08 3COMP  OCTAL ONLY
 1810                    42,2310   04000 0           OCT    04000          09 3COMP  OCTAL ONLY
 1811                    42,2311   00000 1           OCT    00000          10 1COMP  OCTAL ONLY
 1812                    42,2312   24400 0           OCT    24400          11 3COMP  HMS (DEC ONLY)
 1813                    42,2313   02000 0           OCT    02000          12 2COMP  OCTAL ONLY
 1814                    42,2314   24400 0           OCT    24400          13 3COMP  HMS (DEC ONLY)
 1815                    42,2315   00000 1           OCT    0              14 SPARE
 1816                    42,2316   00000 1           OCT    00000          15 1COMP  OCTAL ONLY
 1817                    42,2317   24400 0           OCT    24400          16 3COMP  HMS (DEC ONLY)
 1818                    42,2320   04102 0           OCT    04102          17 3COMP  CDU DEG
 1819                    42,2321   04102 0           OCT    04102          18 3COMP  CDU DEG
 1820                    42,2322   04102 0           OCT    04102          19 3COMP  CDU DEG
 1821                    42,2323   04102 0           OCT    04102          20 3COMP  CDU DEGREES
 1822                    42,2324   04140 0           OCT    04140          21 3COMP  WHOLE
 1823                    42,2325   04102 0           OCT    04102          22 3COMP  CDU DEGREES
 1824                    42,2326   00000 1           OCT    00000          23        SPARE
 1825                    42,2327   24400 0           OCT    24400          24 3COMP  HMS (DEC ONLY)
 1826                    42,2330   04140 0           OCT    04140          25 3COMP  WHOLE
 1827                    42,2331   04000 0           OCT    04000          26 3COMP  OCTAL ONLY
 1828                    42,2332   00140 1           OCT    00140          27 1COMP  WHOLE
 1829                    42,2333   00000 1           OCT    0              28        SPARE
 1830                    42,2334   20102 0           OCT    20102          29 1COMP  CDU DEG (DEC ONLY)
 1831                    42,2335   04140 0           OCT    04140          30 3COMP  WHOLE
 1832                    42,2336   24400 0           OCT    24400          31 3COMP  HMS (DEC ONLY)
 1833                    42,2337   24400 0           OCT    24400          32 3COMP  HMS (DEC ONLY)
 1834                    42,2340   24400 0           OCT    24400          33 3COMP  HMS (DEC ONLY)
 1835                    42,2341   24400 0           OCT    24400          34 3COMP  HMS (DEC ONLY)
 1836                    42,2342   24400 0           OCT    24400          35 3COMP  HMS (DEC ONLY)
 1837                    42,2343   24400 0           OCT    24400          36 3COMP  HMS (DEC ONLY)
 1838                    42,2344   24400 0           OCT    24400          37 3COMP  HMS (DEC ONLY)
 1839                    42,2345   24400 0           OCT    24400          38 3COMP  HMS (DEC ONLY)
 1840                    42,2346   24400 0           OCT    24400          39 3COMP  HMS (DEC ONLY)
R18401  END OF NNTYPTAB FOR NORMAL NOUNS


A18402                                                                    NN   MIXED NOUNS
 1841                    42,2347   24500 1           OCT    24500          40 3COMP  MIN/SEC, VEL3, VEL3
A18411                                                                                (NO LOAD, DEC ONLY)
 1842                    42,2350   00542 1           OCT    00542          41 2COMP  CDU DEG, ELEV DEG
 1843                    42,2351   24410 1           OCT    24410          42 3COMP  POS4, POS4, VEL3
A18431                                                                                (DEC ONLY)
 1844                    42,2352   20204 0           OCT    20204          43 3COMP  DPDEG(360), DPDEG(360), POS4
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A18441
 1845                  42,2353   00410 1        OCT    00410          44 3COMP  (DEC ONLY)
                                                                                 POS4, POS4, MIN/SEC
A18451
 1846                  42,2354   10000 0        OCT    10000          45 3COMP  (NO LOAD, DEC ONLY)
                                                                                 2INT, MIN/SEC, DPDEG(360)
A18461
 1847                  42,2355   00000 1        OCT    00000          46 2COMP  (NO LOAD, DEC ONLY)
                                                                                 OCTAL ONLY FOR EACH
 1848                  42,2356   00306 1        OCT    00306          47 2COMP  WEIGHT2 FOR EACH
A18481
 1849                  42,2357   00614 1        OCT    00614          48 2COMP  (DEC ONLY)
                                                                                 TRIM DEG, TRIM DEG
A18491
 1850                  42,2360   00510 0        OCT    00510          49 3COMP  (DEC ONLY)
                                                                                 POS4, VEL3, WHOLE
A18501
 1851                  42,2361   00417 0        OCT    00417          50 3COMP  (DEC ONLY)
                                                                                 POS6, POS4, MIN/SEC
A18511
 1852                  42,2362   00204 1        OCT    00204          51 2COMP  (NO LOAD, DEC ONLY)
                                                                                 DPDEG(360), DPDEG(360)
A18521
 1853                  42,2363   00004 0        OCT    00004          52 1COMP  (DEC ONLY)
                                                                                 DPDEG(360)
 1854                  42,2364   10507 1        OCT    10507          53 3COMP  POS5, VEL3, DPDEG(360)
A18541
 1855                  42,2365   10507 1        OCT    10507          54 3COMP  (DEC ONLY)
                                                                                 POS5, VEL3, DPDEG(360)
A18551
 1858                  42,2366   10200 1        OCT    10200          55 3COMP  (DEC ONLY)
                                                                                 WHOLE, DPDEG(360), DPDEG(360)
A18581
 1859                  42,2367   00444 0        OCT    00444          56 2COMP  (DEC ONLY)
                                                                                 DPDEG(360), VEL2
A18591
 1860                  42,2370   00010 0        OCT    00010          57 1COMP  (DEC ONLY)
                                                                                 POS4
A18601
 1861                  42,2371   24510 0        OCT    24510          58 3COMP  (DEC ONLY)
                                                                                 POS4, VEL3, VEL3
A18611
 1862                  42,2372   24512 1        OCT    24512          59 3COMP  (DEC ONLY)
                                                                                 VEL3 FOR EACH
A18621
 1863                  42,2373   10440 0        OCT    10440          60 3COMP  (DEC ONLY)
                                                                                 WHOLE, VEL2, DPDEG(360)
A18631
 1864                  42,2374   00204 1        OCT    00204          61 3COMP  (DEC ONLY)
                                                                                 DPDEG(360), DPDEG(360), WHOLE
A18641
 1865                  42,2375   20451 0        OCT    20451          62 3COMP  (DEC ONLY)
                                                                                 VEL2, VEL2, POS4
A18651
 1866                  42,2376   00457 1        OCT    00457          63 3COMP  (DEC ONLY)
                                                                                 POS6, VEL2, MIN/SEC
A18661
 1867                  42,2377   36460 0        OCT    36460          64 3COMP  (NO LOAD, DEC ONLY)
                                                                                 DRAG ACCEL, VEL2, POS6
A18671
 1868                  42,2400   00000 1        OCT    00000          65 3COMP  (DEC ONLY)
                                                                                 HMS (DEC ONLY)
 1869                  42,2401   37044 0        OCT    37044          66 3COMP  DPDEG(360), POS8, POS6
A18691
 1870                  42,2402   10217 1        OCT    10217          67 3COMP  (DEC ONLY)
                                                                                 POS6, DPDEG(360), DPDEG(360)
A18701
 1871                  42,2403   34444 1        OCT    34444          68 3COMP  (DEC ONLY)
                                                                                 DPDEG(360), VEL2, VEL/2VS
A18711
 1872                  42,2404   35004 0        OCT    35004          69 3COMP  (DEC ONLY)
                                                                                 DPDEG(360), DRAG ACCEL,VEL/2VS
A18721                                                                           (DEC ONLY)
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 1873                    42,2405   00000 1        OCT    00000          70 3COMP  OCTAL ONLY FOR EACH
 1874                    42,2406   00000 1        OCT    0              71 3COMP  OCTAL ONLY FOR EACH
 1875                    42,2407   00404 1        OCT    00404          72 3COMP  DPDEG(360), POS4, WHOLE
A18751                                                                            (DEC ONLY)
 1876                    42,2410   10450 1        OCT    10450          73 3COMP  POS4, VEL2, DPDEG(360)
 1877                    42,2411   40444 1        OCT    40444          74 3COMP  DPDEG(360), VEL2, DRAG ACCEL
 1878                    42,2412   00010 0        OCT    00010          75 3COMP  POS4, MIN/SEC, MIN/SEC
A18781                                                                            (NO LOAD, DEC ONLY)
 1879                    42,2413   00000 1        OCT    0              76        SPARE
 1880                    42,2414   00000 1        OCT    0              77        SPARE
 1881                    42,2415   00000 1        OCT    0              78        SPARE
 1882                    42,2416   00000 1        OCT    0              79        SPARE
 1883                    42,2417   22440 1        OCT    22440          80 3COMP  MIN/SEC, VEL2, VEL2
A18831                                                                            (NO LOAD, DEC ONLY)
 1884                    42,2420   24512 1        OCT    24512          81 3COMP  VEL3 FOR EACH
A18841                                                                            (DEC ONLY)
 1885                    42,2421   24512 1        OCT    24512          82 3COMP  VEL3 FOR EACH
A18851                                                                            (DEC ONLY)
 1886                    42,2422   24512 1        OCT    24512          83 3COMP  VEL3 FOR EACH
A18861                                                                            (DEC ONLY)
 1887                    42,2423   24512 1        OCT    24512          84 3COMP  VEL3 FOR EACH
A18871                                                                            (DEC ONLY)
 1888                    42,2424   24512 1        OCT    24512          85 3COMP  VEL3 FOR EACH
A18881                                                                            (DEC ONLY)
 1889                    42,2425   22451 1        OCT    22451          86 3COMP  VEL2 FOR EACH
A18891                                                                            (DEC ONLY)
 1890                    42,2426   00102 1        OCT    00102          87 2COMP  COU DEG, Y OPTICS DEG
 1891                    42,2427   00000 1        OCT    0              88 3COMP  FRAC FOR EACH
A18912                                                                             (DEC ONLY)
 1892                    42,2430   16143 0        OCT    16143          89 3COMP  DPDEG(90), DPDEG(90), POS5
A18921                                                                            (DEC ONLY)
 1893                    42,2431   10507 1        OCT    10507          90 3COMP  POS5, VEL3, DPDEG(360)
A18931                                                                            (DEC ONLY)
 1894                    42,2432   00102 1        OCT    00102          91 2COMP  COU DEG, Y OPTICS DEG
 1895                    42,2433   00102 1        OCT    00102          92 2COMP  COU DEG, Y OPTICS DEG
 1896                    42,2434   06143 1        OCT    06143          93 3COMP  DPDEG(90) FOR EACH
 1897                    42,2435   00102 1        OCT    00102          94 2COMP  COU DEG, Y OPTICS DEG
 1898                    42,2436   04102 0        OCT    04102          95 3COMP  COU DEG FOR EACH
 1899                    42,2437   04102 0        OCT    04102          96 3COMP  COU DEG FOR EACH
 1900                    42,2440   00000 1        OCT    00000          97 3COMP  WHOLE FOR EACH
 1901                    42,2441   00000 1        OCT    00000          98 3COMP  WHOLE, FRAC, WHOLE
 1902                    42,2442   01162 0        OCT    01162          99 3COMP POS9, VEL4, WHOLE
A19021                                                                            (DEC ONLY)
R1903   END OF NNTYPTAB FOR MIXED NOUNS

 2200                    42,2443   00006 1  SFINTAB  OCT    00006          WHOLE, DP TIME (SEC)
 2201                    42,2444   03240 1           OCT    03240
 2202                    42,2445   00000 1           OCT    00000          SPARE
 2203                    42,2446   00000 1           OCT    00000
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2204                    42,2447   00000 1          OCT    00000          CDU DEGREES, Y OPTICS DEGREES
2205                    42,2450   00000 1          OCT    00000             (SFCONS IN DEGINSF, OPTDEGIN)
2206                    42,2451   10707 0          OCT    10707          DP DEGREES (90)
2207                    42,2452   03435 0          OCT    03435                UPPED BY 1
2208                    42,2453   13070 1          OCT    13070          DP DEGREES (360)(POINT BETWN BITS 11-12)
2209                    42,2454   34345 1          OCT    34345                UPPED BY 1
2210                    42,2455   00005 1          OCT    00005          DEGREES (180)
2211                    42,2456   21616 0          OCT    21616
2212                    42,2457   26113 0          OCT    26113          WEIGHT2
2213                    42,2460   31713 0          OCT    31713
2214                    42,2461   00070 0          OCT    00070          POSITION5
2215                    42,2462   20460 1          OCT    20460
2216                    42,2463   01065 0          OCT    01065          POSITION4
2217                    42,2464   05740 1          OCT    05740
2218                    42,2465   11414 0          OCT    11414          VELOCITY2       (POINT BETWN BITS 11-12)
2219                    42,2466   31463 1          OCT    31463
2220                    42,2467   07475 0          OCT    07475          VELOCITY3
2221                    42,2470   16051 1          OCT    16051
2222                    42,2471   00001 0          OCT    00001          ELEVATION DEGREES
2223                    42,2472   03434 1          OCT    03434
2224                    42,2473   00002 0          OCT    00002          TRIM DEGREES
2225                    42,2474   22245 1          OCT    22245
2226                    42,2475   00014 1          OCT    00014          INERTIA, THRUST MOMENT
2227                    42,2476   35607 0          OCT    35607
2228                    42,2477   07606 0          OCT    07606          VELOCITY/2VS
2229                    42,2500   06300 1          OCT    06300
2230                    42,2501   16631 1          OCT    16631          POSITION 6
2231                    42,2502   11307 0          OCT    11307
2232                    42,2503   12000 1          OCT    12000          DRAG ACCELERATION (POINT BETWN BITS 7-8)
2233                    42,2504   00000 1          OCT    00000
2234                    42,2505   27176 1          OCT    27176          POSITION 8
2235                    42,2506   14235 0          OCT    14235
2236                    42,2507   01670 1          2DEC   30480 B-19     POSITION 9
2236                    42,2510   20000 0
2237                    42,2511   07475 0          2DEC   30.48 B-7      VELOCITY4
2237                    42,2512   16051 1
A2290                                                                    END OF SFINTAB


2300                    42,2513   05174 0  SFOUTAB OCT    05174          WHOLE, DP TIME (SEC)
2301                    42,2514   13261 0          OCT    13261
2302                    42,2515   00000 1          OCT    00000          SPARE
2303                    42,2516   00000 1          OCT    00000
2304                    42,2517   00000 1          OCT    00000          CDU DEGREES, Y OPTICS DEGREES
2305                    42,2520   00000 1          OCT    00000             (SFCONS IN DEGOUTSF, OPTDEGOUT)
2306                    42,2521   00714 0          OCT    00714          DP DEGREES (90) (POINT BETWN BITS 7-8)
2307                    42,2522   31463 1          OCT    31463
2308                    42,2523   13412 1          OCT    13412          DP DEGREES (360)
2309                    42,2524   07534 1          OCT    07534
2310                    42,2525   05605 1          OCT    05605          DEGREES (180)
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2311                    42,2526  03656 1        OCT    03656
2312                    42,2527  00001 0        OCT    00001          WEIGHT2
2313                    42,2530  16170 0        OCT    16170
2314                    42,2531  00441 0        OCT    00441          POSITION5
2315                    42,2532  34306 0        OCT    34306
2316                    42,2533  07176 0        OCT    07176          POSITION4
2317                    42,2534  21603 1        OCT    21603
2318                    42,2535  15340 1        OCT    15340          VELOCITY2
2319                    42,2536  15340 1        OCT    15340
2320                    42,2537  01031 1        OCT    01031          VELOCITY3      (POINT BETWN BITS 7-8)
2321                    42,2540  21032 0        OCT    21032
2322                    42,2541  34631 1        OCT    34631          ELEVATION DEGREES
2323                    42,2542  23146 0        OCT    23146
2324                    42,2543  14340 0        OCT    14340          TRIM DEGREES
2325                    42,2544  24145 1        OCT    24145
2326                    42,2545  02363 0        OCT    02363          INERTIA, THRUST MOMENT
2327                    42,2546  03721 0        OCT    03721
2328                    42,2547  20373 1        OCT    20373          VELOCITY/2VS
2329                    42,2550  02122 1        OCT    02122
2330                    42,2551  00424 0        OCT    00424          POSITION 6     (POINT BETWN BITS 7-8)
2331                    42,2552  30446 1        OCT    30446
2332                    42,2553  00631 0        OCT    00631          DRAG ACCELERATION
2333                    42,2554  23146 0        OCT    23146
2334                    42,2555  00260 0        OCT    00260          POSITION 8
2335                    42,2556  06213 1        OCT    06213
2336                    42,2557  04231 0        2DEC   17.2010499 B-7  POSITION 9
2336                    42,2560  27400 0
2337                    42,2561  01031 1        2DEC   .032808399     VELOCITY4
2337                    42,2562  21032 0
A2390                                                                  END OF SFOUTAB


A2400                                                                  NN  SF CONSTANT              SF ROUTINE

2401  REF   4  LAST  272  42,2563  03660 1  IDADDTAB ECADR  TTOGO       40 MIN/SEC                   M/S
2402  REF   1            42,2564  03772 0            ECADR  VGDISP      40 VEL3                      DP3
2403  REF   2  LAST  117  42,2565  03425 1            ECADR  DVTOTAL     40 VEL3                      DP3
2404  REF  10  LAST  272  42,2566  01045 1            ECADR  DSPTEM1     41 CDU DEG                   CDU
2405  REF  11  LAST  279  42,2567  01046 1            ECADR  DSPTEM1 +1  41 ELEV DEG                  ARTH
2406                     42,2570  00000 1            OCT    0           41 SPARE COMPONENT
2407  REF   2  LAST   91  42,2571  02363 0            ECADR  HAPO        42 POS4                      DP3
2408  REF   1            42,2572  02365 0            ECADR  HPER        42 POS4                      DP3
2409  REF   2  LAST  279  42,2573  03772 0            ECADR  VGDISP      42 VEL3                      DP3
2410  REF   4  LAST  180  42,2574  01103 1            ECADR  LAT         43 DPDEG(360)                DP4
2411  REF   3  LAST  180  42,2575  01105 1            ECADR  LONG        43 DPDEG(360)                DP4
2412  REF   3  LAST  190  42,2576  01107 0            ECADR  ALT         43 POS4                      DP3
2413  REF   3  LAST  173  42,2577  02351 1            ECADR  HAPOX       44 POS4                      DP3
2414  REF   2  LAST   91  42,2600  02353 0            ECADR  HPERX       44 POS4                      DP3
2415  REF   2  LAST   90  42,2601  02343 1            ECADR  TFF         44 MIN/SEC                   M/S
2416  REF   3  LAST  184  42,2602  01125 0            ECADR  VHFCNT      45 2INT                      2INT
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2417	REF	5	LAST	279	42,2603	03660 1	ECADR	TTOGO	45	MIN/SEC		M/S
2418	REF	3	LAST	208	42,2604	03625 0	ECADR	+MGA	45	DPDEG(360)		DP4
2419	REF	15	LAST	254	42,2605	03066 1	ECADR	DAPDATR1	46	OCTAL ONLY		OCT
2420	REF	1			42,2606	03067 0	ECADR	DAPDATR2	46	OCTAL ONLY		OCT
2421					42,2607	00000 1	OCT	0	46	SPARE COMPONENT		
2422	REF	3	LAST	216	42,2610	03074 1	ECADR	CSMMASS	47	WEIGHT2		ARTH1
2423	REF	3	LAST	177	42,2611	03073 0	ECADR	LEMMASS	47	WEIGHT2		ARTH1
2424					42,2612	00000 1	OCT	00000	47	SPARE COMPONENT		
2425	REF	12	LAST	261	42,2613	03023 0	ECADR	PACTOFF	48	TRIM DEG		ARTH
2426	REF	1			42,2614	03024 1	ECADR	YACTOFF	48	TRIM DEG		ARTH
2427					42,2615	00000 1	OCT	00000	48	SPARE COMPONENT		
2428	REF	1			42,2616	03501 0	ECADR	N49DISP	49	POS4		DP3
2429	REF	2	LAST	280	42,2617	03503 1	ECADR	N49DISP +2	49	VEL3		DP3
2430	REF	3	LAST	280	42,2620	03505 1	ECADR	N49DISP +4	49	WHOLE		ARTH
2431	REF	1			42,2621	02355 0	ECADR	RSP-RREC	50	POS6		DP3
2432	REF	3	LAST	279	42,2622	02353 0	ECADR	HPERX	50	POS4		DP3
2433	REF	3	LAST	279	42,2623	02343 1	ECADR	TFF	50	MIN/SEC		M/S
2434	REF	3	LAST	250	42,2624	02320 1	ECADR	RHOSB	51	DPDEG(360)		
2435	REF	1			42,2625	02322 0	ECADR	GAMMASB	51	DPDEG(360)		DP4
2436					42,2626	00000 1	OCT	0	51	SPARE COMPONENT		
2437	REF	2	LAST	93	42,2627	02632 1	ECADR	ACTCENT	52	DPDEG(360)		DP4
2438					42,2630	00000 1	OCT	00000	52	SPARE COMPONENT		
2439					42,2631	00000 1	OCT	00000	52	SPARE COMPONENT		
2440	REF	5	LAST	175	42,2632	02320 1	ECADR	RANGE	53	POS5		DP1
2441	REF	2	LAST	90	42,2633	02322 0	ECADR	RRATE	53	VEL3		DP3
2442	REF	3	LAST	175	42,2634	02324 0	ECADR	RTHETA	53	DPDEG(360)		DP4
2443	REF	6	LAST	280	42,2635	02320 1	ECADR	RANGE	54	POS5		DP1
2444	REF	3	LAST	280	42,2636	02322 0	ECADR	RRATE	54	VEL3		DP3
2445	REF	4	LAST	280	42,2637	02324 0	ECADR	RTHETA	54	DPDEG(360)		DP4
2446	REF	1			42,2640	03765 0	ECADR	NN1	55	WHOLE		ARTH
2447	REF	3	LAST	171	42,2641	03743 1	ECADR	ELEV	55	DPDEG(360)		DP4
2448	REF	4	LAST	175	42,2642	03753 0	ECADR	CENTANG	55	DPDEG(360)		DP4
2449	REF	2	LAST	127	42,2643	03633 1	ECADR	RTEGAM2D	56	DPDEG(360)		DP4
2450	REF	2	LAST	127	42,2644	03631 0	ECADR	RTEDVD	56	VEL2		DP4
2451					42,2645	00000 1	OCT	0	56	SPARE COMPONENT		
2452	REF	4	LAST	175	42,2646	02610 1	ECADR	DELTAR	57	POS4		DP3
2453					42,2647	00000 1	OCT	0	57	SPARE COMPONENT		
2454					42,2650	00000 1	OCT	0	57	SPARE COMPONENT		
2455	REF	1			42,2651	02640 1	ECADR	POSTTPI	58	POS4		DP3
2456	REF	3	LAST	93	42,2652	02634 1	ECADR	DELVTPI	58	VEL3		DP3
2457	REF	3	LAST	175	42,2653	02636 0	ECADR	DELVTPF	58	VEL3		DP3
2458	REF	8	LAST	101	42,2654	02610 1	ECADR	DVLOS	59	VEL3		DP3
2459	REF	9	LAST	280	42,2655	02612 0	ECADR	DVLOS +2	59	VEL3		DP3
2460	REF	10	LAST	280	42,2656	02614 0	ECADR	DVLOS +4	59	VEL3		DP3
2461	REF	2	LAST	119	42,2657	03721 0	ECADR	GMAX	60	WHOLE		ARTH
2462	REF	5	LAST	178	42,2660	03766 0	ECADR	VPRED	60	VEL2		DP4
2463	REF	5	LAST	177	42,2661	03770 1	ECADR	GAMMAEI	60	DPDEG(360)		DP4
2464	REF	4	LAST	177	42,2662	03400 0	ECADR	LAT(SPL)	61	DPDEG(360)		DP4
2465	REF	2	LAST	117	42,2663	03402 1	ECADR	LNG(SPL)	61	DPDEG(360)		DP4
2466	REF	2	LAST	112	42,2664	03326 0	ECADR	HEADSUP	61	WHOLE		ARTH

2467	REF	2	LAST	119	42,2665	03722 0	ECADR	VMAGI	62	VEL2	DP4
2468	REF	1			42,2666	03736 0	ECADR	HDOT	62	VEL2	DP4
2469	REF	2	LAST	120	42,2667	03734 1	ECADR	ALTI	62	POS4	DP3
2470	REF	4	LAST	120	42,2670	03713 1	ECADR	RTGO	63	POS6	DP3
2471	REF	4	LAST	178	42,2671	03724 0	ECADR	VIO	63	VEL2	DP4
2472	REF	4	LAST	178	42,2672	03726 1	ECADR	TTE	63	MIN/SEC	M/S
2473	REF	2	LAST	118	42,2673	03637 0	ECADR	D	64	DRAG ACCEL	DP2
2474	REF	3	LAST	281	42,2674	03722 0	ECADR	VMAGI	64	VEL2	DP4
2475	REF	1			42,2675	03713 1	ECADR	RTGON64	64	POS6	DP3
2476	REF	2	LAST	225	42,2676	00013 0	ECADR	SAMPTIME	65	HMS (MIXED ONLY TO KEEP CODE 65)	HMS
2477	REF	3	LAST	281	42,2677	00013 0	ECADR	SAMPTIME	65	HMS	HMS
2478	REF	4	LAST	281	42,2700	00013 0	ECADR	SAMPTIME	65	HMS	HMS
2479	REF	2	LAST	112	42,2701	03315 0	ECADR	ROLLC	66	DPDEG(360)	DP4
2480	REF	1			42,2702	03675 0	ECADR	XRNGERR	66	POS8	DP3
2481	REF	2	LAST	119	42,2703	03715 1	ECADR	DNRNGERR	66	POS6	DP3
2482	REF	1			42,2704	03713 1	ECADR	RTGON67	67	POS6	DP3
2483	REF	5	LAST	279	42,2705	01103 1	ECADR	LAT	67	DPDEG(360)	DP4
2484	REF	4	LAST	279	42,2706	01105 1	ECADR	LONG	67	DPDEG(360)	DP4
2485	REF	3	LAST	281	42,2707	03315 0	ECADR	ROLLC	68	DPDEG(360)	DP4
2486	REF	4	LAST	281	42,2710	03722 0	ECADR	VMAGI	68	VEL2	DP4
2487	REF	2	LAST	119	42,2711	03677 1	ECADR	RDOT	68	VEL/2VS	DP4
2488	REF	4	LAST	281	42,2712	03315 0	ECADR	ROLLC	69	DPDEG(360)	DP4
2489	REF	1			42,2713	03174 0	ECADR	Q7	69	DRAG ACCEL	DP2
2490	REF	1			42,2714	03766 0	ECADR	VL	69	VEL/2VS	DP4
2491	REF	1			42,2715	00735 0	ECADR	STARCODE	70	OCTAL ONLY	OCT
2492	REF	10	LAST	267	42,2716	02751 0	ECADR	LANDMARK	70	OCTAL ONLY	OCT
2493	REF	2	LAST	97	42,2717	02752 0	ECADR	HORIZON	70	OCTAL ONLY	OCT
2494	REF	2	LAST	281	42,2720	00735 0	ECADR	STARCODE	71	OCTAL ONLY	OCT
2495	REF	11	LAST	281	42,2721	02751 0	ECADR	LANDMARK	71	OCTAL ONLY	OCT
2496	REF	3	LAST	281	42,2722	02752 0	ECADR	HORIZON	71	OCTAL ONLY	OCT
2497	REF	2	LAST	94	42,2723	02616 1	ECADR	THETZERO	72	DPDEG(360)	DP4
2498	REF	1			42,2724	03753 0	ECADR	DELHITE	72	POS4	DP3
2499	REF	1			42,2725	01132 0	ECADR	OPTION2	72	WHOLE	ARTH
2500	REF	2	LAST	129	42,2726	03620 0	ECADR	P21ALT	73	POS4	DP3
2501	REF	2	LAST	129	42,2727	03622 1	ECADR	P21VEL	73	VEL2	DP4
2502	REF	1			42,2730	03624 1	ECADR	P21GAM	73	DPDEG(360)	DP4
2503	REF	5	LAST	281	42,2731	03315 0	ECADR	ROLLC	74	DPDEG(360)	DP4
2504	REF	5	LAST	281	42,2732	03722 0	ECADR	VMAGI	74	VEL2	DP4
2505	REF	3	LAST	281	42,2733	03637 0	ECADR	D	74	DRAG ACCEL	DP2
2506	REF	3	LAST	175	42,2734	02632 1	ECADR	DIFFALT	75	POS4	DP3
2507	REF	1			42,2735	02546 1	ECADR	T1TOT2	75	MIN/SEC	M/S
2508	REF	1			42,2736	03655 1	ECADR	T2TOT3	75	MIN/SEC	M/S
2509					42,2737	00000 1	OCT	0	76	SPARE	
2510					42,2740	00000 1	OCT	0	76	SPARE	
2511					42,2741	00000 1	OCT	0	76	SPARE	
2512					42,2742	00000 1	OCT	0	77	SPARE	
2513					42,2743	00000 1	OCT	0	77	SPARE	
2514					42,2744	00000 1	OCT	0	77	SPARE	
2515					42,2745	00000 1	OCT	0	78	SPARE	
2516					42,2746	00000 1	OCT	0	78	SPARE	

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2517                                42,2747   00000 1        OCT    0              78 SPARE
2518                                42,2750   00000 1        OCT    0              79 SPARE
2519                                42,2751   00000 1        OCT    0              79 SPARE
2520                                42,2752   00000 1        OCT    0              79 SPARE
2521   REF   6  LAST  280           42,2753   03660 1        ECADR  TTOGO          80 MIN/SEC                    M/S
2522   REF   3  LAST  279           42,2754   03772 0        ECADR  VGDISP         80 VEL2                       DP4
2523   REF   3  LAST  279           42,2755   03425 1        ECADR  DVTOTAL        80 VEL2                       DP4
2524   REF   1                     42,2756   03404 1        ECADR  DELVLVC         81 VEL3                       DP3
2525   REF   2  LAST  282           42,2757   03406 0        ECADR  DELVLVC +2      81 VEL3                       DP3
2526   REF   3  LAST  282           42,2760   03410 1        ECADR  DELVLVC +4      81 VEL3                       DP3
2527   REF   4  LAST  282           42,2761   03404 1        ECADR  DELVLVC         82 VEL3                       DP3
2528   REF   5  LAST  282           42,2762   03406 0        ECADR  DELVLVC +2      82 VEL3                       DP3
2529   REF   6  LAST  282           42,2763   03410 1        ECADR  DELVLVC +4      82 VEL3                       DP3
2530   REF   3  LAST  214           42,2764   03674 1        ECADR  DELVIMU         83 VEL3                       DP3
2531   REF   4  LAST  282           42,2765   03676 0        ECADR  DELVIMU +2      83 VEL3                       DP3
2532   REF   5  LAST  282           42,2766   03700 0        ECADR  DELVIMU +4      83 VEL3                       DP3
2533   REF   1                     42,2767   03537 0        ECADR  DELVOV          84 VEL3                       DP3
2534   REF   2  LAST  282           42,2770   03541 1        ECADR  DELVOV  +2      84 VEL3                       DP3
2535   REF   3  LAST  282           42,2771   03543 0        ECADR  DELVOV  +4      84 VEL3                       DP3
2536   REF   3  LAST  124           42,2772   03664 0        ECADR  VGBODY         85 VEL3                       DP3
2537   REF   4  LAST  282           42,2773   03666 1        ECADR  VGBODY +2      85 VEL3                       DP3
2538   REF   5  LAST  282           42,2774   03670 0        ECADR  VGBODY +4      85 VEL3                       DP3
2539   REF   7  LAST  282           42,2775   03404 1        ECADR  DELVLVC         86 VEL2                       DP4
2540   REF   8  LAST  282           42,2776   03406 0        ECADR  DELVLVC +2      86 VEL2                       DP4
2541   REF   9  LAST  282           42,2777   03410 1        ECADR  DELVLVC +4      86 VEL2                       DP4
2542   REF  16  LAST  258           42,3000   03730 0        ECADR  MRKBUF1 +3      87 CDU DEG                    CDU
2543   REF  17  LAST  282           42,3001   03732 1        ECADR  MRKBUF1 +5      87 Y OPTICS DEG               YOPT
2544                                42,3002   00000 1        OCT    0              87 SPARE COMPONENT
2545  *REF   1                     42,3003   03704 1        ECADR  STARSAV3        88 DPFRAC                     DPFRAC
2546  *REF   2  LAST  282           42,3004   03706 0        ECADR  STARSAV3 +2     88 DPFRAC                     DPFRAC
2547  *REF   3  LAST  282           42,3005   03710 1        ECADR  STARSAV3 +4     88 DPFRAC                     DPFRAC
2548   REF   1                     42,3006   01103 1        ECADR  LANDLAT         89 DPDEG(90)                  DP3
2549   REF   2  LAST   91           42,3007   02357 1        ECADR  LANDLONG        89 DPDEG(90)                  DP3
2550   REF   2  LAST   91           42,3010   02361 1        ECADR  LANDALT         89 POS5                       DP1
2551   REF   7  LAST  280           42,3011   02320 1        ECADR  RANGE           90 POS5                       DP1
2552   REF   4  LAST  280           42,3012   02322 0        ECADR  RRATE           90 VEL3                       DP3
2553   REF   5  LAST  280           42,3013   02324 0        ECADR  RTHETA          90 DPDEG(360)                 DP4
2554   REF   7  LAST  225           42,3014   00036 1        ECADR  COUS            91 CDU DEG                    CDU
2555   REF   6  LAST  225           42,3015   00035 1        ECADR  COUT            91 Y OPTICS DEG               YOPT
2556                                42,3016   00000 1        OCT    0              91 SPARE COMPONENT
2557   REF   3  LAST  242           42,3017   02773 0        ECADR  SAC             92 CDU DEG                    CDU
2558   REF   3  LAST  242           42,3020   02775 0        ECADR  PAC             92 Y OPTICS DEG               YOPT
2559                                42,3021   00000 1        OCT    0              92 SPARE COMPONENT
2560   REF   6  LAST  243           42,3022   02757 0        ECADR  OGC             93 DPDEG(90)                  DP3
2561   REF   7  LAST  282           42,3023   02761 0        ECADR  OGC      +2     93 DPDEG(90)                  DP3
2562   REF   8  LAST  282           42,3024   02763 1        ECADR  OGC      +4     93 DPDEG(90)                  DP3
2563   REF  18  LAST  282           42,3025   03730 0        ECADR  MRKBUF1 +3      94 CDU DEG                    CDU
2564   REF  19  LAST  282           42,3026   03732 1        ECADR  MRKBUF1 +5      94 Y OPTICS DEG               YOPT
2565                                42,3027   00000 1        OCT    0              94 SPARE
2566   REF   2  LAST  126           42,3030   03722 0        ECADR  PRAXIS         95 CDU DEG                    CDU
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 2567   REF   3  LAST  282   42,3031   03723 1        ECADR  PRAXIS +1      95 CDU DEG                    CDU
 2568   REF   4  LAST  283   42,3032   03724 0        ECADR  PRAXIS +2      95 CDU DEG                    CDU
 2569   REF   4  LAST  271   42,3033   01333 0        ECADR  CPHIX          96 CDU DEG                    CDU
 2570   REF   5  LAST  283   42,3034   01334 1        ECADR  CPHIX +1       96 CDU DEG                    CDU
 2571   REF   6  LAST  283   42,3035   01335 0        ECADR  CPHIX +2       96 CDU DEG                    CDU
 2572   REF  12  LAST  279   42,3036   01045 1        ECADR  DSPTEM1        97 WHOLE                      ARTH
 2573   REF  13  LAST  283   42,3037   01046 1        ECADR  DSPTEM1 +1     97 WHOLE                      ARTH
 2574   REF  14  LAST  283   42,3040   01047 0        ECADR  DSPTEM1 +2     97 WHOLE                      ARTH
 2575   REF   4  LAST  271   42,3041   01050 0        ECADR  DSPTEM2        98 WHOLE                      ARTH
 2576   REF   5  LAST  283   42,3042   01051 1        ECADR  DSPTEM2 +1     98 FRAC                       FRAC
 2577   REF   6  LAST  283   42,3043   01052 1        ECADR  DSPTEM2 +2     98 WHOLE                      ARTH
 2578   REF   1               42,3044   02320 1        ECADR  WWPOS          99 POS9                       DP3
 2579   REF   1               42,3045   02322 0        ECADR  WWVEL          99 VEL4                       DP2
 2580   REF   1               42,3046   02324 0        ECADR  WWOPT          99 WHOLE                      ARTH
R2600   END OF IOADDTAB
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A2800 NN SF ROUTINES

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 2801                         42,3047   16351 1  RUTMXTAB OCT    16351      40 M/S, DP3, DP3
 2802                         42,3050   00142 0           OCT    00142      41 CDU, ARTH
 2803                         42,3051   16347 0           OCT    16347      42 DP3, DP3, DP3
 2804                         42,3052   16512 0           OCT    16512      43 DP4, DP4, DP3
 2805                         42,3053   22347 1           OCT    22347      44 DP3, DP3, M/S
 2806                         42,3054   24454 1           OCT    24454      45 2INT, M/S, DP4
 2807                         42,3055   00000 1           OCT    00000      46 OCT, OCT
 2808                         42,3056   00553 1           OCT    00553      47 ARITH1, ARITH1
 2809                         42,3057   00143 1           OCT    00143      48 ARTH, ARTH
 2810                         42,3060   06347 1           OCT    06347      49 DP3, DP3, ARTH
 2811                         42,3061   22347 1           OCT    22347      50 DP3, DP3, M/S
 2812                         42,3062   00512 1           OCT    00512      51 DP4, DP4
 2813                         42,3063   00012 1           OCT    00012      52 DP4
 2814                         42,3064   24344 1           OCT    24344      53 DP1, DP3, DP4
 2815                         42,3065   24344 1           OCT    24344      54 DP1, DP3, DP4
 2816                         42,3066   24503 1           OCT    24503      55 ARTH, DP4 , DP4
 2817                         42,3067   00512 1           OCT    00512      56 DP4, DP4
 2818                         42,3070   00007 0           OCT    00007      57 DP3
 2819                         42,3071   16347 0           OCT    16347      58 DP3, DP3, DP3
 2820                         42,3072   16347 0           OCT    16347      59 DP3, DP3, DP3
 2821                         42,3073   24503 1           OCT    24503      60 ARTH, DP4, DP4
 2822                         42,3074   06512 1           OCT    06512      61 DP4, DP4, ARTH
 2823                         42,3075   16512 0           OCT    16512      62 DP4, DP4, DP3
 2824                         42,3076   22507 0           OCT    22507      63 DP3, DP4, M/S
 2825                         42,3077   16505 0           OCT    16505      64 DP2, DP4, DP3
 2826                         42,3100   20410 0           OCT    20410      65 HMS, HMS, HMS
 2827                         42,3101   16352 1           OCT    16352      66 DP4, DP3, DP3
 2828                         42,3102   24507 0           OCT    24507      67 DP3, DP4, DP4
 2829                         42,3103   24512 1           OCT    24512      68 DP4, DP4, DP4
 2830                         42,3104   24252 1           OCT    24252      69 DP4, DP2, DP4
 2831                         42,3105   00000 1           OCT    00000      70 OCT, OCT, OCT
```

```
2832                    42,3106   00000 1       OCT    0          71 OCT, OCT, OCT
2833                    42,3107   06352 0       OCT    06352      72 DP4, DP3, ARTH
2834                    42,3110   24507 0       OCT    24507      73 DP3, DP4, DP4
2835                    42,3111   12512 1       OCT    12512      74 DP4, DP4, DP2
2836                    42,3112   22447 0       OCT    22447      75 DP3, M/S, M/S
2837                    42,3113   00000 1       OCT    0          76 SPARE
2838                    42,3114   00000 1       OCT    0          77 SPARE
2839                    42,3115   00000 1       OCT    0          78 SPARE
2840                    42,3116   00000 1       OCT    0          79 SPARE
2841                    42,3117   24511 1       OCT    24511      80 M/S, DP4, DP4
2542                    42,3120   16347 0       OCT    16347      81 DP3, DP3, DP3
2843                    42,3121   16347 0       OCT    16347      82 DP3, DP3, DP3
2844                    42,3122   16347 0       OCT    16347      83 DP3, DP3, DP3
2845                    42,3123   16347 0       OCT    16347      84 DP3, DP3, DP3
2846                    42,3124   16347 0       OCT    16347      85 DP3, DP3, DP3
2847                    42,3125   24512 1       OCT    24512      86 DP4, DP4, DP4
2848                    42,3126   00302 0       OCT    00302      87 CDU, YOPT
2849                    42,3127   32655 0       OCT    32655      88 DPFRAC FOR EACH
2850                    42,3130   10347 0       OCT    10347      89 DP3, DP3, DP1
2851                    42,3131   24344 1       OCT    24344      90 DP1, DP3, DP4
2852                    42,3132   00302 0       OCT    00302      91 CDU, YOPT
2853                    42,3133   00302 0       OCT    00302      92 CDU, YOPT
2854                    42,3134   16347 0       OCT    16347      93 DP3, DP3, DP3
2855                    42,3135   00302 0       OCT    00302      94 CDU, YOPT
2856                    42,3136   04102 0       OCT    04102      95 CDU, CDU, CDU
2857                    42,3137   04102 0       OCT    04102      96 CDU, CDU, CDU
2858                    42,3140   06143 1       OCT    06143      97 ARTH, ARTH, ARTH
2859                    42,3141   06043 0       OCT    06043      98 ARTH, FRAC, ARTH
2860                    42,3142   06247 0       OCT    06247      99 DP3, DP2, ARTH
R2870   END OF RUTMXTAB

2871    REF   2  LAST   34   30,2000                 SBANK= LOWSUPER
```

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```
 0001                        22,2000                    BANK   22
 0002   REF   1              23,2000                    SETLOC COMGEOM1
 0003                        23,2000                    BANK

R0004   THIS ROUTINE TAKES THE SHAFT AND TRUNNION ANGLES AS READ BY THE CM OPTICAL SYSTEM AND CONVERTS THEM INTO A  UNIT
R0006   VECTOR REFERENCED TO THE NAVIGATION BASE COORDINATE SYSTEM AND COINCIDENT WITH THE SEXTANT LINE OF SIGHT.

R0008   THE INPUTS ARE  1) THE SEXTANT SHAFT AND TRUNNION ANGLES ARE STORED SP IN LOCATIONS 3 AND 5 RESPECTIVELY OF THE
R0010   MARK VAC AREA.  2) THE COMPLEMENT OF THE BASE ADDRESS OF THE MARK VAC AREA IS STORED SP AT LOCATION X1 OF YOUR
R0012   JOB VAC AREA.

R0013   THE OUTPUT IS A HALF-UNIT VECTOR IN NAVIGATION BASE COORDINATES AND STORED AT LOCATION 32D OF THE VAC AREA. THE
R0015   OUTPUT IS ALSO AVAILABLE AT MPAC.

 0016   REF   1                                        COUNT  23/GEOM

 0017                        23,2000   47133 0  SXTNB  SLOAD* RTB          PUSHDOWN  00,02,04,(17D-19D),32D-36D
 0018                        23,2001   00006 1          5,1               TRUNNION = TA
 0019   REF   1              23,2002   45513 1          CDULOGIC
 0020                        23,2003   41434 1          RTB    PUSH
 0021   REF   1              23,2004   46027 0          SXTLOGIC
 0022                        23,2005   72556 1          SIN    SL1
 0023                        23,2006   66606 1          PUSH   SLOAD*          PD2 = SIN(TA)
 0024                        23,2007   00004 0          3,1               SHAFT = SA
 0025                        23,2010   41434 1          RTB    PUSH           PD4 = SA
 0026   REF   2  LAST  285   23,2011   45513 1          CDULOGIC

 0027                        23,2012   41346 0          COS    DMP
 0028                        23,2013   00003 1          2
 0029   REF   1              23,2014   14041 1          STODL  STARM          COS(SA)SIN(TA)

 0030                        23,2015   41356 1          SIN    DMP
 0031                        23,2016   77626 0          STADR
 0032   REF   2  LAST  285   23,2017   63734 1          STODL  STARM +2       SIN(SA)SIN(TA)

 0033                        23,2020   77746 1          COS
 0034   REF   3  LAST  285   23,2021   24045 0          STOVL  STARM +4
 0035   REF   4  LAST  285   23,2022   00041 1          STARM             STARM = 32D
 0036                        23,2023   76521 0          MXV    VSL1
 0037   REF   1              23,2024   06302 0          N81N82
 0038                        23,2025   00041 1          STORE  32D
 0039                        23,2026   77616 0          RVQ

 0040   REF   1              23,2027   3 2323 1 SXTLOGIC CAF   10DEGS-       CORRECT FOR 19.775 DEGREE OFFSET
 0041   REF  34  LAST  263   23,2030   26 154 0         ADS    MPAC
 0042   REF   1              23,2031   3 5003 1         CAF    QUARTER
 0043   REF   1              23,2032   0 7256 1         TC     SHORTMP
 0044   REF   1              23,2033   0 6030 1         TC     DANZIG
```

R0045 CALCSXA COMPUTES THE SEXTANT SHAFT AND TRUNNION ANGLES REQUIRED TO POSITION THE OPTICS SUCH THAT A STAR LINE-
R0047 OF-SIGHT LIES ALONG THE STAR VECTOR. THE ROUTINE TAKES THE GIVEN STAR VECTOR AND EXPRESSES IT AS A VECTOR REF-
R0049 ERENCED TO THE OPTICS COORDINATE SYSTEM. IN ADDITION IT SETS UP THREE UNIT VECTORS DEFINING THE X,Y, AND Z AXES
R0051 REFERENCED TO THE OPTICS COORDINATE SYSTEM.

R0052 THE INPUTS ARE 1) THE STAR VECTOR REFERRED TO PRESENT STABLE MEMBER COORDINATES STORED AT STAR. 2) SAME ANGLE
R0054 INPUT AS *SMNB*, I.E. SINES AND COSINES OF THE CDU ANGLES, IN THE ORDER Y Z X, AT SINCDU AND COSCDU. A CALL
R0056 TO CDUTRIG WILL PROVIDE THIS INPUT.

R0057 THE OUTPUTS ARE THE SEXTANT SHAFT AND TRUNNION ANGLES STORED DP AT SAC AND PAC RESPECTIVELY. (LOW ORDER PART
R0059 EQUAL TO ZERO).

```
0060                        23,2034  77220 1  CALCSXA  ITA     VLOAD          PUSHDOWN  00-26D,28D,30D,32D-36D
0061                        23,2035  00034 0                   28D
0062  REF  3  LAST  215     23,2036  02766 1                   STAR
0063                        23,2037  77624 1           CALL
0064  REF  1                23,2040  47644 1                   *SMNB*
0065                        23,2041  76521 0           MXV     VSL1
0066  REF  1                23,2042  06260 0                   NB2NB1
0067  REF  4  LAST  286     23,2043  26766 1           STOVL   STAR
0068  REF  1                23,2044  15333 0                   HIUNITX
0069  REF  2  LAST   93     23,2045  26555 0           STOVL   XNB1
0070  REF  1                23,2046  15331 1                   HIUNITY
0071  REF  2  LAST   93     23,2047  26563 0           STOVL   YNB1
0072  REF  1                23,2050  15327 0                   HIUNITZ
0073  REF  2  LAST   93     23,2051  36571 1           STCALL  ZNB1
0074  REF  1                23,2052  46076 1                   SXTANG1
```

R0075 SXTANG COMPUTES THE SEXTANT SHAFT AND TRUNNION ANGLES REQUIRED TO POSITION THE OPTICS SUCH THAT A STAR LINE-OF-
R0077 SIGHT LIES ALONG THE STAR VECTOR.

R0079 THE INPUTS ARE 1) THE STAR VECTOR REFERRED TO ANY COORDINATE SYSTEM STORED AT STAR. 2) THE NAVIGATION BASE
R0080 COORDINATES REFERRED TO THE SAME COORDINATE SYSTEM. THESE THREE HALF-UNIT VECTORS ARE STORED AT XNB, YNB, AND
R0082 ZNB.

R0083 THE OUTPUTS ARE THE SEXTANT SHAFT AND TRUNNION ANGLES STORED DP AT SAC AND PAC RESPECTIVELY. (LOW ORDER PART
R0085 EQUAL TO ZERO).

```
0086                        23,2053  47020 0  SXTANG   ITA     RTB             PUSHDOWN  16D,18D,22D-26D,28D
0087                        23,2054  00034 0           28D
0088  REF   1              23,2055  45662 1           TRANSP1         EREF WRT NB2
0089                        23,2056  64375 1           VLOAD   MXV
0090  REF   1              23,2057  02714 1           XNB
0091  REF   2  LAST  286   23,2060  06260 0           NB2NB1
0092                        23,2061  77772 0           VSL1
0093  REF   3  LAST  286   23,2062  26555 0           STOVL   XNB1
0094  REF   1              23,2063  02722 1           YNB
0095                        23,2064  76521 0           MXV     VSL1
0096  REF   3  LAST  287   23,2065  06260 0           NB2NB1
0097  REF   3  LAST  286   23,2066  26563 0           STOVL   YNB1
0098  REF   1              23,2067  02730 1           ZNB
0099                        23,2070  76521 0           MXV     VSL1
0100  REF   4  LAST  287   23,2071  06260 0           NB2NB1
0101  REF   3  LAST  286   23,2072  02571 0           STORE   ZNB1

0102                        23,2073  47034 0           RTB     RTB
0103  REF   2  LAST  287   23,2074  45662 1           TRANSP1
0104  REF   1              23,2075  45676 1           TRANSP2

0105                        23,2076  47375 0  SXTANG1  VLOAD   VXV
0106  REF   4  LAST  287   23,2077  02571 0           ZNB1
0107  REF   5  LAST  286   23,2100  02766 1           STAR
0108                        23,2101  77600 1           BOV
0109                        23,2102  46103 1           +1
0110                        23,2103  40056 0           UNIT    BOV
0111  REF   1              23,2104  46145 0           ZNB=S1
0112  REF   1              23,2105  00027 1           STORE   PDA             PDA = UNIT(ZNB X S)

0113                        23,2106  57441 1           DOT     DCOMP
0114  REF   4  LAST  287   23,2107  02555 0           XNB1
0115  REF   1              23,2110  24023 0           STOVL   SINTH           SIN(SA) = PDA . -XNB
0116  REF   2  LAST  287   23,2111  00027 1           PDA

0117                        23,2112  77641 1           DOT
0118  REF   4  LAST  287   23,2113  02563 0           YNB1
0119  REF   1              23,2114  34021 0           STCALL  COSTH           COS(SA) = PDA . YNB
0120  REF   1              23,2115  47256 0           ARCTRIG
```

```
0121                          23,2116  77634 0          RTB
0122  REF  1                  23,2117  45546 1                   1STO2S
0123  REF  4  LAST  282       23,2120  26774 1          STOVL    SAC
0124  REF  6  LAST  287       23,2121  02766 1                   STAR
0125                          23,2122  77600 1          BOV
0126                          23,2123  46124 1                   +1
0127                          23,2124  72441 0          DOT      SL1
0128  REF  5  LAST  287       23,2125  02571 0                   ZNB1
0129                          23,2126  77726 1          ACOS
0131                          23,2127  62440 0          BMN      SL2
0132  REF  1                  23,2130  46142 1                   SXTALARM      TRUNNION ANGLE NEGATIVE
0133                          23,2131  45200 1          BOV      DSU
0134  REF  2  LAST  288       23,2132  46142 1                   SXTALARM      TRUNNION ANGLE GREATER THAN 90 DEGREES
0135  REF  1                  23,2133  06331 0                   2ODEG-
0136                          23,2134  77634 0          RTB
0137  REF  2  LAST  288       23,2135  45546 1                   1STO2S
0138  REF  4  LAST  282       23,2136  02776 0          STORE    PAC           FOR FLIGHT USE, CULTFLAG IS ON IF
0139                          23,2137  77614 1          CLRGO                  TRUNION IS GREATER THAN 90 DEG
0140  REF  1                  23,2140  01630 0                   CULTFLAG
0141                          23,2141  00034 0                   28D
0142                          23,2142  77614 1  SXTALARM SETGO                 ALARM HAS BEEN REMOVED FROM THIS
0143  REF  2  LAST  288       23,2143  01430 1                   CULTFLAG
0144                          23,2144  00034 0                   28D           SUBROUTINE.ALARM WILL BE SET BY MPI
0145                          23,2145  77745 1  ZNB=S1   DLOAD
0146  REF  1                  23,2146  06325 0                   270DEG
0147  REF  5  LAST  288       23,2147  16774 1          STODL    SAC
0148  REF  1                  23,2150  06327 1                   2ODEGS-
0149  REF  5  LAST  288       23,2151  02776 0          STORE    PAC
0150                          23,2152  77614 1          CLRGO
0151  REF  3  LAST  288       23,2153  01630 0                   CULTFLAG
0152                          23,2154  00034 0                   28D
```

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P0153   THESE TWO ROUTINES COMPUTE THE ACTUAL STATE VECTOR FOR LM, CSM BY ADDING
R0154   THE CONIC R,V AND THE DEVIATIONSR,V. THE STATE VECTORS ARE CONVERTED TO
R0155   METERS B-29 AND METERS/CSEC B-7 AND STORED APPROPRIATELY IN RN,VN OR
R0156   R-OTHER , V-OTHER FOR DOWNLINK. THE ROUTINES NAMES ARE SWITCHED IN THE
R0157   OTHER VEHICLES COMPUTER.

R0158   INPUT
R0159     STATE VECTOR IN TEMPORARY STORAGE AREA
R0160     IF STATE VECTOR IS SCALED POS B27 AND VEL B5
R0161        SET X2 TO +2
R0162     IF STATE VECTOR IS SCALED POS B29 AND VEL B7
R0163        SET X2 TO 0

R0164   OUTPUT
R0165     R(T) IN RN, V(T) IN VN, T IN PIPTIME
R0166   OR
R0167     R(T) IN R-OTHER, V(T) IN V-OTHER   (T IS DEFINED BY T-OTHER)


 0168                          23,2155                          BANK   23
 0169   REF   1                10,2000                          SETLOC COMGEOM2
 0170                          10,2237                          BANK
 0171   REF   1                                                 COUNT  10/GEOM
 0172                          10,2237   43414 1  SVDWN1  BOF   RVQ            SW=1=AVETOMID DOING W-MATRIX INTEG
 01721  REF   1                10,2240   04756 1                AVEMIDSW
 01722                         10,2241   20242 1                +1
 01723                         10,2242   53775 1          VLOAD VSL*
 0173   REF   2  LAST   85     10,2243   01521 0                TDELTAV
 0174                          10,2244   57605 0                0 -7,2
 0175                          10,2245   53655 1          VAD   VSL*
 0176   REF   2  LAST   85     10,2246   01535 0                RCV
 0177                          10,2247   57576 1                0,2
 0178   REF   4  LAST  171     10,2250   25171 1          STOVL RN
 0179   REF   2  LAST   85     10,2251   01527 0                TNUV
 0180                          10,2252   53257 1          VSL*  VAD
 0181                          10,2253   57602 1                0 -4,2
 0182   REF   2  LAST   85     10,2254   01543 1                VCV
 0183                          10,2255   77657 0          VSL*
 0184                          10,2256   57576 1                0,2
 0185   REF   4  LAST  171     10,2257   15177 1          STODL VN
 0186   REF   3  LAST  272     10,2260   01517 0                TET
 0187   REF   3  LAST  171     10,2261   01205 1          STORE PIPTIME
 0188                          10,2262   77616 0          RVQ


 0189                          10,2263   53775 1  SVDWN2  VLOAD VSL*
 0190   REF   3  LAST  289     10,2264   01521 0                TDELTAV
 0191                          10,2265   57605 0                0 -7,2
 0192                          10,2266   53655 1          VAD   VSL*
 0193   REF   3  LAST  289     10,2267   01535 0                RCV
```

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0194                              10,2270   57576 1                 0,2
0195   REF   4 LAST  172          10,2271   25722 1          STOVL  R-OTHER
0196   REF   3 LAST  289          10,2272   01527 0                 TNUV
0197                              10,2273   53257 1          VSL*   VAD
0198                              10,2274   57602 1                 0 -4,2
0199   REF   3 LAST  289          10,2275   01543 1                 VCV
0200                              10,2276   77657 0          VSL*
0201                              10,2277   57576 1                 0,2
0202   REF   4 LAST  172          10,2300   01730 1          STORE  V-OTHER
0203                              10,2301   77616 0          RVQ
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R0204   SUBROUTINE TO COMPUTE THE NATURAL LOG OF C(MPAC, MPAC +1).

R0205             ENTRY:      CALL
R0206                             LOG

R0207   SUBROUTINE RETURNS WITH  -LOG  IN DP MPAC.

R0208   EBANK IS ARBITRARY..


 0209                       14,2000                    BANK   14
 0210   REF   1             23,2000                    SETLOC POWFLIT2
 0211                       23,2155                    BANK
 0212   REF   2 LAST  285 TO  289:   109   109*        COUNT  23/GEOM

 0213                       23,2155   44301 0  LOG     NORM   BDSU          GENERATES LOG BY SHIFTING ARG
 0214   REF  35  LAST  285   23,2156   00160 0          MPAC +3          UNTIL IT LIES BETWEEN .5 AND 1.
 0215   REF   1             23,2157   06212 0          NEARLY1          THE LOG OF THIS PART IS FOUND AND THE
 0216                       23,2160   77776 1          EXIT             LOG OF THE SHIFTED PART IS COMPUTED

 0217   REF   1             23,2161   0 7171 1         TC     POLY      AND ADDED IN. SHIFT COUNT STORED

 0218                       23,2162   00002 0          DEC    2         (N-1, SUPPLIED BY SMERZH)
 0219                       23,2163   00000 1          2DEC   0         IN MPAC +3.
 0219                       23,2164   00000 1
 0220                       23,2165   01001 1          2DEC   .031335467
 0220                       23,2166   14635 1
 0221                       23,2167   00325 0          2DEC   .0130145859
 0221                       23,2170   07310 1
 0222                       23,2171   00541 1          2DEC   .0215738898
 0222                       23,2172   16735 1

 0223   REF  26  LAST  266   23,2173   3 5021 1         CAF    ZERO
 0224   REF  36  LAST  291   23,2174   54 156 1         TS     MPAC +2
 0225                       23,2175   0 0006 1         EXTEND
 0226   REF   1             23,2176   3 2214 1         DCA    CLOG2/32
 0227   REF  37  LAST  291   23,2177   52 155 1         DXCH   MPAC
 0228   REF  38  LAST  291   23,2200   52 160 1         DXCH   MPAC +3
 0229                       23,2201   4 0000 0         COM                     LOAD POSITIVE SHIFT COUNT IN A.
 0230   REF   2  LAST  285   23,2202   0 7256 1         TC     SHORTMP          MULTIPLY BY SHIFT COUNT.

 0231   REF  39  LAST  291   23,2203   52 156 1         DXCH   MPAC +1
 0232   REF  40  LAST  291   23,2204   52 155 1         DXCH   MPAC
 0233   REF  41  LAST  291   23,2205   52 160 1         DXCH   MPAC +3
 0234   REF  42  LAST  291   23,2206   20 155 1         DAS    MPAC
 0235   REF   8  LAST  265   23,2207   0 6006 1         TC     INTPRET          RESULT IN MPAC, MPAC +1

 0236                       23,2210   77616 0          RVQ

 0237                       23,2211   37777 1  NEARLY1 2DEC   .999999999
 0237                       23,2212   37777 1
```

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0238                        23,2213   00542 I  CLOG2/32 2DEC   .0216608494
0238                        23,2214   34414 I
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```
R0239   SUBROUTINE NAME:       EARTH ROTATOR     (EARROT1 OR EARROT2)          DATE:           15 FEB 67
R0241   MOD NO:  N +1                                                          LOG SECTION:    POWERED FLIGHT SUBROS
R0243   MOD BY:  ENTRY GROUP  (BAIRNSFATHER)
R0244   FUNCTIONAL DESCRIPTION:      THIS ROUTINE PROJECTS THE INITIAL EARTH TARGET VECTOR   RTINIT   AHEAD THROUGH
R0246           THE ESTIMATED TIME OF FLIGHT. INITIAL CALL RESOLVES THE INITIAL TARGET VECTOR   RTINIT   INTO EASTERLY
R0249           AND NORMAL COMPONENTS   RTEAST   AND   RTNORM   . INITIAL AND  SUBSEQUENT CALLS ROTATE THIS VECTOR
R0250           ABOUT THE (FULL) UNIT POLAR AXIS   UNITW   THROUGH THE ANGLE    WIE DTEAROT   TO OBTAIN THE ROTATED
R0252           TARGET VECTOR   RT   . ALL VECTORS EXCEPT   UNITW   ARE HALF UNIT.
R0254           THE EQUATIONS ARE
R0255                 - -  -                    -
R0256                 RT = RTINIT + RTNORM (COS(WT) -1) + RTEAST SIN(WT)
R0257           WHERE  WT = WIE DTEAROT
R0258                 RTINIT = INITIAL TARGET VECTOR
R0259                 -      -     -
R0260                 RTEAST = UNITW*RTINIT
R0261                 -      -     -
R0262                 RTNORM = RTEAST*UNITW

R0263           FOR CONTINUOUS UPDATING, ONLY ONE ENTRY TO EARROT1 IS REQUIRED. WITH SUBSEQUENT ENTRIES AT EARROT2.
R0265   CALLING SEQUENCE:  FIRST CALL                    SUBSEQUENT CALL
R0266                     STCALL DTEAROT                 STCALL DTEAROT
R0267                            EARROT1                        EARROT2
R0268                     C(MPAC) UNSPECIFIED            C(MPAC) = DTEAROT
R0269           PUSHLOC = PDL+0, ARBITRARY.  6 LOCATIONS USED.

R0270   SUBROUTINES USED:  NONE
R0271   NORMAL EXIT MODES:   RVQ
R0272   ALARMS:  NONE
R0273   OUTPUT:  RTEAST (-1)          .5 UNIT VECTOR EAST, COMPNT OF RTINIT   LEFT BY FIRST CALL
R0275            RTNORM (-1)          .5 UNIT VECTOR NORML, COMPNT OF RTINIT  LEFT BY FIRST CALL
R0277            RT     (-1)          .5 UNIT TARGET VECTOR, ROTATED          LEFT BY ALL CALLS
R0279            DTEAROT  (-28) CS    MAY BE CHANGED BY EARROT2, IF OVER 1 DAY
R0280   ERASABLE INITIALIZATION REQUIRED:
R0281            UNITW  (0)           UNIT POLAR VECTOR                       PAD LOADED
R0283            RTINIT (-1)          .5 UNIT INITIAL TARGET VECTOR           LEFT BY ENTRY
R0285            DTEAROT  (-28) CS    TIME OF FLIGHT                          LEFT BY CALLER
R0287   DEBRIS:  QPRET,     PDL+0 ... PDL+5
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P0288

 0289   REF  3 LAST  216   E7,1451                        EBANK= RTINIT

 0290                      23,2215   47375 0  EARROT1  VLOAD  VXV
 0291   REF  3 LAST   86   23,2216   01714 1            UNITW          FULL UNIT VECTOR
 0292   REF  4 LAST  294   23,2217   03452 1            RTINIT         .5 UNIT
 0293   REF  2 LAST  118   23,2220   03460 0            STORE  RTEAST  .5 UNIT

 0294                      23,2221   77635 1            VXV
 0295   REF  4 LAST  294   23,2222   01714 1            UNITW          FULL UNIT
 0296   REF  2 LAST  118   23,2223   17466 0            STODL  RTNORM  .5 UNIT
 0297   REF  2 LAST  118   23,2224   03606 1            DTEAROT        (-28) CS

 0298                      23,2225   56204 1  EARROT2  BOVB   DDV
 0299   REF  1            23,2226   57352 1            TCDANZIG       RESET OVFIND, IF ON
 0300   REF  1            23,2227   06256 0            1/WIE
 0301                      23,2230   41400 0            BOV    PUSH
 0302   REF  1            23,2231   46245 0            OVERADAY
 0303                      23,2232   45346 1            COS    DSU
 0304   REF  1            23,2233   15333 0            HIDPHALF
 0305                      23,2234   65361 0            VXSC   PODL    XCH W PUSH LIST
 0306   REF  3 LAST  294   23,2235   03466 0            RTNORM         .5 UNIT
 0307                      23,2236   74356 1            SIN    VXSC
 0308   REF  3 LAST  294   23,2237   03460 0            RTEAST         .5 UNIT
 0309                      23,2240   76455 1            VAD    VSL1
 0310                      23,2241   53455 0            VAD    UNIT    INSURE THAT RT IS 'UNIT'.
 0311   REF  5 LAST  294   23,2242   03452 1            RTINIT         .5 UNIT
 0312   REF  2 LAST  118   23,2243   03474 0            STORE  RT      .5 UNIT TARGET VECTOR

 0313                      23,2244   77616 0            RVQ

 0314                      23,2245   75345 1  OVERADAY DLOAD  SIGN
 0315   REF  2 LAST  294   23,2246   06256 0            1/WIE
 0316   REF  3 LAST  294   23,2247   03606 1            DTEAROT
 0317                      23,2250   77621 1            BDSU
 0318   REF  4 LAST  294   23,2251   03606 1            DTEAROT
 0319   REF  5 LAST  294   23,2252   03606 1            STORE  DTEAROT

 0320                      23,2253   77650 1            GOTO
 0321   REF  1            23,2254   46225 0            EARROT2

A0322                                         WIE      2DEC   .1901487997
 0323                      23,2255   01015 1  1/WIE     2DEC   8616410
 0323                      23,2256   34732 0
 1036                      23,2257   15373 1  NB2NB1    2DEC   +.8431756920 B-1
 1036                      23,2260   11346 0
 1037                      23,2261   00000 1            2DEC   0
 1037                      23,2262   00000 1
 1038                      23,2263   67313 1            2DEC   -.5376381241 B-1
 1038                      23,2264   65307 0
```

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1039                    23,2265   00000 1  ZERINFLT 2DEC   0
1039                    23,2266   00000 1
1040                    23,2267   20000 0  HALFNFLT 2DEC   .5
1040                    23,2270   00000 1
1041                    23,2271   00000 1           2DEC   0
1041                    23,2272   00000 1

1042                    23,2273   10464 0           2DEC   +.5376381241 B-1
1042                    23,2274   12470 1
1043                    23,2275   00000 1           2DEC   0
1043                    23,2276   00000 1
1044                    23,2277   15373 1           2DEC   +.8431756920 B-1
1044                    23,2300   11346 0


1045                    23,2301   15373 1  NB1NB2   2DEC   +.8431756920 B-1
1045                    23,2302   11346 0
1046                    23,2303   00000 1           2DEC   0
1046                    23,2304   00000 1
1047                    23,2305   10464 0           2DEC   +.5376381241 B-1
1047                    23,2306   12470 1
1048                    23,2307   00000 1           2DEC   0
1048                    23,2310   00000 1
1049                    23,2311   20000 0           2DEC   .5
1049                    23,2312   00000 1
1050                    23,2313   00000 1           2DEC   0
1050                    23,2314   00000 1

1051                    23,2315   67313 1           2DEC   -.5376381241 B-1
1051                    23,2316   65307 0
1052                    23,2317   00000 1           2DEC   0
1052                    23,2320   00000 1
1053                    23,2321   15373 1           2DEC   +.8431756920 B-1
1053                    23,2322   11346 0
```

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1054                    23,2323   07020 1  10DEGS-  DEC    3600

1055                    23,2324   60000 1  270DEG   OCT    60000        SHAFT  270 DEGREES  2S COMP.
1056                    23,2325   00000 1           OCT    00000

1057                    23,2326   61740 0  20DEGS-  DEC    -07199
1058                    23,2327   77777 0           DEC    -00000

1059                    23,2330   07020 1  20DEG-   DEC    03600
1060                    23,2331   00000 1           DEC    00000
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```
 0001                          07,2441                    BANK   7
 000101 REF   1                06,2000                    SETLOC IMUCOMP
 000102                        06,3262                    BANK
 0002   REF   2  LAST   84     E3,1460                    EBANK= NBDX

 0100   REF   1                                          COUNT  06/ICOMP

 0112   REF   1                06,3262  3 3516 0  1/PIPA  CAF    LGCOMP      SAVE EBANK OF CALLING PROGRAM
 0113   REF  15  LAST  265     06,3263  56 003 1          XCH    EBANK
 0114   REF   1                06,3264  54 163 1          TS     MODE

 0115   REF   1                06,3265  11'477 0          CCS    GCOMPSW     BYPASS IF GCOMPSW NEGATIVE
 0116                          06,3266  1 3271 1          TCF    +3
 0117                          06,3267  1 3271 1          TCF    +2
 0118   REF   1                06,3270  1 3407 0          TCF    IRIG1       RETURN

 01181                         06,3271  0 0004 0          INHINT               ASSURE COMPLETE COMPENSATION OF DELV'S
A01182                                                                        FOR DOWNLINK.
 0119   REF   1                06,3272  3 5015 0  1/PIPA1  CAF    FOUR        PIPAZ, PIPAY, PIPAX
 0120   REF   4  LAST   70     06,3273  54 132 0          TS     BUF +2

 0121   REF   5  LAST  297     06,3274  50 132 1          INDEX  BUF +2
 0122   REF   1                06,3275  3 1453 1          CA     PIPASCF     (P.P.M.) X 2(-9)
 0123                          06,3276  0 0006 1          EXTEND
 0124   REF   6  LAST  297     06,3277  5 0132 1          INDEX  BUF +2
 0125   REF   1                06,3300  7 1162 1          MP     DELVX       (PP) X 2(+14) NOW (PIPA PULSES) X 2(+5)
 0126   REF  32  LAST  270     06,3301  54 002 1          TS     Q           SAVE MAJOR PART

 0127   REF  20  LAST  246     06,3302  3 0001 0          CA     L           MINOR PART
 0128                          06,3303  0 0006 1          EXTEND
 0129   REF  23  LAST  225     06,3304  7 5012 0          MP     BIT6        SCALE 2(+9)   SHIFT RIGHT 9
 0130   REF   7  LAST  297     06,3305  50 132 1          INDEX  BUF +2
 0131   REF   2  LAST  297     06,3306  55'163 0          TS     DELVX +1    FRACTIONAL PIPA PULSES SCALED 2(+14)

 0132   REF  33  LAST  297     06,3307  3 0002 0          CA     0           MAJOR PART
 0133                          06,3310  0 0006 1          EXTEND
 0134   REF  24  LAST  297     06,3311  7 5012 0          MP     BIT6        SCALE 2(+9)   SHIFT RIGHT 9
 0135   REF   8  LAST  297     06,3312  50 132 1          INDEX  BUF +2
 0136   REF   3  LAST  297     06,3313  21'163 0          DAS    DELVX       (PIPAI) + (PIPAI)(SFE)

 0137   REF   9  LAST  297     06,3314  50 132 1          INDEX  BUF +2
 0138   REF   1                06,3315  4 1452 1          CS     PIPABIAS    (PIPA PULSES)/(CS) X 2(-8)              *
 0139                          06,3316  0 0006 1          EXTEND
 0140   REF   2  LAST   77     06,3317  7 1074 1          MP     1/PIPADT    (CS) X 2(+8)  NOW (PIPA PULSES) X 2(+0)*
 0141                          06,3320  0 0006 1          EXTEND
 0142   REF  23  LAST  234     06,3321  7 5017 0          MP     BIT1        SCALE 2(+14)  SHIFT RIGHT 14            *
 0143   REF  10  LAST  297     06,3322  50 132 1          INDEX  BUF +2
 0144   REF   4  LAST  297     06,3323  21'163 0          DAS    DELVX       (PIPAI) + (PIPAI)(SFE) - (BIAS)(DELTAT)

 0145   REF  11  LAST  297     06,3324  10 132 0          CCS    BUF +2      PIPAZ, PIPAY, PIPAX
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L IMU COMPENSATION PACKAGE

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0146   REF   1          06,3325  6 7716 0        AD     NEGI
0147   REF   1          06,3326  1 3273 0        TCF    1/PIPA1 +1
0148                    06,3327  13 330 0        NOOP                  LESS THAN ZERO IMPOSSIBLE.
01481                   06,3330  0 0003 1        RELINT
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P01482
 0149   REF   2  LAST  297   06,3331  55'477 0  IRIGCOMP TS      GCOMPSW          INDICATE COMMANDS 2 PULSES OR LESS
 0150   REF  12  LAST  297   06,3332  54 130 1           TS      BUF              INDEX COUNTER - IRIGX, IRIGY, IRIGZ

 0151                        06,3333  0 0006 1  IRIGX    EXTEND
 0152   REF   5  LAST  297   06,3334  4 1163 0           DCS     DELVX            (PIPA PULSES) X 2(+14)
 0153   REF  43  LAST  291   06,3335  52 155 1           DXCH    MPAC
 0154   REF   1             06,3336  3 1463 1           CA      ADIAX            (GYRO PULSES)/(PIPA PULSE) X 2(-3)     *
 0155   REF   1             06,3337  0 3412 0           TC      GCOMPSUB         -(ADIAX)(PIPAX)   (GYRO PULSES) X 2(+14)

 0156                        06,3340  0 0006 1           EXTEND
 0157   REF   1             06,3341  4 1165 0           DCS     DELVY            (PIPA PULSES) X 2(+14)
 0158   REF  44  LAST  299   06,3342  52 155 1           DXCH    MPAC
 0159   REF   1             06,3343  4 1466 0           CS      ADSRAX           (GYRO PULSES)/(PIPA PULSE) X 2(-3)     *
 0160   REF   2  LAST  299   06,3344  0 3412 0           TC      GCOMPSUB         +(ADSRAX)(PIPAY)  (GYRO PULSES) X 2(+14)

A01603                                                  EXTEND          ***
A01604                                                  DCS     DELVZ   ***      (PIPA PULSES) X 2(+14)
A01605                                                  DXCH    MPAC    ***
A01606                                                  CA      ADOAX   ***      (GYRO PULSES)/(PIPA PULSE) X 2(-3)     *
A01607                                                  TC      GCOMPSUB ***     -(ADOAX)(PIPAZ)   (GYRO PULSES) X 2(+14)

 0161   REF   3  LAST  297   06,3345  4 1460 0           CS      NBDX             (GYRO PULSES)/(CS) X 2(-5)
 0162   REF   1             06,3346  0 3441 0           TC      DRIFTSUB         -(NBDX)(DELTAT)   (GYRO PULSES) X 2(+14)

 0163                        06,3347  0 0006 1  IRIGY    EXTEND
 0164   REF   2  LAST  299   06,3350  4 1165 0           DCS     DELVY            (PIPA PULSES) X 2(+14)
 0165   REF  45  LAST  299   06,3351  52 155 1           DXCH    MPAC
 0166   REF   1             06,3352  3 1464 0           CA      ADIAY            (GYRO PULSES)/(PIPA PULSE) X 2(-3)     *
 0167   REF   3  LAST  299   06,3353  0 3412 0           TC      GCOMPSUB         -(ADIAY)(PIPAY)   (GYRO PULSES) X 2(+14)

 0168                        06,3354  0 0006 1           EXTEND
 0169   REF   1             06,3355  4 1167 1           DCS     DELVZ            (PIPA PULSES) X 2(+14)
 0170   REF  46  LAST  299   06,3356  52 155 1           DXCH    MPAC
 0171   REF   1             06,3357  4 1467 1           CS      ADSRAY           (GYRO PULSES)/(PIPA PULSE) X 2(-3)     *
 0172   REF   4  LAST  299   06,3360  0 3412 0           TC      GCOMPSUB         +(ADSRAY)(PIPAZ)  (GYRO PULSES) X 2(+14)

A01723                                                  EXTEND          ***
A01724                                                  DCS     DELVX   ***      (PIPA PULSES) X 2(+14)
A01725                                                  DXCH    MPAC    ***
A01726                                                  CA      ADOAY   ***      (GYRO PULSES)/(PIPA PULSE) X 2(-3)     *
A01727                                                  TC      GCOMPSUB ***     -(ADOAY)(PIPAX)   (GYRO PULSES) X 2(+14)

 0173   REF   1             06,3361  4 1461 1           CS      NBDY             (GYRO PULSES)/(CS) X 2(-5)
 0174   REF   2  LAST  299   06,3362  0 3441 0           TC      DRIFTSUB         -(NBDY)(DELTAT)   (GYRO PULSES) X 2(+14)

 0175                        06,3363  0 0006 1  IRIGZ    EXTEND
 0176   REF   3  LAST  299   06,3364  4 1165 0           DCS     DELVY            (PIPA PULSES) X 2(+14)
 0177   REF  47  LAST  299   06,3365  52 155 1           DXCH    MPAC
 0178   REF   1             06,3366  3 1470 0           CA      ADSRAZ           (GYRO PULSES)/(PIPA PULSE) X 2(-3)     *
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 0179   REF   5  LAST  299   06,3367  0 3412 0        TC     GCOMPSUB        -(ADSRAZ)(PIPAY)  (GYRO PULSES) X 2(+14)

 0180                        06,3370  0 0006 1        EXTEND
 0181   REF   2  LAST  299   06,3371  4 1167 1        DCS    DELVZ           (PIPA PULSES) X 2(+14)
 0182   REF  48  LAST  299   06,3372  52 155 1        DXCH   MPAC
 0183   REF   1              06,3373  3 1465 1        CA     ADIAZ           (GYRO PULSES)/(PIPA PULSE) X 2(-3)     *
 0184   REF   6  LAST  300   06,3374  0 3412 0        TC     GCOMPSUB        -(ADIAZ)(PIPAZ)   (GYRO PULSES) X 2(+14)

A01843                                               EXTEND         ***
A01844                                               DCS    DELVX   ***     (PIPA PULSE) X 2(+14)
A01845                                               DXCH   MPAC    ***
A01846                                               CS     ADOAZ   ***     (GYRO PULSES)/(PIPA PULSE) X 2(-3)     *
A01847                                               TC     GCOMPSUB ***    +(ADOAZ)(PIPAX)   (GYRO PULSES) X 2(+14)

 0185   REF   1              06,3375  3 1462 0        CA     NBDZ            (GYRO PULSES)/(CS) X 2(-5)
 0186   REF   3  LAST  299   06,3376  0 3441 0        TC     DRIFTSUB        +(NBDZ)(DELTAT)   (GYRO PULSES) X 2(+14)
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0187   REF   3  LAST  299   06,3377  11'477 0          CCS    GCOMPSW        ARE GYRO COMMANDS GREATER THAN 2 PULSES
0188                        06,3400  1 3402 0          TCF    +2             YES
0189   REF   2  LAST  297   06,3401  1 3407 0          TCF    IRIG1          NO

0191   REF   1               06,3402  3 5073 0          CAF    PRIO21         HIGHER THAN SERVICER-LESS THAN PRELAUNCH
0192   REF  10  LAST  257   06,3403  0 5134 1          TC     NOVAC
0193   REF   4  LAST  299   E3,1460                    EBANK= NBDX
0194   REF   1               06,3404   03474 0         2CADR  1/GYRO
0194   REF   1               06,3405   14063 1

0195                        06,3406  0 0003 1          RELINT
0196   REF   2  LAST  297   06,3407  3 0163 0 IRIG1    CA     MODE           SET EBANK FOR RETURN
0197   REF  16  LAST  297   06,3410  54 003 0          TS     EBANK
0198   REF   6  LAST  224   06,3411  1 4675 0          TCF    SWRETURN

0199   REF  49  LAST  300   06,3412  56 154 1 GCOMPSUB XCH    MPAC           ADIA OR ADSRA COEFFICIENT ARRIVES IN A
0200                        06,3413  0 0006 1          EXTEND                 C(MPAC) = (PIPA PULSES) X 2(+14)
0201   REF  50  LAST  301   06,3414  7 0154 0          MP     MPAC           (GYRO PULSES)/(PIPA PULSE) X 2(-3)     *
0202   REF  14  LAST   70   06,3415  52 123 0          DXCH   VBUF           NOW = (GYRO PULSES) X 2(+11)           *

0203   REF  51  LAST  301   06,3416  3 0155 0          CA     MPAC +1        MINOR PART PIPA PULSES
0204                        06,3417  0 0006 1          EXTEND
0205   REF  52  LAST  301   06,3420  7 0154 0          MP     MPAC           ADIA OR ADSRA
0206   REF  21  LAST  297   06,3421  54 001 1          TS     L
0207   REF  27  LAST  291   06,3422  3 5021 1          CAF    ZERO
0208   REF  15  LAST  301   06,3423  20 123 0          DAS    VBUF           NOW = (GYRO PULSES) X 2(+11)           *

0209   REF  16  LAST  301   06,3424  3 0122 0          CA     VBUF           PARTIAL RESULT - MAJOR
0210                        06,3425  0 0006 1          EXTEND
0211   REF  17  LAST  233   06,3426  7 5004 1          MP     BIT12          SCALE 2(+3)      SHIFT RIGHT 3         *
0212   REF  13  LAST  299   06,3427  50 130 0          INDEX  BUF            RESULT = (GYRO PULSES) X 2(+14)
0213   REF   3  LAST   85   06,3430  21'472 0          DAS    GCOMP          HI(ADIA)(PIPAI)  OR  HI(ADSRA)(PIPAI)

0214   REF  17  LAST  301   06,3431  3 0123 1          CA     VBUF +1        PARTIAL RESULT - MINOR
0215                        06,3432  0 0006 1          EXTEND
0216   REF  18  LAST  301   06,3433  7 5004 1          MP     BIT12          SCALE 2(+3)      SHIFT RIGHT 3         *
0217   REF  22  LAST  301   06,3434  54 001 1          TS     L
0218   REF  28  LAST  301   06,3435  3 5021 1          CAF    ZERO
0219   REF  14  LAST  301   06,3436  50 130 0          INDEX  BUF            RESULT = (GYRO PULSES) X 2(+14)
0220   REF   4  LAST  301   06,3437  21'472 0          DAS    GCOMP          (ADIA)(PIPAI)  OR  (ADSRA)(PIPAI)

0221   REF  34  LAST  297   06,3440  0 0002 0          TC     Q
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0222                          06,3441  0 0006 1  DRIFTSUB EXTEND
0223   REF  15  LAST  301     06,3442  22 131 1           QXCH    BUF +1

0224                          06,3443  0 0006 1           EXTEND                  C(A) = NBD    (GYRO PULSES)/(CS) X 2(-5)
0225   REF   3  LAST  297     06,3444  7 1074 1           MP      1/PIPADT        (CS) X 2(+8)   NOW (GYRO PULSES) X 2(+3)
0226   REF  53  LAST  301     06,3445  22 155 0           LXCH    MPAC +1         SAVE FOR FRACTIONAL COMPENSATION
0227                          06,3446  0 0006 1           EXTEND
0228   REF  18  LAST  253     06,3447  7 5014 0           MP      BIT4            SCALE 2(+11)     SHIFT RIGHT 11
0229   REF  16  LAST  302     06,3450  50 130 0           INDEX   BUF
0230   REF   5  LAST  301     06,3451  21'472 0           DAS     GCOMP           HI(NBD)(DELTAT)   (GYRO PULSES) X 2(+14)

0231   REF  54  LAST  302     06,3452  3 0155 0           CA      MPAC +1         NOW MINOR PART
0232                          06,3453  0 0006 1           EXTEND
0233   REF  19  LAST  302     06,3454  7 5014 0           MP      BIT4            SCALE 2(+11)     SHIFT RIGHT 11
0234   REF  23  LAST  301     06,3455  54 001 1           TS      L
0235   REF  29  LAST  301     06,3456  3 5021 1           CAF     ZERO
0236   REF  17  LAST  302     06,3457  50 130 0           INDEX   BUF             ADD IN FRACTIONAL COMPENSATION
0237   REF   6  LAST  302     06,3460  21'472 0           DAS     GCOMP           (NBD)(DELTAT)     (GYRO PULSES) X 2(+14)

0238   REF   7  LAST  270     06,3461  3 5016 0  DRFTSUB2 CAF     TWO             PIPAX, PIPAY, PIPAZ
0239   REF  18  LAST  302     06,3462  6 0130 0           AD      BUF
0240   REF  19  LAST  302     06,3463  56 130 0           XCH     BUF
0241   REF  74  LAST  271     06,3464  50 000 1           INDEX   A
0242   REF   7  LAST  302     06,3465  11'471 0           CCS     GCOMP           ARE GYRO COMMANDS 1 PULSE OR GREATER
0243                          06,3466  1 3470 0           TCF     +2              YES
0244   REF  20  LAST  302     06,3467  0 0131 1           TC      BUF +1          NO

0245   REF  10  LAST  259     06,3470  7 7716 1           MASK    NEGONE
0246   REF  75  LAST  302     06,3471  10 000 0           CCS     A               ARE GYRO COMMANDS GREATER THAN 2 PULSES
0247   REF   4  LAST  301     06,3472  55'477 0           TS      GCOMPSW         YES - SET GCOMPSW POSITIVE
0248   REF  21  LAST  302     06,3473  0 0131 1           TC      BUF +1          NO
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0249   REF   2  LAST  297   06,3474  3 5015 0  1/GYRO   CAF     FOUR          PIPAZ, PIPAY, PIPAX
0250   REF  22  LAST  302   06,3475  54 130 1           TS      BUF

0251   REF  23  LAST  303   06,3476  50 130 0           INDEX   BUF           SCALE GYRO COMMANDS FOR IMUPULSE
0252   REF   8  LAST  302   06,3477  3 1472 1           CA      GCOMP +1      FRACTIONAL PULSES
0253                        06,3500  0 0006 1           EXTEND
0254   REF  18  LAST  202   06,3501  7 5010 1           MP      BIT8          SHIFT RIGHT 7
0255   REF  24  LAST  303   06,3502  50 130 0           INDEX   BUF
0256   REF   9  LAST  303   06,3503  55'472 0           TS      GCOMP +1      FRACTIONAL PULSES SCALED

0257   REF  30  LAST  302   06,3504  3 5021 1           CAF     ZERO          SET GCOMP = 0 FOR DAS INSTRUCTION
0258   REF  25  LAST  303   06,3505  50 130 0           INDEX   BUF
0259   REF  10  LAST  303   06,3506  57'471 1           XCH     GCOMP         GYRO PULSES
0260                        06,3507  0 0006 1           EXTEND
0261   REF  19  LAST  303   06,3510  7 5010 1           MP      BIT8          SHIFT RIGHT 7
0262   REF  26  LAST  303   06,3511  50 130 0           INDEX   BUF
0263   REF  11  LAST  303   06,3512  21'472 0           DAS     GCOMP         ADD THESE TO FRACTIONAL PULSES ABOVE

0264   REF  27  LAST  303   06,3513  10 130 1           CCS     BUF           PIPAZ, PIPAY, PIPAX
0265   REF   2  LAST  298   06,3514  6 7716 0           AD      NEG1
0266   REF   2  LAST  301   06,3515  1 3475 0           TCF     1/GYRO +1
0267   REF  12  LAST  303   06,3516   01471 1  LGCOMP    ECADR   GCOMP         LESS THAN ZERO IMPOSSIBLE
0268   REF   2  LAST  297   06,3517  3 3516 0           CAF     LGCOMP
0269   REF  34  LAST  263   06,3520  0 4662 1           TC      BANKCALL
0270   REF   2  LAST  243   06,3521   17206 0           CADR    IMUPULSE      CALL GYRO TORQUING ROUTINE
0271   REF  35  LAST  303   06,3522  0 4662 1           TC      BANKCALL
0272   REF   5  LAST  243   06,3523   17577 1           CADR    IMUSTALL      WAIT FOR PULSES TO GET OUT
0273   REF  13  LAST  267   06,3524  1 5217 1           TCF     ENDOFJOB      TEMPORARY

0274   REF   3  LAST  303   06,3525  3 5015 0  GCOMP1   CAF     FOUR          PIPAZ, PIPAY, PIPAX
0275   REF  28  LAST  303   06,3526  54 130 1           TS      BUF

0276   REF  29  LAST  303   06,3527  50 130 0           INDEX   BUF           RESCALE
0277   REF  13  LAST  303   06,3530  3 1472 1           CA      GCOMP +1
0278                        06,3531  0 0006 1           EXTEND
0279   REF  20  LAST  303   06,3532  7 5010 1           MP      BIT8          SHIFT MINOR PART LEFT 7 - MAJOR PART = 0
0280   REF  30  LAST  303   06,3533  50 130 0           INDEX   BUF
0281   REF  14  LAST  303   06,3534  23'472 1           LXCH    GCOMP +1      BITS 8-14 OF MINOR PART WERE = 0

0282   REF  31  LAST  303   06,3535  10 130 1           CCS     BUF           PIPAZ, PIPAY, PIPAX
0283   REF   3  LAST  303   06,3536  6 7716 0           AD      NEG1
0284   REF   1              06,3537  1 3526 1           TCF     GCOMP1 +1
0285                        06,3540   01436 1  V06N30S   VN      0630
0286   REF  14  LAST  303   06,3541  1 5217 1           TCF     ENDOFJOB
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0287   REF   5  LAST  302   06,3542  11'477 0  NBDONLY  CCS    GCOMPSW      BYPASS IF GCOMPSW NEGATIVE
0288                        06,3543  1 3546 1           TCF    +3
0289                        06,3544  1 3546 1           TCF    +2
0290   REF  15  LAST  303   06,3545  1 5217 1           TCF    ENDOFJOB

029005                      06,3546  0 0004 0           INHINT
02901  REF   6  LAST  200   06,3547  10 076 1           CCS    FLAGWRD2     PREREAD T3RUPT MAY COINCIDE
02902  REF  16  LAST  304   06,3550  1 5217 1           TCF    ENDOFJOB
02903  REF  17  LAST  304   06,3551  1 5217 1           TCF    ENDOFJOB
02904                       06,3552  1 3553 0           TCF    +1

0291   REF   4  LAST  221   06,3553  3 0025 0           CA     TIME1        (CS) X 2(+14)
0292   REF   4  LAST  302   06,3554  57'074 0           XCH    1/PIPADT     PREVIOUS TIME
02925                       06,3555  0 0003 1           RELINT
0293                        06,3556  4 0000 0           COM
0294   REF   5  LAST  304   06,3557  6 1074 0           AD     1/PIPADT
0295   REF  76  LAST  302   06,3560  10 000 0  NBD2     CCS    A            CALCULATE ELAPSED TIME
0296   REF  13  LAST  270   06,3561  6 5017 1           AD     ONE          NO TIME1 OVERFLOW
0297   REF   1               06,3562  1 3567 1           TCF    NBD3         RESTORE TIME DIFFERENCE AND JUMP
0298                        06,3563  1 3565 0           TCF    +2           TIME1 OVERFLOW
0299   REF  18  LAST  304   06,3564  1 5217 1           TCF    ENDOFJOB     IF ELAPSED TIME = 0  (DIFFERENCE = -0)

0300                        06,3565  4 0000 0           COM                 CALCULATE ABSOLUTE DIFFERENCE
0301   REF   6  LAST  190   06,3566  6 4777 1           AD     POSMAX

0302                        06,3567  0 0006 1  NBD3     EXTEND              C(A) = DELTAT    (CS) X 2(+14)
0303   REF  18  LAST  231   06,3570  7 5006 0           MP     BIT10        SHIFT RIGHT 5
0304   REF  18  LAST  301   06,3571  52 123 0           DXCH   VBUF
0305                        06,3572  0 0006 1           EXTEND
0306   REF  19  LAST  304   06,3573  3 0123 1           DCA    VBUF
0307   REF  55  LAST  302   06,3574  52 155 1           DXCH   MPAC         DELTAT NOW SCALED (CS) X 2(+19)

0308   REF  31  LAST  303   06,3575  3 5021 1           CAF    ZERO
0309   REF   6  LAST  304   06,3576  55'477 0           TS     GCOMPSW      INDICATE COMMANDS 2 PULSES OR LESS
0310   REF  32  LAST  303   06,3577  54 130 1           TS     BUF          PIPAX, PIPAY, PIPAZ

0311   REF   5  LAST  301   06,3600  4 1460 0           CS     NBDX         (GYRO PULSES)/(CS) X 2(-5)
0312   REF   1               06,3601  0 3617 1           TC     FBIASSUB     -(NBDX)(DELTAT)   (GYRO PULSES) X 2(+14)

0313                        06,3602  0 0006 1           EXTEND
0314   REF  20  LAST  304   06,3603  4 0123 0           DCS    VBUF
0315   REF  56  LAST  304   06,3604  52 155 1           DXCH   MPAC         DELTAT SCALED (CS) X 2(+19)
0316   REF   2  LAST  299   06,3605  3 1461 0           CA     NBDY         (GYRO PULSES)/(CS) X 2(-5)
0317   REF   2  LAST  304   06,3606  0 3617 1           TC     FBIASSUB     -(NBDY)(DELTAT)   (GYRO PULSES) X 2(+14)

0318                        06,3607  0 0006 1           EXTEND
0319   REF  21  LAST  304   06,3610  4 0123 0           DCS    VBUF
0320   REF  57  LAST  304   06,3611  52 155 1           DXCH   MPAC         DELTAT SCALED (CS) X 2(+19)
0321   REF   2  LAST  300   06,3612  4 1462 1           CS     NBDZ         (GYRO PULSES)/(CS) X 2(-5)
0322   REF   3  LAST  304   06,3613  0 3617 1           TC     FBIASSUB     +(NBDZ)(DELTAT)   (GYRO PULSES) X 2(+14)
```

L IMU COMPENSATION PACKAGE USER'S PAGE NO. 9 E3 S3

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0323   REF   7  LAST  304   06,3614  11'477 0          CCS    GCOMPSW        ARE GYRO COMMANDS GREATER THAN 2 PULSES
0324   REF   3  LAST  303   06,3615  1 3474 1          TCF    1/GYRO         YES
0325   REF  19  LAST  304   06,3616  1 5217 1          TCF    ENDOFJOB       NO
```

```
0326   REF  35  LAST  301   06,3617  56 002 0  FBIASSUB XCH    Q
0327   REF  33  LAST  304   06,3620  54 131 0           TS     BUF +1

0328   REF  36  LAST  306   06,3621  3 0002 0           CA     Q          NBD SCALED (GYRO PULSES)/(CS) X 2(-5)
0329                        06,3622  0 0006 1           EXTEND
0330   REF  58  LAST  304   06,3623  7 0154 0           MP     MPAC       DELTAT SCALED (CS) X 2(+19)
0331   REF  34  LAST  306   06,3624  50 130 0           INDEX  BUF
0332   REF  15  LAST  303   06,3625  21'472 0           DAS    GCOMP      HI(NBD)(DELTAT)   (GYRO PULSES) X 2(+14)

0333   REF  37  LAST  306   06,3626  3 0002 0           CA     Q          NOW FRACTIONAL PART
0334                        06,3627  0 0006 1           EXTEND
0335   REF  59  LAST  306   06,3630  7 0155 1           MP     MPAC +1
0336   REF  24  LAST  302   06,3631  54 001 1           TS     L
0337   REF  32  LAST  304   06,3632  3 5021 1           CAF    ZERO
0338   REF  35  LAST  306   06,3633  50 130 0           INDEX  BUF
0339   REF  16  LAST  306   06,3634  21'472 0           DAS    GCOMP      (NBD)(DELTAT)     (GYRO PULSES) X 2(+14)

0340   REF   1              06,3635  1 3461 0           TCF    DRFTSUB2   CHECK MAGNITUDE OF COMPENSATION


03401  REF  36  LAST  303   06,3636  0 4662 1  LASTBIAS TC     BANKCALL
03402  REF   1              06,3637   17156 0           CADR   PIPUSE

0341   REF   8  LAST  305   06,3640  11'477 0           CCS    GCOMPSW    BYPASS IF GCOMPSW NEGATIVE
0342                        06,3641  1 3644 0           TCF    +3
0343                        06,3642  1 3644 0           TCF    +2
0344   REF  20  LAST  305   06,3643  1 5217 1           TCF    ENDOFJOB

0345   REF   1              06,3644  3 7665 0           CAF    PRIO31     2 SECONDS SCALED (CS) X 2(+8)
0346   REF   6  LAST  304   06,3645  57'074 0           XCH    1/PIPADT
0347                        06,3646  4 0000 0           COM
0348   REF   4  LAST  178   06,3647  6 1246 0           AD     PIPTIME1 +1  TIME AT PIPA1 =0
0349   REF   1              06,3650  1 3560 0           TCF    NBD2
```

R0001 PROGRAM NAME - KEYBOARD AND DISPLAY PROGRAM
R0002 MOD NO - 4 DATE - 27 APRIL 1967 ASSEMBLY - PINDISK REV 17
R0003 MOD BY - FILENE
R0004 LOG SECTION - PINBALL GAME BUTTONS AND LIGHTS

R0009 FUNCTIONAL DESCRIPTION-

R0010 THE KEYBOARD AND DISPLAY SYSTEM PROGRAM OPERATES UNDER EXECUTIVE
R0011 CONTROL AND PROCESSES INFORMATION EXCHANGED BETWEEN THE AGC AND THE
R0012 COMPUTER OPERATOR. THE INPUTS TO THE PROGRAM ARE FROM THE KEYBOARD,
R0013 FROM INTERNAL PROGRAMS, AND FROM THE UPLINK.
R0014 THE LANGUAGE OF COMMUNICATION WITH THE PROGRAM IS A PAIR OF WORDS
R0015 KNOWN AS VERB AND NOUN. EACH OF THESE IS REPRESENTED BY A 2 CHARACTER
R0016 DECIMAL NUMBER. THE VERB CODE INDICATES WHAT ACTION IS TO BE TAKEN, THE
R0017 NOUN CODE INDICATES TO WHAT THIS ACTION IS APPLIED. NOUNS USUALLY
R0018 REFER TO A GROUP OF ERASABLE REGISTERS.

R0020 VERBS ARE GROUPED INTO DISPLAYS, LOADS, MONITORS (DISPLAYS THAT ARE
R0021 UPDATED ONCE PER SECOND), SPECIAL FUNCTIONS, AND EXTENDED VERBS(THESE
R0022 ARE OUTSIDE OF THE DOMAIN OF PINBALL AND CAN BE FOUND UNDER LOG SECTION
R0023 :EXTENDED VERBS:).
R0024 A LIST OF VERBS AND NOUNS IS GIVEN IN LOG SECTION :ASSEMBLY AND
R0025 OPERATION INFORMATION:.

R0026 CALLING SEQUENCES-

R0027 KEYBOARD:
R0028 EACH DEPRESSION OF A MAIN (NAVIGATION) KEYBOARD BUTTON ACTIVATES
R0029 INTERRUPT KEYRUPT1 (KEYRUPT2) AND PLACES THE 5 BIT KEY CODE INTO
R00291 CHANNEL 15 (CHANNEL 16). KEYRUPT1 (KEYRUPT2) PLACES THE KEY
R0030 CODE INTO MPAC, ENTERS AN EXECUTIVE REQUEST FOR THE KEYBOARD AND DISPLAY
R0031 PROGRAM (AT :CHARIN:), AND EXECUTES A RESUME.

R0032 UPLINK:
R0033 EACH WORD RECEIVED BY THE UPLINK ACTIVATES INTERRUPT UPRUPT WHICH
R0034 PLACES THE 5 BIT KEY CODE INTO MPAC, ENTERS AN EXECUTIVE REQUEST FOR THE
R0035 KEYBOARD AND DISPLAY PROGRAM (AT:CHARIN:) AND EXECUTES A RESUME.

R0036 INTERNAL PROGRAMS:
R0037 INTERNAL PROGRAMS CALL PINBALL AT :NVSUB: WITH THE DESIRED VERB/NOUN
R0038 CODE IN A (LOW 7 BITS FOR NOUN, NEXT 7 BITS FOR VERB). DETAILS
R0039 DESCRIBED ON REMARKS CARDS JUST BEFORE :NVSUB: AND :NVSBWAIT: (SEE
R0040 SYMBOL TABLE FOR PAGE NUMBERS).

R0045 NORMAL EXIT MODES-

R0046 IF PINBALL WAS CALLED BY EXTERNAL ACTION, THERE ARE FOUR EXITS:
R004605 1) ALL BUT (2), (3), AND (4) EXIT DIRECTLY TO ENDOFJOB.

```
R00461          2) EXTENDED VERBS GO TO THE EXTENDED VERB FAN AS PART OF THE
R00461A            PINBALL EXECUTIVE JOB WITH PRIORITY 30000.  IT IS THE
R00462             RESPONSIBILITY OF THE EXTENDED VERB CALLED TO EVENTUALLY
R00463             CHANGE PRIORITY (IF NECESSARY) AND DO AN ENDOFJOB.
R00463A            ALSO PINBALL IS A NOVAC JOB. EBANK SET FOR COMMON.
R00464          3) VERB 37. CHANGE OF PROGRAM (MAJOR MODE) CALLS :V37: IN THE
R00465             SERVICE ROUTINES AS PART OF THE PINBALL EXEC JOB WITH PRIO
R00466             30000.  THE NEW PROGRAM CODE (MAJOR MODE) IS LEFT IN A.
R00467          4) KEY RELEASE BUTTON CALLS :PINBRNCH: IN THE DISPLAY INTERFACE
R00468             ROUTINES AS PART OF THE PINBALL EXEC JOB WITH PRIO 30000 IF
R00469             THE KEY RELEASE LIGHT IS OFF AND :CADRSTOR: IS NOT +0.

R0047       IF PINBALL WAS CALLED BY INTERNAL PROGRAMS, EXIT FROM PINBALL IS BACK
R0048    TO CALLING ROUTINE.  DETAILS DESCRIBED IN REMARKS CARDS JUST BEFORE
R0049    :NVSUB: AND :NVSBWAIT: (SEE SYMBOL TABLE FOR PAGE NUMBERS).


R0050    ALARM OR ABORT EXIT MODES-

R0051    EXTERNAL INITIATION:
R0052       IF SOME IMPROPER SEQUENCE OF KEY CODES IS DETECTED, THE OPERATOR
R0053    ERROR LIGHT IS TURNED ON AND EXIT IS TO :ENDOFJOB:.

R0054    INTERNAL PROGRAM INITIATION:
R0055       IF AN ILLEGAL V/N COMBINATION IS ATTEMPTED, AN ABORT IS CAUSED
R0056    (WITH OCTAL 01501).
R00561      IF A SECOND ATTEMPT IS MADE TO GO TO SLEEP IN PINBALL, AN ABORT IS
R00562   CAUSED (WITH OCTAL 01206). THERE ARE TWO WAYS TO GO TO SLEEP IN PINBALL:
R00563           1) ENDIDLE OR DATAWAIT.
R00564           2) NVSBWAIT, PRENVBSY, OR NVSUBUSY.

R0057    CONDITIONS LEADING TO THE ABOVE ARE DESCRIBED IN FORTHCOMING MIT/IL
R0058    E-REPORT DESCRIBING KEYBOARD AND DISPLAY OPERATION FOR 278.


R0059    OUTPUT-

R0060       INFORMATION TO BE SENT TO THE DISPLAY PANEL IS LEFT IN THE :DSPTAB:
R0061    BUFFERS REGISTERS (UNDER EXEC CONTROL).  :DSPOUT: (A PART OF T4RUPT)
R0062    HANDLES THE PLACING OF THE :DSPTAB: INFORMATION INTO OUTPUT CHANNEL 10
R0063    IN INTERRUPT.


R0064    ERASABLE INITIALIZATION-

R0065       FRESH START AND RESTART INITIALIZE THE NECESSARY E REGISTERS FOR
R0066    PINBALL IN :STARTSUB:.  REGISTERS ARE:  DSPTAB BUFFER, CADRSTOR,
R0067    REQRET, CLPASS, DSPLOCK, MONSAVE, MONSAVE1, VERBREG, NOUNREG, DSPLIST,
R0068    DSPCOUNT, NOUT.
```

R0069 A COMPLETE LIST OF ALL THE ERASABLES (BOTH RESERVED AND TEMPORARIES) FOR
R0070 PINBALL IS GIVEN BELOW.

R0071 THE FOLLOWING ARE OF GENERAL INTEREST-

R0072 REMARKS CARDS PRECEDE THE REFERENCED SYMBOL DEFINITION. SEE SYMBOL
R0073 TABLE TO FIND APPROPRIATE PAGE NUMBERS.

R0074 NVSUB CALLING POINT FOR INTERNAL USE OF PINBALL.
R0075 OF RELATED INTEREST NVSBWAIT
R0076 NVSUBUSY
R0077 PRENVBSY

R0083 ENDIDLE ROUTINE FOR INTERNAL PROGRAMS WISHING TO GO TO SLEEP WHILE
R0084 AWAITING OPERATORS RESPONSE.

R00851 DSPMM ROUTINE BY WHICH AN INTERNAL PROGRAM MAY DISPLAY A DECIMAL
R00852 PROGRAM CODE (MAJOR MODE) IN THE PROGRAM (MAJOR MODE) LIGHTS.
R008525 (DSPMM DOES NOT DISPLAY DIRECTLY BUT ENTERS EXEC REQUEST
R008527 FOR DSPMMJB WITH PRIO 30000 AND RETURNS TO CALLER.)

R00853 BLANKSUB ROUTINE BY WHICH AN INTERNAL PROGRAM MAY BLANK ANY
R00854 COMBINATION OF THE DISPLAY REGISTERS R1, R2, R3.

R00855 JAMTERM ROUTINES BY WHICH AN INTERNAL PROGRAM MAY PERFORM THE
R00856 JAMPROC TERMINATE (V 34) OR PROCEED (V 33) FUNCTION.

R0086 MONITOR VERBS FOR PERIODIC (1 PER SEC) DISPLAY.

R00861 PLEASE PERFORM, PLEASE MARK SITUATIONS
R00862 REMARKS DESCRIBING HOW AN INTERNAL ROUTINE SHOULD HANDLE
R00863 THESE SITUATIONS CAN BE FOUND JUST BEFORE :NVSUB: (SEE
R00864 SYMBOL TABLE FOR PAGE NUMBER).

R0087 THE NOUN TABLE FORMAT IS DESCRIBED ON A PAGE OF REMARKS CARDS JUST
R0088 BEFORE :DSPABC: (SEE SYMBOL TABLE FOR PAGE NUMBER).

R0089 THE NOUN TABLES THEMSELVES ARE FOUND IN LOG SECTION :PINBALL NOUN
R00891 TABLES:.

R0090 FOR FURTHER DETAILS ABOUT OPERATION OF THE KEYBOARD AND DISPLAY SYSTEM
R0091 PROGRAM, SEE THE MISSION PLAN AND/OR MIT/IL E-2129
R0092 DESCRIBING KEYBOARD AND DISPLAY OPERATION FOR 278.

R0150 THE FOLLOWING QUOTATION IS PROVIDED THROUGH THE COURTESY OF THE AUTHORS.

R0151 ::IT WILL BE PROVED TO THY FACE THAT THOU HAST MEN ABOUT THEE THAT

```
R0152   USUALLY TALK OF A NOUN AND A VERB, AND SUCH ABOMINABLE WORDS AS NO
R0153   CHRISTIAN EAR CAN ENDURE TO HEAR.::

R0154                           HENRY 6, ACT 2, SCENE 4


R0155   THE FOLLOWING ASSIGNMENTS FOR PINBALL ARE MADE ELSEWHERE


R0156   RESERVED FOR PINBALL EXECUTIVE ACTION

R0157   DSPCOUNT ERASE                  DISPLAY POSITION INDICATOR
R0158   DECBRNCH ERASE                  +DEC, - DEC, OCT INDICATOR
R0159   VERBREG  ERASE                  VERB CODE
R0160   NOUNREG  ERASE                  NOUN CODE
R0161   XREG     ERASE                  R1 INPUT BUFFER
R0162   YREG     ERASE                  R2 INPUT BUFFER
R0163   ZREG     ERASE                  R3 INPUT BUFFER
R0164   XREGLP   ERASE                  LO PART OF XREG (FOR DEC CONV ONLY)
R0165   YREGLP   ERASE                  LO PART OF YREG (FOR DEC CONV ONLY)
R0166   HITEMOUT =      YREGLP          TEMP FOR DISPLAY OF HRS, MIN, SEC
R0167                                           MUST = LOTEMOUT-1.
R0168   ZREGLP   ERASE                  LO PART OF ZREG (FOR DEC CONV ONLY)
R0169   LOTEMOUT =      ZREGLP          TEMP FOR DISPLAY OF HRS, MIN, SEC
R0170                                           MUST = HITEMOUT+1.
R0171   MODREG   ERASE                  MODE CODE
R0172   DSPLOCK  ERASE                  KEYBOARD/SUBROUTINE CALL INTERLOCK
R0173   REQRET   ERASE                  RETURN REGISTER FOR LOAD
R0174   LOADSTAT ERASE                  STATUS INDICATOR FOR LOADTST
R0175   CLPASS   ERASE                  PASS INDICATOR CLEAR
R0176   NOUT     ERASE                  ACTIVITY COUNTER FOR DSPTAB
R0177   NOUNCADR ERASE                  MACHINE CADR FOR NOUN
R0178   MONSAVE  ERASE                  N/V CODE FOR MONITOR. (= MONSAVE1-1)
R0179   MONSAVE1 ERASE                  NOUNCADR FOR MONITOR(MATBS) =MONSAVE +1
R01795  MONSAVE2 ERASE                  NVMONOPT OPTIONS
R0180   DSPTAB   ERASE          +13D    0-10,DISPLAY PANEL BUFFER.11-13,C RELAYS
R0181   CADRSTOR ERASE                  ENDIOLE STORAGE
R0182   NVQTEM   ERASE                  NVSUB STORAGE FOR CALLING ADDRESS
R0183                                   MUST = NVBNKTEM-1
R0184   NVBNKTEM ERASE                  NVSUB STORAGE FOR CALLING BANK
R0185                                   MUST = NVQTEM+1
R0186   VERBSAVE ERASE                  NEEDED FOR RECYCLE
R0187   DSPLIST  ERASE                  WAITING REG FOR DSP SYST INTERNAL USE
R0188   EXTVBACT REASE                  EXTENDED VERB ACTIVITY INTERLOCK
R0189   DSPTEM1  ERASE          +2      BUFFER STORAGE AREA 1 (MOSTLY FOR TIME)
R0190   DSPTEM2  ERASE          +2      BUFFER STORAGE AREA 2 (MOSTLY FOR DEG)
R0191   END OF ERASABLES RESERVED FOR PINBALL EXECUTIVE ACTION


R0192   TEMPORARIES FOR PINBALL EXECUTIVE ACTION
```

```
R0193   DSEXIT   =      INTBI5+         RETURN FOR DSPIN
R0194   EXITEM   =      INTBI5+         RETURN FOR SCALE FACTOR ROUTINE SELECT
R0195   BLANKRET =      INTBI5+         RETURN FOR 2BLANK

R0196   WRDRET   =      INTBIT15        RETURN FOR 5BLANK
R0197   WDRET    =      INTBIT15        RETURN FOR DSPWD
R0198   DECRET   =      INTBIT15        RETURN FOR PUTCOM(DEC LOAD)
R0199   21/22REG =      INTBIT15        TEMP FOR CHARIN

R0200   UPDATRET =      POLISH          RETURN FOR UPDATNN, UPDATVB
R0201   CHAR     =      POLISH          TEMP FOR CHARIN
R0202   ERCNT    =      POLISH          COUNTER FOR ERROR LIGHT RESET
R0203   DECOUNT  =      POLISH          COUNTER FOR SCALING AND DISPLAY (DEC)

R0204   SGNON    =      VBUF            TEMP FOR +,- ON
R0205   NOUNTEM  =      VBUF            COUNTER FOR MIXNOUN FETCH
R0206   DISTEM   =      VBUF            COUNTER FOR OCTAL DISPLAY VERBS
R0207   DECTEM   =      VBUF            COUNTER FOR FETCH (DEC DISPLAY VERBS)

R0208   SGNOFF   =      VBUF    +1      TEMP FOR +,- ON
R0209   NVTEMP   =      VBUF    +1      TEMP FOR NVSUB
R0210   SFTEMP1  =      VBUF    +1      STORAGE FOR SF CONST HI PART(=SFTEMP2-1)
R0211   HITEMIN  =      VBUF    +1      TEMP FOR LOAD OF HRS, MIN, SEC
R0212                                   MUST = LOTEMIN-1.
R0213   CODE     =      VBUF    +2      FOR DSPIN
R0214   SFTEMP2  =      VBUF    +2      STORAGE FOR SF CONST LO PART(=SFTEMP1+1)
R0215   LOTEMIN  =      VBUF    +2      TEMP FOR LOAD OF HRS, MIN, SEC
R0216                                   MUST = HITEMIN+1.
R0217   MIXTEMP  =      VBUF    +3      FOR MIXNOUN DATA
R0218   SIGNRET  =      VBUF    +3      RETURN FOR +,- ON

R0219   ALSO MIXTEMP+1 = VBUF+4, MIXTEMP+2 = VBUF+5.

R0220   ENTRET   =      DOTINC          EXIT FROM ENTER

R0221   WDCNT    =      DOTRET          CHAR COUNTER FOR DSPWD
R0222   INREL    =      DOTRET          INPUT BUFFER SELECTOR ( X,Y,Z, REG )

R0223   DSPMMTEM =      MATINC          DSPCOUNT SAVE FOR DSPMM
R0224   MIXBR    =      MATINC          INDICATOR FOR MIXED OR NORMAL NOUN

R0225   TEM1     ERASE                  EXEC TEMP
R0226   DSREL    =      TEM1            REL ADDRESS FOR DSPIN

R0227   TEM2     ERASE                  EXEC TEMP
R0228   DSMAG    =      TEM2            MAGNITUDE STORE FOR DSPIN
R0229   IDADDTEM =      TEM2            MIXNOUN INDIRECT ADDRESS STORAGE

R0230   TEM3     ERASE                  EXEC TEMP
R0231   COUNT    =      TEM3            FOR DSPIN
```

```
R0232   TEM4     ERASE                  EXEC TEMP
R0233   LSTPTR   =      TEM4            LIST POINTER FOR GRABUSY
R0234   RELRET   =      TEM4            RETURN FOR RELDSP
R0235   FREERET  =      TEM4            RETURN FOR FREEDSP
R0236   DSPWORET =      TEM4            RETURN FOR DSPSIGN
R0237   SEPSCRET =      TEM4            RETURN FOR SEPSEC
R0238   SEPMNRET =      TEM4            RETURN FOR SEPMIN

R0239   TEM5     ERASE                  EXEC TEMP
R0240   NOUNADD  =      TEM5            TEMP STORAGE FOR NOUN ADDRESS

R0241   NNADTEM  ERASE                  TEMP FOR NOUN ADDRESS TABLE ENTRY
R0242   NNTYPTEM ERASE                  TEMP FOR NOUN TYPE TABLE ENTRY
R0243   IDAD1TEM ERASE                  TEMP FOR INDIR ADRESS TABLE ENTRY(MIXNN)
R0244                                   MUST = IDAD2TEM-1, = IDAD3TEM-2.
R0245   IDAD2TEM ERASE                  TEMP FOR INDIR ADRESS TABLE ENTRY(MIXNN)
R0246                                   MUST = IDAD1TEM+1, = IDAD3TEM-1.
R0247   IDAD3TEM ERASE                  TEMP FOR INDIR ADRESS TABLE ENTRY(MIXNN)
R0248                                   MUST = IDAD1TEM+2, = IDAD2TEM+1.
R0249   RUTMXTEM ERASE                  TEMP FOR SF ROUT TABLE ENTRY(MIXNN ONLY)
R0250   END OF TEMPORARIES FOR PINBALL EXECUTIVE ACTION

R0250I  ADDITIONAL TEMPORARIES FOR PINBALL EXECUTIVE ACTION

R02502  MPAC, THRU MPAC +6
R02503  BUF, +1, +2
R02504  BUF2, +1, +2
R02506  MPTEMP
R02507  ADDRWD
R02509    END OF ADDITIONAL TEMPS FOR PINBALL EXEC ACTION


R0251   RESERVED FOR PINBALL INTERRUPT ACTION

R0252   DSPCNT   ERASE                  COUNTER FOR DSPOUT
R0253   UPLOCK   ERASE                  BIT1 = UPLINK INTERLOCK (ACTIVATED BY
A0254                                                  RECEPTION OF A BAD MESSAGE IN UPLINK)
R0255   END OF ERASABLES RESERVED FOR PINBALL INTERRUPT ACTION


R0256   TEMPORARIES FOR PINBALL INTERRUPT ACTION

R0257   KEYTEMP1 =      WAITEXIT        TEMP FOR KEYRUPT, UPRUPT
R0258   DSRUPTEM =      WAITEXIT        TEMP FOR DSPOUT
R0259   KEYTEMP2 =      RUPTAGN         TEMP FOR KEYRUPT, UPRUPT
R0260   END OF TEMPORARIES FOR PINBALL INTERRUPT ACTION
```

```
R0261   THE INPUT CODES ASSUMED FOR THE KEYBOARD ARE.
R0262   0          10000
R0263   1          00001
R0264   9          01001
R0265   VERB       10001
R0266   ERROR RES  10010
R0267   KEY RLSE   11001
R0268   +          11010
R0269   -          11011
R0270   ENTER      11100
R0271   CLEAR      11110
R0272   NOUN       11111


R0273   OUTPUT FORMAT FOR DISPLAY PANEL. SET OUTO TO  AAAABCCCCCDDDDD.
R0274   A-S SELECT A RELAYWORD. THIS DETERMINES WHICH PAIR OF CHARACTERS ARE
R0275   ENERGIZED.
R0276   B FOR SPECIAL RELAYS SUCH AS SIGNS ETC.
R0277   C-S  5 BIT RELAY CODE FOR LEFT CHAR OF PAIR SELECTED BY RELAYWORD
R0278   D-S  5 BIT RELAY CODE FOR RIGHTCHAR OF PAIR SELECTED BY RELAYWORD.

R0279   THE PANEL APPEARS AS FOLLOWS,
R0280   MD1    MD2                              (MAJOR MODE)
R0281   VD1    VD2 (VERB)    ND1    ND2         (NOUN)
R0282   R1D1   R1D2   R1D3   R1D4   R1D5        (R1)
R0283   R2D1   R2D2   R2D3   R2D4   R2D5        (R2)
R0284   R3D1   R3D2   R3D3   R3D4   R3D5        (R3)

R0285   EACH OF THESE IS GIVEN A DSPCOUNT NUMBER FOR USE WITHIN COMPUTATION ONLY
R0286   MD1   25     R2D1  11          ALL ARE OCTAL
R0287   MD2   24     R2D2  10
R0288   VD1   23     R2D3   7
R0289   VD2   22     R2D4   6
R0290   ND1   21     R2D5   5
R0291   ND2   20     R3D1   4
R0292   R1D1  16     R3D2   3
R0293   R1D2  15     R3D3   2
R0294   R1D3  14     R3D4   1
R0295   R1D4  13     R3D5   0
R0296   R1D5  12


R0297   THERE IS AN 11 REGISTER TABLE (DSPTAB) FOR THE DISPLAY PANEL.

R0298   DSPTAB RELAYWD       BIT11     BITS 10-6     BITS 5-1
R0299   RELADD
R0300   10     1011                    MD1  (25)     MD2  (24)
R0301   9      1010                    VD1  (23)     VD2  (22)
R0302   8      1001                    ND1  (21)     ND2  (20)
R0303   7      1000                                  R1D1 (16)
```

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R0304	6	0111		+R1	R1D2 (15)	R1D3 (14)
R0305	5	0110		-R1	R1D4 (13)	R1D5 (12)
R0306	4	0101		+R2	R2D1 (11)	R2D2 (10)
R0307	3	0100		-R2	R2D3 (7)	R2D4 (6)
R0308	2	0011			R2D5 (5)	R3D1 (4)
R0309	1	0010		+R3	R3D2 (3)	R3D3 (2)
R0310	0	0001		-R3	R3D4 (1)	R3D5 (0)
R0311		0000	NO RELAYWORD			

R0312 THE 5 BIT OUTPUT RELAY CODES ARE:

R0313	BLANK	00000
R0314	0	10101
R0315	1	00011
R0316	2	11001
R0317	3	11011
R0318	4	01111
R0319	5	11110
R0320	6	11100
R0321	7	10011
R0322	8	11101
R0323	9	11111

R03231 OUTPUT BITS USED BY PINBALL:

R03232	KEY RELEASE LIGHT	- BIT 5 OF CHANNEL 11
R03233	VERB/NOUN FLASH	- BIT 6 OF CHANNEL 11
R03234	OPERATOR ERROR LIGHT	- BIT 7 OF CHANNEL 11

P0324 START OF EXECUTIVE SECTION OF PINBALL

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0325                            40,2000                 BANK    40
032501 REF   1                  40,2000                 SETLOC  PINBALL1
032502                          40,2000                 BANK

03255  REF   1                                          COUNT   40/PIN

0330   REF  14  LAST  304       40,2000  3 5017 1  CHARIN  CAF     ONE          BLOCK DISPLAY SYST
0331   REF   2  LAST  192       40,2001  57'012 0          XCH     DSPLOCK      MAKE DSP SYST BUSY, BUT SAVE OLD
0332   REF   1                  40,2002  54 115 0          TS      21/22REG     C(DSPLOCK) FOR ERROR LIGHT RESET.
03321  REF   2  LAST  192       40,2003  11'042 1          CCS     CADRSTOR     ALL KEYS EXCEPT ER TURN ON KR LITE IF
03322                           40,2004  0 2006 0          TC      +2           CADRSTOR IS FULL.  THIS REMINDS OPERATOR
03323  REF   1                  40,2005  0 2013 1          TC      CHARIN2      TO RE-ESTABLISH A FLASHING DISPLAY
03324  REF   1                  40,2006  4 2057 0          CS      ELRCODE1     WHICH HE HAS OBSCURED WITH DISPLAYS OF
03325  REF  60  LAST  306       40,2007  6 0154 1          AD      MPAC         HIS OWN (SEE REMARKS PRECEDING ROUTINE
03326                           40,2010  0 0006 1          EXTEND               VBRELDSP).
03327  REF   2  LAST  315       40,2011  1 2013 0          BZF     CHARIN2
03328  REF   1                  40,2012  0 4410 0          TC      RELDSPON
0333   REF  61  LAST  315       40,2013  56 154 1  CHARIN2 XCH     MPAC
0334   REF   1                  40,2014  54 117 1          TS      CHAR
0335   REF  77  LAST  304       40,2015  50 000 1          INDEX   A
0336                            40,2016  0 2017 0          TC      +1           INPUT CODE     FUNCTION
0337   REF   1                  40,2017  0 3341 1          TC      CHARALRM     0
0338   REF   1                  40,2020  0 2076 1          TC      NUM          1
0339   REF   2  LAST  315       40,2021  0 2076 1          TC      NUM          2
0340   REF   3  LAST  315       40,2022  0 2076 1          TC      NUM          3
0341   REF   4  LAST  315       40,2023  0 2076 1          TC      NUM          4
0342   REF   5  LAST  315       40,2024  0 2076 1          TC      NUM          5
0343   REF   6  LAST  315       40,2025  0 2076 1          TC      NUM          6
0344   REF   7  LAST  315       40,2026  0 2076 1          TC      NUM          7
0345   REF   1                  40,2027  0 2062 1          TC      89TEST       10                  8
0346   REF   2  LAST  315       40,2030  0 2062 1          TC      89TEST       11                  9
0347   REF   2  LAST  315       40,2031  0 3341 1          TC      CHARALRM     12
0348   REF   3  LAST  315       40,2032  0 3341 1          TC      CHARALRM     13
0349   REF   4  LAST  315       40,2033  0 3341 1          TC      CHARALRM     14
0350   REF   5  LAST  315       40,2034  0 3341 1          TC      CHARALRM     15
0351   REF   6  LAST  315       40,2035  0 3341 1          TC      CHARALRM     16
0352   REF   7  LAST  315       40,2036  0 3341 1          TC      CHARALRM     17
0353   REF   8  LAST  315       40,2037  0 2074 0          TC      NUM     -2   20                  0
0354   REF   1                  40,2040  0 2255 1          TC      VERB         21                  VERB
0355   REF   1                  40,2041  0 3510 0          TC      ERROR        22                  ERROR LIGHT RESET
0356   REF   8  LAST  315       40,2042  0 3341 1          TC      CHARALRM     23
0357   REF   9  LAST  315       40,2043  0 3341 1          TC      CHARALRM     24
0358   REF  10  LAST  315       40,2044  0 3341 1          TC      CHARALRM     25
0359   REF  11  LAST  315       40,2045  0 3341 1          TC      CHARALRM     26
0360   REF  12  LAST  315       40,2046  0 3341 1          TC      CHARALRM     27
0361   REF  13  LAST  315       40,2047  0 3341 1          TC      CHARALRM     30
0362   REF   1                  40,2050  0 3366 1          TC      VBRELDSP     31                  KEY RELEASE
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0363   REF   1              40,2051  0 2310 1           TC     POSGN          32                  +
0364   REF   1              40,2052  0 2275 0           TC     NEGSGN         33                  -
0365   REF   1              40,2053  0 2060 0           TC     ENTERJMP       34                  ENTER
0366   REF  14  LAST  315   40,2054  0 3341 1           TC     CHARALRM       35
0367   REF   1              40,2055  0 2370 1           TC     CLEAR          36                  CLEAR
0368   REF   1              40,2056  0 2271 1           TC     NOUN           37                  NOUN

03685                       40,2057   00022 1  ELRCODE1  OCT    22
0369   REF  16  LAST  266   40,2060  0 4701 0  ENTERJMP  TC     POSTJUMP
0370   REF   1              40,2061   62002 1           CADR   ENTER

0371   REF   3  LAST  192   40,2062  10 777 1  89TEST    CCS    DSPCOUNT
0372                        40,2063  0 2067 1           TC     +4             +
0373                        40,2064  0 2067 1           TC     +3             +0
0374   REF  21  LAST  306   40,2065  0 5217 0           TC     ENDOFJOB       - BLOCK DATA IN IF DSPCOUNT IS - OR -0
0375   REF  22  LAST  316   40,2066  0 5217 0           TC     ENDOFJOB       -0
0376   REF   3  LAST  204   40,2067  3 6214 0           CAF    THREE
0377   REF   1              40,2070  7 1000 1           MASK   DECBRNCH
0378   REF  78  LAST  315   40,2071  10 000 0           CCS    A
0379   REF   9  LAST  315   40,2072  0 2076 1           TC     NUM            IF DECBRNCH IS +, 8 OR 9 OK
0380   REF  15  LAST  316   40,2073  0 3341 1           TC     CHARALRM       IF DECBRNCH IS +0, REJECT 8 OR 9

R0381  NUM ASSEMBLES OCTAL 3 BITS AT A TIME. FOR DECIMAL IT CONVERTS INCOMING
R0382  WORD AS A FRACTION, KEEPING RESULTS TO DP.
R0383  OCTAL RESULTS ARE LEFT IN XREG, YREG, OR ZREG. HI PART OF DEC IN XREG,
R0384  YREG, ZREG. THE LOW PARTS IN XREGLP, YREGLP, OR ZREGLP)
R0385  DECBRNCH IS LEFT AT +0 FOR OCT, +1 FOR + DEC, +2 FOR - DEC.
R0386  IF DSPCOUNT WAS LEFT -, NO MORE DATA IS ACCEPTED.

0387   REF  33  LAST  306   40,2074  3 5021 1           CAF    ZERO
0388   REF   2  LAST  315   40,2075  54 117 1           TS     CHAR
0389   REF   4  LAST  316   40,2076  10 777 1  NUM      CCS    DSPCOUNT
0390                        40,2077  0 2103 1           TC     +4             +
0391                        40,2100  0 2103 1           TC     +3             +0
0392                        40,2101  0 2102 0           TC     +1             -BLOCK DATA IN IF DSPCOUNT IS -
0393   REF  23  LAST  316   40,2102  0 5217 0           TC     ENDOFJOB       -0
0394   REF   1              40,2103  0 2225 0           TC     GETINREL
0395   REF   2  LAST  192   40,2104  11'015 0           CCS    CLPASS         IF CLPASS IS + OR +0, MAKE IT +0.
0396   REF  34  LAST  316   40,2105  3 5021 1           CAF    ZERO
0397   REF   3  LAST  316   40,2106  55'015 0           TS     CLPASS
0398                        40,2107  0 2110 0           TC     +1
0399   REF   3  LAST  316   40,2110  50 117 0           INDEX  CHAR
0400   REF   2  LAST  135   40,2111  3 4072 0           CAF    RELTAB
0401   REF   2  LAST  233   40,2112  7 4362 0           MASK   LOW5
0402   REF   1              40,2113  54 124 1           TS     CODE
0403   REF   5  LAST  316   40,2114  3 0777 0           CA     DSPCOUNT
0404   REF   1              40,2115  54 143 0           TS     COUNT
0405   REF   1              40,2116  0 3227 0           TC     DSPIN
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 0406   REF   4  LAST  316   40,2117  3 6214 0          CAF    THREE
 0407   REF   2  LAST  316   40,2120  7 1000 1          MASK   DECBRNCH
 0408   REF  79  LAST  316   40,2121  10 000 0          CCS    A              +0, OCTAL.  +1, + DEC.  +2, - DEC.
 0409   REF   1              40,2122  0 2133 1          TC     DECTOBIN       +
 0410   REF   1              40,2123  50 137 1          INDEX  INREL          +0 OCTAL
 0411   REF   2  LAST  192   40,2124  57'001 1          XCH    VERBREG
 0412   REF   1              40,2125  54 022 0          TS     CYL
 0413   REF   2  LAST  317   40,2126  4 0022 0          CS     CYL
 0414   REF   3  LAST  317   40,2127  4 0022 0          CS     CYL
 0415   REF   4  LAST  317   40,2130  56 022 1          XCH    CYL
 0416   REF   4  LAST  316   40,2131  6 0117 0          AD     CHAR
 0417   REF   1              40,2132  0 2150 1          TC     ENDNMTST
 0418   REF   2  LAST  317   40,2133  50 137 1 DECTOBIN INDEX  INREL
 0419   REF   3  LAST  317   40,2134  57'001 1          XCH    VERBREG
 0420   REF  62  LAST  315   40,2135  54 154 0          TS     MPAC           SUM X 2EXP-14 IN MPAC
 0421   REF  35  LAST  316   40,2136  3 5021 1          CAF    ZERO
 0422   REF  63  LAST  317   40,2137  54 155 1          TS     MPAC    +1
 0423   REF   2  LAST  191   40,2140  3 4377 0          CAF    TEN            10 X 2EXP-14
 0424   REF   3  LAST  291   40,2141  0 7256 1          TC     SHORTMP        10SUM X 2EXP-28 IN MPAC, MPAC+1
 0425   REF  64  LAST  317   40,2142  56 155 0          XCH    MPAC    +1
 0426   REF   5  LAST  317   40,2143  6 0117 0          AD     CHAR
 0427   REF  65  LAST  317   40,2144  54 155 1          TS     MPAC    +1
 0428   REF   2  LAST  317   40,2145  0 2150 1          TC     ENDNMTST       NO OF
 0429   REF  65  LAST  317   40,2146  26 154 0          ADS    MPAC           OF MUST BE 5TH CHAR
 0430   REF   1              40,2147  0 2166 1          TC     DECEND
 0431   REF   3  LAST  317   40,2150  50 137 1 ENDNMTST INDEX  INREL
 0432   REF   4  LAST  317   40,2151  55'001 0          TS     VERBREG
 0433   REF   6  LAST  316   40,2152  4 0777 1          CS     DSPCOUNT
 0434   REF   4  LAST  317   40,2153  50 137 1          INDEX  INREL
 0435   REF   1              40,2154  6 2216 0          AD     CRITCON
 0436                        40,2155  0 0006 1          EXTEND
 0437   REF   1              40,2156  1 2160 0          BZF    ENDNUM         -0, DSPCOUNT = CRITCON
 0438   REF   1              40,2157  0 2213 0          TC     MORNUM         - , DSPCOUNT G/ CRITCON
 0439   REF   5  LAST  317   40,2160  3 6214 0 ENDNUM   CAF    THREE
 0440   REF   3  LAST  317   40,2161  7 1000 1          MASK   DECBRNCH
 0441   REF  80  LAST  317   40,2162  10 000 0          CCS    A
 0442   REF   2  LAST  317   40,2163  0 2166 1          TC     DECEND
 0443   REF   7  LAST  317   40,2164  4 0777 1 ENDALL   CS     DSPCOUNT       BLOCK NUMIN BY PLACING DSPCOUNT
 0444   REF   2  LAST  317   40,2165  0 2214 1          TC     MORNUM  +1     NEGATIVELY
 0445   REF  15  LAST  315   40,2166  4 5017 0 DECEND   CS     ONE
 0446   REF   5  LAST  317   40,2167  6 0137 1          AD     INREL
 0447                        40,2170  0 0006 1          EXTEND
 0448   REF   1              40,2171  6 2164 0          BZMF   ENDALL         IF INREL=0,1(VBREG,NNREG), LEAVE WHOLE
 0449   REF   1              40,2172  0 7052 1          TC     DMP            IF INREL=2,3,4(R1,R2,R3),CONVERT TO FRAC
A0450                                                                        MULT SUM X 2EXP-28 IN MPAC, MPAC+1 BY
 0451   REF   1              40,2173   02223 0          ADRES  DECON          2EXP14/10EXP5. GIVES(SUM/10EXP5)X2EXP-14
 0452   REF   6  LAST  317   40,2174  3 6214 0          CAF    THREE          IN MPAC, +1, +2.
 0453   REF   4  LAST  317   40,2175  7 1000 1          MASK   DECBRNCH
 0454   REF  81  LAST  317   40,2176  50 000 1          INDEX  A
 0455                        40,2177  0 2177 1          TC     +0
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0456   REF   1                  40,2200  0 2204 0           TC     +DECSGN
0457                            40,2201  0 0006 1           EXTEND                    - CASE
0458   REF  67  LAST  317       40,2202  4 0156 1           DCS    MPAC    +1
0459   REF  68  LAST  318       40,2203  52 156 1           DXCH   MPAC    +1
0460   REF  69  LAST  318       40,2204  56 156 0 +DECSGN   XCH    MPAC    +2
0461   REF   6  LAST  317       40,2205  50 137 1           INDEX  INREL
0462   REF   1                  40,2206  55'004 0           TS     XREGLP  -2
0463   REF  70  LAST  318       40,2207  56 155 0           XCH    MPAC    +1
0464   REF   7  LAST  318       40,2210  50 137 1           INDEX  INREL
0465   REF   5  LAST  317       40,2211  55'001 0           TS     VERBREG
0466   REF   2  LAST  317       40,2212  0 2164 0           TC     ENDALL
0467   REF   8  LAST  317       40,2213  10 777 1 MORNUM    CCS    DSPCOUNT         DECREMENT DSPCOUNT
0468   REF   9  LAST  318       40,2214  54 777 1           TS     DSPCOUNT
0469   REF  24  LAST  316       40,2215  0 5217 0           TC     ENDOFJOB

0470                            40,2216   00022 1 CRITCON   OCT    22               (DEC 18)
0471                            40,2217   00020 0           OCT    20               (DEC 16)
0472                            40,2220   00012 1           OCT    12               (DEC 10)
0473                            40,2221   00005 1           OCT    5
0474                            40,2222   00000 1           OCT    0

0475                            40,2223   05174 0 DECON     2DEC   E-5 B14         2EXP14/10EXP5 = .16384 DEC
0475                            40,2224   13261 0

R0476  GETINREL GETS PROPER DATA REG REL ADDRESS FOR CURRENT C(DSPCOUNT) AND
R0477  PUTS IN INTO INREL. +0 VERBREG, 1 NOUNREG, 2 XREG, 3 YREG, 4 ZREG.

0478   REF  10  LAST  318       40,2225  50 777 0 GETINREL INDEX  DSPCOUNT
0479   REF   1                  40,2226  3 2231 0           CAF    INRELTAB
0480   REF   8  LAST  318       40,2227  54 137 0           TS     INREL            (A TEMP, REG)
0481   REF  38  LAST  306       40,2230  0 0002 0           TC     Q

0482                            40,2231   00004 0 INRELTAB  OCT    4                R3D5 (DSPCOUNT = 0)
0483                            40,2232   00004 0           OCT    4                R3D4           =(1)
0484                            40,2233   00004 0           OCT    4                R3D3           =(2)
0485                            40,2234   00004 0           OCT    4                R3D2           =(3)
0486                            40,2235   00004 0           OCT    4                R3D1           =(4)
0487                            40,2236   00003 1           OCT    3                R2D5           =(5)
0488                            40,2237   00003 1           OCT    3                R2D4           =(6)
0489                            40,2240   00003 1           OCT    3                R2D3           =(7)
0490                            40,2241   00003 1           OCT    3                R2D2           =(8D)
0491                            40,2242   00003 1           OCT    3                R2D1           =(9D)
0492                            40,2243   00002 0           OCT    2                R1D5           =(10D)
0493                            40,2244   00002 0           OCT    2                R1D4           =(11D)
0494                            40,2245   00002 0           OCT    2                R1D3           =(12D)
0495                            40,2246   00002 0           OCT    2                R1D2           =(13D)
0496                            40,2247   00002 0           OCT    2                R1D1           =(14D)
0497   REF   1                  40,2250  0 5747 0           TC     CCSHOLE          NO DSPCOUNT NUMBER = 15D
0498                            40,2251   00001 0           OCT    1                ND2            =(16D)
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 0499                          40,2252   00001 0          OCT    1              ND1            =(17D)
 0500                          40,2253   00000 1          OCT    0              VD2            =(18D)
 0501                          40,2254   00000 1          OCT    0              VD1            =(19D)


 0502   REF  36  LAST  317     40,2255   3 5021 1  VERB    CAF    ZERO
 0503   REF   6  LAST  318     40,2256   55'001 0          TS     VERBREG
 0504   REF   2  LAST  192     40,2257   3 4374 0          CAF    VD1
 0505   REF  11  LAST  318     40,2260   54 777 1  NVCOM   TS     DSPCOUNT
 0506   REF   1                40,2261   0 2502 1          TC     2BLANK
 0507   REF  16  LAST  317     40,2262   3 5017 1          CAF    ONE
 0508   REF   5  LAST  317     40,2263   55'000 1          TS     DECBRNCH       SET FOR DEC V/N CODE
 0509   REF  37  LAST  319     40,2264   3 5021 1          CAF    ZERO
 0510   REF   2  LAST  192     40,2265   55'013 0          TS     REQRET         SET FOR ENTPASO
 0511   REF   1                40,2266   3 4233 1          CAF    ENDINST        IF DSPALARM OCCURS BEFORE FIRST ENTPASO
 0512   REF   1                40,2267   54 136 1          TS     ENTRET         OR NVSUB, ENTRET MUST ALREADY BE SET
A0513                                                                            TO TC ENDOFJOB
 0514   REF  25  LAST  318     40,2270   0 5217 0          TC     ENDOFJOB
 0515   REF  38  LAST  319     40,2271   3 5021 1  NOUN    CAF    ZERO
 0516   REF   7  LAST  270     40,2272   55'002 0          TS     NOUNREG
 0517   REF   1                40,2273   3 4375 1          CAF    ND1            ND1, OCT 21 (DEC 17)
 0518   REF   1                40,2274   0 2260 1          TC     NVCOM

 0519   REF   1                40,2275   0 2347 0  NEGSGN  TC     SIGNTEST
 0520   REF   1                40,2276   0 2334 1          TC     -ON
 0521   REF   8  LAST  302     40,2277   3 5016 0          CAF    TWO
 0522   REF   9  LAST  318     40,2300   50 137 1  BOTHSGN INDEX  INREL          SET DEC COMP BIT TO 1 (IN DECBRNCH)
 0523   REF  19  LAST  226     40,2301   6 5011 1          AD     BIT7           BIT 5 FOR R1,  BIT 4 FOR R2,
 0524   REF   6  LAST  319     40,2302   27'000 1          ADS    DECBRNCH       BIT 3 FOR R3.
 0525   REF   4  LAST  316     40,2303   11'015 0  FIXCLPAS CCS   CLPASS         IF CLPASS IS + OR +0, MAKE IT +0.
 0526   REF  39  LAST  319     40,2304   3 5021 1          CAF    ZERO
 0527   REF   5  LAST  319     40,2305   55'015 0          TS     CLPASS
 0528                          40,2306   0 2307 1          TC     +1
 0529   REF  28  LAST  319     40,2307   0 5217 0          TC     ENDOFJOB

 0530   REF   2  LAST  319     40,2310   0 2347 0  POSGN   TC     SIGNTEST
 0531   REF   1                40,2311   0 2314 0          TC     +ON
 0532   REF  17  LAST  319     40,2312   3 5017 1          CAF    ONE
 0533   REF   1                40,2313   0 2300 0          TC     BOTHSGN

 0534   REF  39  LAST  318     40,2314   22 002 0  +ON     LXCH   0
 0535   REF   2  LAST  316     40,2315   0 2225 0          TC     GETINREL
 0536   REF  10  LAST  319     40,2316   50 137 1          INDEX  INREL
 0537   REF   1                40,2317   3 2342 0          CAF    SGNTAB  -2
 0538   REF   1                40,2320   54 123 0          TS     SGNOFF
 0539   REF  18  LAST  319     40,2321   6 5017 1          AD     ONE
 0540   REF   1                40,2322   54 122 1          TS     SGNON
 0541   REF  40  LAST  319     40,2323   3 5021 1  SGNCOM  CAF    ZERO
 0542   REF   2  LAST  316     40,2324   54 124 1          TS     CODE
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0543   REF   2  LAST  319   40,2325  56 123 1          XCH    SGNOFF
0544   REF   1              40,2326  0 3311 1          TC     IIDSPIN
0545   REF  13  LAST  202   40,2327  3 5005 1          CAF    BIT11
0546   REF   3  LAST  319   40,2330  54 124 1          TS     CODE
0547   REF   2  LAST  319   40,2331  56 122 0          XCH    SGNON
0548   REF   2  LAST  320   40,2332  0 3311 1          TC     IIDSPIN
0549   REF  25  LAST  306   40,2333  0 0001 0          TC     L
0550   REF  40  LAST  319   40,2334  22 002 0  -ON     LXCH   Q
0551   REF   3  LAST  319   40,2335  0 2225 0          TC     GETINREL
0552   REF  11  LAST  319   40,2336  50 137 1          INDEX  INREL
0553   REF   2  LAST  319   40,2337  3 2342 0          CAF    SGNTAB  -2
0554   REF   3  LAST  320   40,2340  54 122 1          TS     SGNON
0555   REF  19  LAST  319   40,2341  6 5017 1          AD     ONE
0556   REF   3  LAST  320   40,2342  54 123 0          TS     SGNOFF
0557   REF   1              40,2343  0 2323 1          TC     SGNCOM

0558                        40,2344   00005 1  SGNTAB   OCT    5              -R1
0559                        40,2345   00003 1           OCT    3              -R2
0560                        40,2346   00000 1           OCT    0              -R3

0561   REF  41  LAST  320   40,2347  22 002 0  SIGNTEST LXCH   Q              ALLOWS +,- ONLY WHEN DSPCOUNT=R1D1,
0562   REF   7  LAST  317   40,2350  3 6214 0          CAF    THREE          R2D1, OR R3D1. ALLOWS ONLY FIRST OF
0563   REF   7  LAST  319   40,2351  7 1000 1          MASK   DECBRNCH       CONSECUTIVE +/- CHARACTERS.
0564   REF  82  LAST  317   40,2352  10 000 0          CCS    A              IF LOW2 BITS OF DECBRNCH NOT= 0, SIGN
0565   REF  27  LAST  319   40,2353  0 5217 0          TC     ENDOFJOB       FOR THIS WORD ALREADY IN. REJECT.
0566   REF   2  LAST  233   40,2354  4 4333 1          CS     R1D1
0567   REF   1              40,2355  0 2363 0          TC     SGNTST1
0568   REF   1              40,2356  4 4334 0          CS     R2D1
0569   REF   2  LAST  320   40,2357  0 2363 0          TC     SGNTST1
0570   REF   1              40,2360  4 4335 1          CS     R3D1
0571   REF   3  LAST  320   40,2361  0 2363 0          TC     SGNTST1
0572   REF  28  LAST  320   40,2362  0 5217 0          TC     ENDOFJOB       NO MATCH FOUND. SIGN ILLEGAL
0573   REF  12  LAST  319   40,2363  6 0777 0  SGNTST1  AD     DSPCOUNT
0574                        40,2364  0 0006 1          EXTEND
0575                        40,2365  1 2367 0          BZF    +2             MATCH FOUND
0576   REF  42  LAST  320   40,2366  0 0002 0          TC     Q
0577   REF  26  LAST  320   40,2367  0 0001 0          TC     L              SIGN LEGAL

R0578  CLEAR BLANKS WHICH R1, R2, R3 IS CURRENT OR LAST TO BE DISPLAYED(PERTINE
R0579  NT XREG,YREG,ZREG IS CLEARED). SUCCESSIVE CLEARS TAKE CARE OF EACH RX
R0580  L/ RC UNTIL R1 IS DONE. THEN NO FURTHER ACTION

R0581  THE SINGLE COMPONENT LOAD VERBS ALLOW ONLY THE SINGLE RC THAT IS
R0582  APPROPRIATE TO BE CLEARED.

R0583  CLPASS   +0  PASSO, CAN BE BACKED UP
R0584           +NZ  HIPASS, CAN BE BACKED UP
R0585           -NZ  PASSO, CANNOT BE BACKED UP
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0586  REF  13  LAST  320   40,2370  10 777 1  CLEAR   CCS    DSPCOUNT
0587  REF  20  LAST  320   40,2371  6 5017 1           AD     ONE
0588                       40,2372  0 2374 0           TC     +2
0589  REF  21  LAST  321   40,2373  6 5017 1           AD     ONE
0590  REF  83  LAST  320   40,2374  50 000 1           INDEX  A              DO NOT CHANGE DSPCOUNT BECAUSE MAY LATER
0591  REF   2  LAST  318   40,2375  3 2231 0           CAF    INRELTAB       FAIL LEGALTST.
0592  REF  12  LAST  320   40,2376  54 137 0           TS     INREL          MUST SET INREL, EVEN FOR HIPASS.
0593  REF   6  LAST  319   40,2377  11'015 0           CCS    CLPASS
0594  REF   1             40,2400  0 2406 1           TC     CLPASHI        +
0595                       40,2401  0 2403 1           TC     +2             +0    IF CLPASS IS +0 OR -, IT IS PASSO
0596                       40,2402  0 2403 1           TC     +1             -
0597  REF  13  LAST  321   40,2403  3 0137 1           CA     INREL
0598  REF   1             40,2404  0 2430 1           TC     LEGALTST
0599  REF   1             40,2405  0 2423 0           TC     CLEAR1
0600  REF  14  LAST  321   40,2406  10 137 0  CLPASHI  CCS    INREL
0601  REF  15  LAST  321   40,2407  54 137 0           TS     INREL
0602  REF   2  LAST  321   40,2410  0 2430 1           TC     LEGALTST
0603  REF   1             40,2411  3 2500 0           CAF    DOUBLK +2      +3 TO - NUMBER. BACKS DATA REQUESTS.
0604  REF   3  LAST  319   40,2412  27'013 0           ADS    REQRET
0605  REF  16  LAST  321   40,2413  3 0137 1           CA     INREL
0606  REF   1             40,2414  54 125 0           TS     MIXTEMP        TEMP STORAGE FOR INREL
0607                       40,2415  0 0006 1           EXTEND
0608  REF   7  LAST  319   40,2416  27'001 0           DIM    VERBREG        DECREMENT VERB AND RE-DISPLAY
0609  REF  37  LAST  306   40,2417  0 4662 1           TC     BANKCALL
0610  REF   1             40,2420   62340 1           CADR   UPDATV8
0611  REF   2  LAST  321   40,2421  3 0125 1           CA     MIXTEMP
0612  REF  17  LAST  321   40,2422  54 137 0           TS     INREL          RESTORE INREL
0613  REF   1             40,2423  0 2426 0  CLEAR1   TC     CLR5
0614  REF   7  LAST  321   40,2424  25'015 1           INCR   CLPASS         ONLY IF CLPASS IS + OR +0.
0615  REF  29  LAST  320   40,2425  0 5217 0           TC     ENDOFJOB       SET FOR HIGHER PASS.
0616  REF  43  LAST  320   40,2426  22 002 0  CLR5     LXCH   Q              USES 5BLANK  BUT AVOIDS ITS TC GETINREL
0617  REF   1             40,2427  0 2441 1           TC     5BLANK  +2
0618  REF   2  LAST  235   40,2430  6 7715 0  LEGALTST AD     NEG2
0619  REF  84  LAST  321   40,2431  10 000 0           CCS    A
0620  REF  44  LAST  321   40,2432  0 0002 0           TC     Q              LEGAL  INREL G/ 2
0621  REF   2  LAST  318   40,2433  0 5747 0           TC     CCSHOLE
0622  REF  30  LAST  321   40,2434  0 5217 0           TC     ENDOFJOB       ILLEGAL   INREL= 0,1
0623  REF  45  LAST  321   40,2435  0 0002 0           TC     Q              LEGAL    INREL = 2

R0624  5BLANK BLANKS 5 CHAR DISPLAY WORD IN R1, R2, OR R3. IT ALSO ZEROES XREG,
R0625  YREG, OR ZREG.PLACE ANY + DSPCOUNT NUMBER FOR PERTINENT RC INTO DSPCOUNT
R0626  DSPCOUNT IS LEFT SET TO LEFT MOST DSP NUMB FOR RC JUST BLANKED.

0627  REF  14  LAST  321   40,2436  54 777 1           TS     DSPCOUNT       NEEDED FOR BLANKSUB
0628  REF  46  LAST  321   40,2437  22 002 0  5BLANK   LXCH   Q
0629  REF   4  LAST  320   40,2440  0 2225 0           TC     GETINREL
0630  REF  41  LAST  319   40,2441  3 5021 1           CAF    ZERO
0631  REF  18  LAST  321   40,2442  50 137 1           INDEX  INREL
0632  REF   8  LAST  321   40,2443  55'001 0           TS     VERBREG        ZERO X, Y, Z REG.
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0633   REF  19  LAST  321   40,2444  50 137 1          INDEX  INREL
0634   REF   2  LAST  318   40,2445  55'004 0          TS     XREGLP  -2
0635   REF   4  LAST  320   40,2446  54 124 1          TS     CODE
0636   REF  20  LAST  322   40,2447  50 137 1          INDEX  INREL          ZERO PERTINENT DEC COMP BIT.
0637   REF  20  LAST  319   40,2450  4 5011 0          CS     BIT7           PROTECT OTHERS
0638   REF   8  LAST  320   40,2451  7 1000 1          MASK   DECBRNCH
0639   REF   1               40,2452  7 2501 0          MASK   BRNCHCON       ZERO LOW 2 BITS.
0640   REF   9  LAST  322   40,2453  55'000 1          TS     DECBRNCH
0641   REF  21  LAST  322   40,2454  50 137 1          INDEX  INREL
0642   REF   1               40,2455  3 2471 1          CAF    SINBLANK -2    BLANK ISOLATED CHAR SEPARATELY
0643   REF   2  LAST  316   40,2456  54 143 0          TS     COUNT
0644   REF   2  LAST  316   40,2457  0 3227 0          TC     DSPIN
0645   REF  22  LAST  322   40,2460  50 137 1  5BLANK1 INDEX  INREL
0646   REF   2  LAST  321   40,2461  3 2474 1          CAF    DOUBLK  -2
0647   REF  15  LAST  321   40,2462  54 777 1          TS     DSPCOUNT
0648   REF   2  LAST  319   40,2463  0 2502 1          TC     2BLANK
0649   REF   9  LAST  319   40,2464  4 5016 1          CS     TWO
0650   REF  16  LAST  322   40,2465  26 777 1          ADS    DSPCOUNT
0651   REF   3  LAST  322   40,2466  0 2502 1          TC     2BLANK
0652   REF  23  LAST  322   40,2467  50 137 1          INDEX  INREL
0653   REF   3  LAST  320   40,2470  3 4331 1          CAF    R1D1    -2
0654   REF  17  LAST  322   40,2471  54 777 1          TS     DSPCOUNT       SET DSPCOUNT TO LEFT MOST DSP NUMBER
0655   REF  27  LAST  320   40,2472  0 0001 0          TC     L              OF REG. JUST BLANKED
0656                        40,2473  00016 0  SINBLANK OCT    16             DEC 14
0657                        40,2474  00005 1           OCT    5
0658                        40,2475  00004 0           OCT    4
0659                        40,2476  00015 0  DOUBLK   OCT    15             DEC 13
0660                        40,2477  00011 1           OCT    11             DEC 9
0661                        40,2500  00003 1           OCT    3

0662                        40,2501  77774 0  BRNCHCON OCT    77774

R0663  2BLANK BLANKS TWO CHAR. PLACE DSP NUMBER OF LEFT CHAR  OF THE PAIR INTO
R0664  DSPCOUNT. THIS NUMBER IS LEFT IN DSPCOUNT

0665   REF  18  LAST  322   40,2502  3 0777 0  2BLANK   CA     DSPCOUNT
0666   REF   4  LAST  267   40,2503  54 021 0          TS     SR
0667   REF   1               40,2504  4 2515 0          CS     BLANKCON
0668                        40,2505  0 0004 0          INHINT
0669   REF   5  LAST  322   40,2506  50 021 1          INDEX  SR
0670   REF  25  LAST  191   40,2507  57'023 1          XCH    DSPTAB
0671                        40,2510  0 0006 1          EXTEND
0672                        40,2511  6 2513 1          BZMF   +2              IF OLD CONTENTS -, NOUT OK
0673   REF   6  LAST  192   40,2512  25'015 1          INCR   NOUT            IF OLD CONTENTS +, +1 TO NOUT
0674                        40,2513  0 0003 1          RELINT                 IF -,NOUT OK
0675   REF  47  LAST  321   40,2514  0 0002 0          TC     Q
0676                        40,2515  04000 0  BLANKCON OCT    4000
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P0677   ENTER PASS 0 IS THE EXECUTE FUNCTION. HIGHER ORDER ENTERS ARE TO LOAD
R0678   DATA. THE SIGN OF REQRET DETERMINES THE PASS, + FOR PASS 0,- FOR HIGHER
R0679   PASSES.


R0680   MACHINE CADR TO BE SPECIFIED (MCTBS) NOUNS DESIRE AN ECADR TO BE LOADED
R0681   WHEN USED WITH LOAD VERBS, MONITOR VERBS, OR DISPLAY VERBS (EXCEPT
R0682   VERB = FIXED MEMORY DISPLAY, WHICH REQUIRES AN FCADR).


 0683                          41,2000                        BANK   41
 068301 REF   1                41,2000                        SETLOC PINBALL2
 068302                        41,2000                        BANK

 06835  REF   1                                              COUNT  41/PIN

 0684   REF   1                41,2000  0 3544 1  NVSUBB     TC     NVSUB1          STANDARD LEAD INS. DONT MOVE.
 0685   REF   1                41,2001  0 2775 0  LOADLVI    TC     LOADLV
A0686                                                                                 END OF STANDARD LEAD INS.


 0687   REF  42  LAST  321     41,2002  3 5021 1  ENTER      CAF    ZERO
 0688   REF   8  LAST  321     41,2003  55'015 0             TS     CLPASS
 0689   REF   2  LAST  319     41,2004  3 4233 1             CAF    ENDINST
 0690   REF   2  LAST  319     41,2005  54 136 1             TS     ENTRET
 0691   REF   4  LAST  321     41,2006  11'013 0             CCS    REQRET
 0692   REF   1                41,2007  0 2035 0             TC     ENTPASO         IF +, PASS 0
 0693   REF   2  LAST  323     41,2010  0 2035 0             TC     ENTPASO         IF +, PASS 0
 0694                          41,2011  0 2012 0             TC     +1              IF -, NOT PASS 0
 0695   REF   1                41,2012  3 2033 0  ENTPASHI  CAF    MMADREF
 0696   REF   5  LAST  323     41,2013  6 1013 1             AD     REQRET          IF L/ 2 CHAR IN FOR MM CODE, ALARM
 0697                          41,2014  0 0006 1             EXTEND                 AND RECYCLE(DECIDE AT MMCHANG+1).
 0698   REF   1                41,2015  1 2027 1             BZF    ACCEPTWD
 0699   REF   8  LAST  320     41,2016  3 6214 0             CAF    THREE           IF DEC, ALARM IF L/ 5 CHAR IN FOR DATA.
 0700   REF  10  LAST  322     41,2017  7 1000 1             MASK   DECBRNCH        BUT LEAVE REQRET - AND FLASH ON, SO
 0701   REF  85  LAST  321     41,2020  10 000 0             CCS    A               OPERATOR CAN SUPPLY MISSING NUMERICAL
 0702                          41,2021  0 2023 1             TC     +2              CHARACTERS AND CONTINUE.
 0703   REF   2  LAST  323     41,2022  0 2027 0             TC     ACCEPTWD        OCTAL. ANY NUMBER OF CHAR OK.
 0704   REF  19  LAST  322     41,2023  10 777 1             CCS    DSPCOUNT
 0705   REF   1                41,2024  0 2351 1             TC     GODSPALM        LESS THAN 5 CHAR DEC(DSPCOUNT IS +)
 0706   REF   2  LAST  323     41,2025  0 2351 1             TC     GODSPALM        LESS THAN 5 CHAR DEC(DSPCOUNT IS +)
 0707                          41,2026  0 2027 0             TC     +1              5 CHAR IN (DSPCOUNT IS -)
 0708   REF   6  LAST  323     41,2027  4 1013 0  ACCEPTWD   CS     REQRET          5 CHAR IN (DSPCOUNT IS -)
 0709   REF   7  LAST  323     41,2030  55'013 0             TS     REQRET          SET REQRET +.
 0710   REF   2  LAST  244     41,2031  0 4447 1             TC     FLASHOFF
 0711   REF   8  LAST  323     41,2032  0 1013 1             TC     REQRET

 0712   REF   3  LAST  323        0136                ENTEXIT  =      ENTRET

 0713   REF   1                41,2033   03431 1  MMADREF   ADRES  MMCHANG +1      ASSUMES TC REQMM AT MMCHANG.
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0714                        41,2034   00034 0  LOWVERB  DEC    28              LOWER VERB THAT AVOIDS NOUN TEST.

0715  REF  43  LAST  323    41,2035   3 5021 1 ENTPASO  CAF    ZERO             NOUN VERB SUB ENTERS HERE
0716  REF  11  LAST  323    41,2036   55'000 1         TS     DECBRNCH
0717  REF   3  LAST  319    41,2037   4 4374 1         CS     VD1              BLOCK FURTHER NUM CHAR, SO THAT STRAY
0718  REF  20  LAST  323    41,2040   54 777 1         TS     DSPCOUNT         CHAR DO NOT GET INTO VERB OR NOUN LTS.
0719  REF   9  LAST  321    41,2041   4 1001 0 TESTVB  CS     VERBREG          IF VERB IS G/E LOWVB, SKIP NOUN TEST.
0720  REF   1               41,2042   55'041 1         TS     VERBSAVE         SAVE VERB FOR POSSIBLE RECYCLE.
0721  REF   1               41,2043   6 2034 1         AD     LOWVERB          LOWVERB - VB
0722                        41,2044   0 0006 1         EXTEND
0723  REF   1               41,2045   6 2133 1         BZMF   VERBFAN          VERB G/E LOWVERB
0724                        41,2046   0 0006 1 TESTNN   EXTEND                  VERB L/ LOWVERB
0725  REF   1               41,2047   3 2114 1         DCA    LODNNLOC         SWITCH BANKS TO NOUN TABLE READING
0726  REF   3  LAST  271    41,2050   52 006 0         DXCH   Z                ROUTINE.
0727  REF   3  LAST  270    41,2051   50 140 1         INDEX  MIXBR
0728                        41,2052   0 2052 1         TC     +0
0729                        41,2053   0 2055 0         TC     +2               NORMAL
0730  REF   1               41,2054   0 2221 1         TC     MIXNOUN          MIXED
0731  REF   3  LAST  270    41,2055   10 145 0         CCS    NNADTEM          NORMAL
0732  REF   2  LAST  324    41,2056   0 2131 0         TC     VERBFAN -2             NORMAL IF +
0733  REF   3  LAST  323    41,2057   0 2351 1         TC     GODSPALM         NOT IN USE   IF +0
0734  REF   1               41,2060   0 2064 1         TC     REQADD           SPECIFY MACHINE CADR IF -
0735  REF   1               41,2061   25'017 0         INCR   NOUNCADR         AUGMENT MACHINE CADR IF -0
0736  REF   1               41,2062   0 4325 1         TC     SETNADD          ECADR FROM NOUNCADR. SETS EB, NOUNADD.
0737  REF   1               41,2063   0 2120 0         TC     INTMCTBS +2
0738  REF  22  LAST  189    41,2064   3 5001 0 REQADD   CAF    BIT15            SET CLPASS FOR PASSO ONLY
0739  REF   9  LAST  323    41,2065   55'015 0         TS     CLPASS
0740  REF   3  LAST  323    41,2066   4 4233 0         CS     ENDINST          TEST IF REACHED HERE FROM INTERNAL OR
0741  REF   1               41,2067   6 0136 0         AD     ENTEXIT                    FROM EXTERNAL
0742                        41,2070   0 0006 1         EXTEND
0743                        41,2071   1 2073 0         BZF    +2               EXTERNAL MACH CADR TO BE SPECIFIED
0744  REF   2  LAST  324    41,2072   0 2116 0         TC     INTMCTBS
0745  REF   1               41,2073   0 2307 1         TC     REQDATZ          EXTERNAL MACH CADR TO BE SPECIFIED
0746  REF  12  LAST  324    41,2074   11'000 1         CCS    DECBRNCH         ALARM AND RECYCLE IF DECIMAL USED
0747  REF   1               41,2075   0 4161 0         TC     ALMCYCLE         FOR MCTBS.
0748  REF   4  LAST  324    41,2076   4 4374 1         CS     VD1              OCTAL USED  OK
0749  REF  21  LAST  324    41,2077   54 777 1         TS     DSPCOUNT         BLOCK NUM CHAR IN
0750  REF   3  LAST  315    41,2100   11'042 1         CCS    CADRSTOR
0751                        41,2101   0 2104 0         TC     +3               EXTERNAL MCTBS DISPLAY WILL LEAVE FLASH
0752  REF   1               41,2102   0 2105 1         TC     USEADD           ON IF ENDIDLE NOT = +0.
0753                        41,2103   0 2104 0         TC     +1
0754  REF   1               41,2104   0 4443 0         TC     FLASHON
0755  REF   1               41,2105   57'005 0 USEADD  XCH    ZREG
0756  REF   1               41,2106   0 4317 0         TC     SETNCADR         ECADR INTO NOUNCADR. SET EB, NOUNADD.
0757                        41,2107   0 0006 1         EXTEND
0758  REF   2  LAST  324    41,2110   3 2114 1         DCA    LODNNLOC         SWITCH BANKS TO NOUN TABLE READING
0759  REF   4  LAST  324    41,2111   52 006 0         DXCH   Z                ROUTINE.
0760  REF   3  LAST  324    41,2112   0 2133 1         TC     VERBFAN

0761  REF  22  LAST  324       0777                    EBANK= DSPCOUNT
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0762   REF   1                41,2113   02062 1  LODNNLOC 2CADR  LODNNTAB
0762   REF   1                41,2114   64101 0

0763                          41,2115   77772 0  NEG5     OCT    77772

0764   REF  71  LAST  318     41,2116  3 0156 0  INTMCTBS CA     MPAC    +2      INTERNAL MACH CADR TO BE SPECIFIED.
0765   REF   2  LAST  324     41,2117  0 4317 0           TC     SETNCADR        ECADR INTO NOUNCADR. SET EB, NOUNADD.
0766   REF   6  LAST  233     41,2120  4 5022 0           CS     FIVE            NVSUB CALL LEFT CADR IN MPAC+2 FOR MACH
0767   REF  10  LAST  324     41,2121  6 1001 1           AD     VERBREG         CADR TO BE SPECIFIED.
0768                          41,2122  0 0006 1           EXTEND
0769   REF   4  LAST  324     41,2123  1 2133 0           BZF    VERBFAN         DONT DISPLAY CADR IF VB = 05.
0770   REF   2  LAST  320     41,2124  3 4335 0           CAF    R3D1            VB NOT = 05. DISPLAY CADR.
0771   REF  23  LAST  324     41,2125  54 777 1           TS     DSPCOUNT
0772   REF   2  LAST  324     41,2126  3 1017 0           CA     NOUNCADR
0773   REF   1                41,2127  0 3363 1           TC     DSPOCTWD
0774   REF   5  LAST  325     41,2130  0 2133 1           TC     VERBFAN

0775   REF  22  LAST  321     41,2131  6 5017 1           AD     ONE
0776   REF   3  LAST  325     41,2132  0 4317 0           TC     SETNCADR        ECADR INTO NOUNCADR. SETS EB, NOUNADD.
0777   REF   1                41,2133  4 2145 1  VERBFAN  CS     LST2CON
0778   REF  11  LAST  325     41,2134  6 1001 1           AD     VERBREG         VERB-LST2CON
0779   REF  86  LAST  323     41,2135  10 000 0           CCS    A
0780   REF  23  LAST  325     41,2136  6 5017 1           AD     ONE             VERB G/ LST2CON
0781                          41,2137  0 2141 1           TC     +2
0782   REF   1                41,2140  0 2146 0           TC     VBFANDIR        VERB L/ LST2CON
0783   REF  72  LAST  325     41,2141  54 154 0           TS     MPAC
0784   REF   4  LAST  203     41,2142  0 4473 0           TC     RELDSP          RELEASE DISPLAY SYST
0785   REF  17  LAST  316     41,2143  0 4701 0           TC     POSTJUMP        GO TO GOEXTVB WITH VB-40 IN MPAC.
0786   REF   1                41,2144   66000 1           CADR   GOEXTVB
0789                          41,2145   00050 1  LST2CON  DEC    40              FIRST LIST2 VERB (EXTENDED VERB)

0790   REF  12  LAST  325     41,2146  51'001 1  VBFANDIR INDEX  VERBREG
0791   REF   1                41,2147  3 2151 0           CAF    VERBTAB
0792   REF   1                41,2150  0 4704 0           TC     BANKJUMP

0793   REF   4  LAST  324     41,2151   62351 1  VERBTAB  CADR   GODSPALM        VB00 ILLEGAL
0794   REF   1                41,2152   62365 0           CADR   DSPA            VB01 DISPLAY OCT COMP 1 (R1)
0795   REF   1                41,2153   62373 1           CADR   DSPB            VB02 DISPLAY OCT COMP 2 (R1)
0796   REF   1                41,2154   62400 1           CADR   DSPC            VB03 DISPLAY OCT COMP 3 (R1)
0797   REF   1                41,2155   62360 0           CADR   DSPAB           VB04 DISPLAY OCT COMP 1,2 (R1,R2)
0798   REF   1                41,2156   62353 0           CADR   DSPABC          VB05 DISPLAY OCT COMP 1,2,3 (R1,R2,R3)
0799   REF   1                41,2157   62523 1           CADR   DECDSP          VB06 DECIMAL DISPLAY
0800   REF   1                41,2160   60677 1           CADR   DSPDPDEC        VB07 DP DECIMAL DISPLAY (R1,R2)
0801   REF   5  LAST  325     41,2161   62351 1           CADR   GODSPALM        VB08 SPARE
0802   REF   6  LAST  325     41,2162   62351 1           CADR   GODSPALM        VB09 SPARE
0803   REF   1                41,2163   61325 1           CADR   DSPALARM        VB10 SPARE
0804   REF   1                41,2164   63230 0           CADR   MONITOR         VB11 MONITOR OCT COMP 1 (R1)
0805   REF   2  LAST  325     41,2165   63230 0           CADR   MONITOR         VB12 MONITOR OCT COMP 2 (R1)
0806   REF   3  LAST  325     41,2166   63230 0           CADR   MONITOR         VB13 MONITOR OCT COMP 3 (R1)
0807   REF   4  LAST  325     41,2167   63230 0           CADR   MONITOR         VB14 MONITOR OCT COMP 1,2 (R1,R2)
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 0808   REF   5  LAST  325   41,2170   63230 0          CADR   MONITOR      VB15 MONITOR OCT COMP 1,2,3 (R1,R2,R3)
 0809   REF   6  LAST  326   41,2171   63230 0          CADR   MONITOR      VB16 MONITOR DECIMAL
 0810   REF   7  LAST  326   41,2172   63230 0          CADR   MONITOR      VB17 MONITOR DP DEC  (R1,R2)
 0811   REF   7  LAST  325   41,2173   62351 1          CADR   GODSPALM     VB18 SPARE
 0812   REF   8  LAST  326   41,2174   62351 1          CADR   GODSPALM     VB19 SPARE
 0813   REF   9  LAST  326   41,2175   62351 1          CADR   GODSPALM     VB20 SPARE
 0814   REF   1              41,2176   62732 0          CADR   ALOAD        VB21 LOAD COMP 1 (R1)
 0815   REF   1              41,2177   62743 0          CADR   BLOAD        VB22 LOAD COMP 2 (R2)
 0816   REF   1              41,2200   62760 1          CADR   CLOAD        VB23 LOAD COMP 3 (R3)
 0817   REF   1              41,2201   62703 1          CADR   ABLOAD       VB24 LOAD COMP 1,2 (R1,R2)
 0818   REF   1              41,2202   62616 1          CADR   ABCLOAD      VB25 LOAD COMP 1,2,3 (R1,R2,R3)
 0819   REF  10  LAST  326   41,2203   62351 1          CADR   GODSPALM     VB26 SPARE
 0820   REF   1              41,2204   63353 1          CADR   DSPFMEM      VB27 FIXED MEMORY DISPLAY
A0821                                                                      THE FOLLOWING VERBS MAKE NO NOUN TEST
 0822   REF  11  LAST  326   41,2205   62351 1          CADR   GODSPALM     VB28 SPARE
 0823   REF  12  LAST  326   41,2206   62351 1          CADR   GODSPALM     VB29 SPARE
 0824   REF   1              41,2207   63466 0 REQEXLOC CADR   VBRQEXEC     VB30 REQUEST EXECUTIVE
 0825   REF   1              41,2210   63512 1          CADR   VBRQWAIT     VB31 REQUEST WAITLIST
 0826   REF   1              41,2211   61364 1          CADR   VBRESEQ      VB32 RESEQUENCE
 0827   REF   1              41,2212   61347 0          CADR   VBPROC       VB33 PROCEED WITHOUT DATA
 0828   REF   1              41,2213   61355 0          CADR   VBTERM       VB34 TERMINATE CURRENT TEST OR LOAD REQ
 0829   REF   1              41,2214   63613 0          CADR   VBTSTLTS     VB35 TEST LIGHTS
 0830   REF   1              41,2215   12342 1          CADR   SLAP1        VB36 FRESH START
 0831   REF   2  LAST  323   41,2216   63430 0          CADR   MMCHANG      VB37 CHANGE MAJOR MODE
 0832   REF  13  LAST  326   41,2217   62351 1          CADR   GODSPALM     VB38 SPARE
 0833   REF  14  LAST  326   41,2220   62351 1          CADR   GODSPALM     VB39 SPARE

R0834   THE LIST2 VERBFAN IS LOCATED IN THE EXTENDED VERB BANK.
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P0835   NNADTAB CONTAINS A RELATIVE ADDRESS, IDADDREL(IN LOW 10 BITS), REFERRING
R0836   TO WHERE 3 CONSECUTIVE ADDRESSES ARE STORED (IN IDADDTAB).
R0837   MIXNOUN GETS DATA AND STORES IN MIXTEMP,+1,+2. IT SETS NOUNADD FOR
R0838    MIXTEMP.

 0839   REF   4  LAST  324   41,2221  10 146 0  MIXNOUN  CCS     NNADTEM
 0840                        41,2222  0 2226 0            TC      +4              +  IN USE
 0841   REF  15  LAST  326   41,2223  0 2351 1            TC      GODSPALM        +0  NOT IN USE
 0842                        41,2224  0 2226 0            TC      +2              -  IN USE
 0843                        41,2225  0 2226 0            TC      +1              -0  IN USE
 0844   REF  11  LAST  228   41,2226  4 6211 1            CS      SIX
 0845   REF  13  LAST  325   41,2227  6 1001 1            AD      VERBREG
 0846                        41,2230  0 0006 1            EXTEND
 0847                        41,2231  6 2233 1            BZMF    +2              VERB L/E 6
 0848   REF   6  LAST  325   41,2232  0 2133 1            TC      VERBFAN         AVOID MIXNOUN SWAP IF VB NOT = DISPLAY
 0849   REF  10  LAST  322   41,2233  3 5016 0            CAF     TWO
 0850   REF   1              41,2234  54 117 1  MIXNN1    TS      DECOUNT
 0851   REF   1              41,2235  6 2260 1            AD      MIXAD
 0852   REF   1              41,2236  54 145 0            TS      NOUNADD         SET NOUNADD TO MIXTEMP + K
 0853   REF   2  LAST  327   41,2237  50 117 0            INDEX   DECOUNT         GET IDADDTAB ENTRY FOR COMPONENT K
 0854   REF   2  LAST  270   41,2240  3 0150 0            CA      IDADITEM        OF NOUN.
 0855   REF   1              41,2241  54 122 1            TS      NOUNTEM
A0856                                                                            TEST FOR DP(FOR OCT DISPLAY). IF SO, GET
A0857                                                                             MINOR PART ONLY.
 0858   REF   1              41,2242  0 3034 0            TC      SFRUTMIX        GET SF ROUT NUMBER IN A
 0859   REF   1              41,2243  0 2261 0            TC      DPTEST
 0860   REF   1              41,2244  0 2246 0            TC      MIXNN2          NO DP
 0861   REF   2  LAST  327   41,2245  24 122 0            INCR    NOUNTEM         DP  GET MINOR PART
 0862   REF   3  LAST  327   41,2246  3 0122 0  MIXNN2    CA      NOUNTEM
 0863   REF   3  LAST  135   41,2247  7 4372 1            MASK    LOW11           ESUBK (NO DP)  OR (ESUBK)+1    FOR DP
 0864   REF   1              41,2250  0 4327 0            TC      SETEBANK        SET EBANK, LEAVE EADRES IN A.
 0865   REF  87  LAST  325   41,2251  50 000 1            INDEX   A               PICK UP C(ESUBK)  NOT DP
 0866                        41,2252  3 0000 1            CA      0               OR C((ESUBK)+1)  FOR DP MINOR PART
 0867   REF   2  LAST  327   41,2253  50 145 1            INDEX   NOUNADD
 0868                        41,2254  56 000 1            XCH     0               STORE IN MIXTEM + K
 0869   REF   3  LAST  327   41,2255  10 117 1            CCS     DECOUNT
 0870   REF   1              41,2256  0 2234 0            TC      MIXNN1
 0871   REF   7  LAST  327   41,2257  0 2133 1            TC      VERBFAN

 0872   REF   3  LAST  321   41,2260  0 0125 1  MIXAD     TC      MIXTEMP


R0873   DPTEST  ENTER WITH SF ROUT NUMBER IN A.
R0874           RETURNS TO L+1 IF NO DP.
R0875           RETURNS TO L+2 IF DP.

 0876   REF  88  LAST  327   41,2261  50 000 1  DPTEST    INDEX   A
 0877                        41,2262  1 2263 0            TCF     +1
 0878   REF  48  LAST  322   41,2263  0 0002 0            TC      Q               OCTAL ONLY  NO DP
 0879   REF  49  LAST  327   41,2264  0 0002 0            TC      Q               FRACT NO DP
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0880   REF  50  LAST  327   41,2265  0 0002 0           TC     Q              DEG  NO DP
0881   REF  51  LAST  328   41,2266  0 0002 0           TC     Q              ARITH  NO DP
0882   REF   1               41,2267  1 2301 0           TCF    DPTEST1        DP1OUT
0883   REF   2  LAST  328   41,2270  1 2301 0           TCF    DPTEST1        DP2OUT
0884   REF  52  LAST  328   41,2271  0 0002 0           TC     Q              DPDEG  NO DP
0885   REF   3  LAST  328   41,2272  1 2301 0           TCF    DPTEST1        DP3OUT
0886   REF  53  LAST  328   41,2273  0 0002 0           TC     Q              HMS   NO DP
0887   REF  54  LAST  328   41,2274  0 0002 0           TC     Q              M/S   NO DP
0888   REF   4  LAST  328   41,2275  1 2301 0           TCF    DPTEST1        DP4OUT
08881  REF  55  LAST  328   41,2276  0 0002 0           TC     Q              ARITH1   NO DP
08882  REF  56  LAST  328   41,2277  0 0002 0           TC     Q              2INTOUT  NO DP TO GET HI PART IN MPAC
08883  REF   5  LAST  328   41,2300  1 2301 0           TCF    DPTEST1        DPFRACOT
0889   REF  57  LAST  328   41,2301  50 002 0  DPTEST1  INDEX  Q
0890                         41,2302  0 0001 0           TC     1              RETURN TO L+2

0891   REF   4  LAST  322   41,2303  3 4333 0  REQDATX  CAF    R1D1
0892   REF   1               41,2304  1 2310 0           TCF    REQCOM
0893   REF   2  LAST  320   41,2305  3 4334 1  REQDATY  CAF    R2D1
0894   REF   2  LAST  328   41,2306  1 2310 0           TCF    REQCOM
0895   REF   3  LAST  325   41,2307  3 4335 0  REQDATZ  CAF    R3D1
0896   REF  24  LAST  325   41,2310  54 777 1  REQCOM   TS     DSPCOUNT
0897   REF  58  LAST  328   41,2311  4 0002 1           CS     Q
0898   REF   9  LAST  323   41,2312  55'013 0           TS     REQRET
0899   REF  38  LAST  321   41,2313  0 4662 1           TC     BANKCALL
0900   REF   2  LAST  321   41,2314   60437 1           CADR   SBLANK
0901   REF   2  LAST  324   41,2315  0 4443 0           TC     FLASHON
0902   REF   2  LAST  324   41,2316  0 0136 0  ENDRODAT TC     ENTEXIT

0903   REF   9  LAST  319   41,2317  55'002 0           TS     NOUNREG
0904   REF  59  LAST  328   41,2320  56 002 0  UPDATNN  XCH    Q
0905   REF   1               41,2321  54 117 1           TS     UPDATRET
0906                         41,2322  0 0006 1           EXTEND
0907   REF   3  LAST  324   41,2323  3 2114 1           DCA    LODNNLOC       SWITCH BANKS TO NOUN TABLE READING
0908   REF   5  LAST  324   41,2324  52 006 0           DXCH   Z              ROUTINE.
0909   REF   5  LAST  327   41,2325  10 146 0           CCS    NNADTEM
0910   REF  24  LAST  325   41,2326  6 5017 1           AD     ONE            NORMAL
0911   REF   1               41,2327  1 2332 0           TCF    PUTADD
0912   REF   2  LAST  328   41,2330  1 2333 1           TCF    PUTADD  +1     MCTBS  DONT CHANGE NOUNADD
0913   REF   3  LAST  328   41,2331  1 2333 1           TCF    PUTADD  +1     MCTBI  DONT CHANGE NOUNADD
0914   REF   4  LAST  325   41,2332  0 4317 0  PUTADD   TC     SETNCADR       ECADR INTO NOUNCADR. SETS EB, NOUNADD.
0915   REF   2  LAST  319   41,2333  3 4375 1           CAF    ND1
0916   REF  25  LAST  328   41,2334  54 777 1           TS     DSPCOUNT
0917   REF   9  LAST  328   41,2335  3 1002 1           CA     NOUNREG
0918   REF   1               41,2336  1 2345 0           TCF    UPDAT1

0919   REF  14  LAST  327   41,2337  55'001 0           TS     VERBREG
0920   REF  60  LAST  328   41,2340  56 002 0  UPDATVB  XCH    Q
0921   REF   2  LAST  328   41,2341  54 117 1           TS     UPDATRET
0922   REF   5  LAST  324   41,2342  3 4374 0           CAF    VD1
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0923   REF  26  LAST  328   41,2343  54 777 I          TS     DSPCOUNT
0924   REF  15  LAST  328   41,2344  3 1001 I          CA     VERBREG
0925   REF  18  LAST  325   41,2345  0 4701 0  UPDATI   TC     POSTJUMP      CANT USE SWCALL TO GO TO DSPDECVN,SINCE
0926   REF   1              41,2346   61224 I          CADR   GOVNUPDT      UPDATVB CAN ITSELF BE CALLED BY SWCALL.
0927   REF   3  LAST  328   41,2347  0 0117 0          TC     UPDATRET

0928   REF   2  LAST  324   41,2350  0 4161 0  GOALMCYC TC     ALMCYCLE      NEEDED BECAUSE BANKJUMP CANT HANDLE F/F.

0929   REF  19  LAST  329   41,2351  0 4701 0  GODSPALM TC     POSTJUMP
0930   REF   2  LAST  325   41,2352   61325 I          CADR   DSPALARM
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P0931            NOUN   TABLES
R0932   NOUN CODE L/40, NORMAL NOUN CASE.  NOUN CODE G/E 40, MIXED NOUN CASE.
R0933   FOR NORMAL CASE, NNADTAB CONTAINS ONE       ECADR     FOR EACH NOUN.
R0934   +0 INDICATES NOUN NOT USED.   - ENTRY INDICATES MACHINE CADR(E OR F) TO
R0935   BE SPECIFIED. -1 INDICATES CHANNEL TO BE SPECIFIED. -0 INDICATES AUGMENT
R0936   OF LAST MACHINE CADR SUPPLIED.

R0937   FOR MIXED CASE, NNADTAB CONTAINS ONE INDIRECT ADDRESS(IDADDREL) IN LOW
R0938   10 BITS, AND THE COMPONENT CODE NUMBER IN THE HIGH 5 BITS.

R0939   NNTYPTAB IS A PACKED TABLE OF THE FORM MMMMMNNNNNPPPPP.

R0940   FOR THE NORMAL CASE, M-S ARE THE COMPONENT CODE NUMBER.
R0941                     N-S ARE THE SF ROUTINE CODE NUMBER.
R0942                     P-S ARE THE SF CONSTANT CODE NUMBER.

R0943   MIXED CASE,M-S ARE THE SF CONSTANT3 CODE NUMBER     3 COMPONENT CASE
R0944              N-S ARE THE SF CONSTANT2 CODE NUMBER
R0945              P-S ARE THE SF CONSTANT1 CODE NUMBER
R0946              N-S ARE THE SF CONSTANT2 CODE NUMBER     2 COMPONENT CASE
R0947              P-S ARE THE SF CONSTANT1 CODE NUMBER
R0948              P-S ARE THE SF CONSTANT1 CODE NUMBER      1 COMPONENT CASE

R0949   THERE IS ALSO AN INDIRECT ADDRESS TABLE(IDADDTAB) FOR MIXED CASE ONLY.
R0950   EACH ENTRY CONTAINS ONE ECADR.    IDADDREL IS THE RELATIVE ADDRESS OF
R0951   THE FIRST OF THESE ENTRIES.
R0952   THERE IS ONE ENTRY IN THIS TABLE FOR EACH COMPONENT OF A MIXED NOUN
R0953   THEY ARE LISTED IN ORDER OF ASCENDING K.

R0954   THERE IS ALSO A SCALE FACTOR ROUTINE NUMBER TABLE( RUTMXTAB ) FOR MIXED
R0955   CASE ONLY. THERE IS ONE ENTRY PER MIXED NOUN. THE FORM IS,
R0956         QQQQQRRRRRSSSSS
R0957   Q-S ARE THE SF ROUTINE 3 CODE NUMBER     3 COMPONENT CASE
R0958   R-S ARE THE SF ROUTINE 2 CODE NUMBER
R0959   S-S ARE THE SF ROUTINE 1 CODE NUMBER
R0960   R-S ARE THE SF ROUTINE 2 CODE NUMBER     2 COMPONENT CASE
R0961   S-S ARE THE SF ROUTINE 1 CODE NUMBER


R0962   IN OCTAL DISPLAY AND LOAD (OCT OR DEC) VERBS, EXCLUDE USE OF VERBS WHOSE
R0963   COMPONENT NUMBER IS GREATER THAN THE NUMBER OF COMPONENTS IN NOUN.
R0964   (ALL MACHINE ADDRESS TO BE SPECIFIED NOUNS ARE 3 COMPONENT.)


R0967   IN MULTI-COMPONENT LOAD VERBS, NO MIXING OF OCTAL AND DECIMAL DATA
R0968   COMPONENT WORDS IS ALLOWED. ALARM IF VIOLATION.

R0969   IN DECIMAL LOADS OF DATA, 5 NUMERICAL CHARACTERS MUST BE KEYED IN
R0970   BEFORE EACH ENTER. IF NOT, ALARM.
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P0971             DISPLAY  VERBS
 0972   REF  11  LAST  327   41,2353  4 5016 1  DSPABC   CS      TWO
 0973   REF   1              41,2354  0 2424 1           TC      COMPTEST
 0974   REF   3  LAST  327   41,2355  50 145 1           INDEX   NOUNADD
 0975                        41,2356  4 0002 1           CS      2
 0976   REF  36  LAST  306   41,2357  56 132 1           XCH     BUF      +2
 0977   REF  25  LAST  328   41,2360  4 5017 0  DSPAB    CS      ONE
 0978   REF   2  LAST  331   41,2361  0 2424 1           TC      COMPTEST
 0979   REF   4  LAST  331   41,2362  50 145 1           INDEX   NOUNADD
 0980                        41,2363  4 0001 1           CS      1
 0981   REF  37  LAST  331   41,2364  56 131 1           XCH     BUF      +1
 0982   REF   1              41,2365  0 2443 0  DSPA     TC      DECTEST
 0983   REF   1              41,2366  0 2466 1           TC      TSTFORDP
 0984   REF   5  LAST  331   41,2367  50 145 1           INDEX   NOUNADD
 0985                        41,2370  4 0000 0           CS      0
 0986   REF  38  LAST  331   41,2371  56 130 0  DSPCOM1  XCH     BUF
 0987   REF   1              41,2372  0 2405 1           TC      DSPCOM2
 0988   REF  26  LAST  331   41,2373  4 5017 0  DSPB     CS      ONE
 0989   REF   1              41,2374  0 2437 0           TC      DCOMPTST
 0990   REF   6  LAST  331   41,2375  50 145 1           INDEX   NOUNADD
 0991                        41,2376  4 0001 1           CS      1
 0992   REF   1              41,2377  0 2371 0           TC      DSPCOM1
 0993   REF  12  LAST  331   41,2400  4 5016 1  DSPC     CS      TWO
 0994   REF   2  LAST  331   41,2401  0 2437 0           TC      DCOMPTST
 0995   REF   7  LAST  331   41,2402  50 145 1           INDEX   NOUNADD
 0996                        41,2403  4 0002 1           CS      2
 0997   REF   2  LAST  331   41,2404  0 2371 0           TC      DSPCOM1
 0998   REF  13  LAST  331   41,2405  4 5016 1  DSPCOM2  CS      TWO              A  B  C  AB  ABC
 0999   REF  16  LAST  329   41,2406  6 1001 1           AD      VERBREG          -1 -0 +1 +2  +3   IN A
 1000   REF  89  LAST  327   41,2407  10 000 0           CCS     A                +0 +0 +0 +1  +2    IN A AFTER CCS
 1001   REF   1              41,2410  0 2413 0           TC      DSPCOM3
 1002   REF   3  LAST  328   41,2411  0 0136 0           TC      ENTEXIT
 1003                        41,2412  0 2413 0           TC      +1
 1004   REF   1              41,2413  54 122 1  DSPCOM3  TS      DISTEM           +0,+1,+2 INTO DISTEM
 1005   REF  90  LAST  331   41,2414  50 000 1           INDEX   A
 1006   REF   5  LAST  328   41,2415  3 4333 0           CAF     R1D1
 1007   REF  27  LAST  329   41,2416  54 777 1           TS      DSPCOUNT
 1008   REF   2  LAST  331   41,2417  50 122 0           INDEX   DISTEM
 1009   REF  39  LAST  331   41,2420  4 0130 1           CS      BUF
 1010   REF   2  LAST  325   41,2421  0 3363 1           TC      DSPOCTWD
 1011   REF   3  LAST  331   41,2422  56 122 0           XCH     DISTEM
 1012   REF   2  LAST  331   41,2423  0 2407 0           TC      DSPCOM2 +2

R1013   COMPTEST ALARMS IF COMPONENT NUMBER OF VERB(LOAD OR OCT DISPLAY) IS
R1014   GREATER THAN THE HIGHEST COMPONENT NUMBER OF NOUN.
 1016   REF   4  LAST  271   41,2424  54 123 0  COMPTEST TS      SFTEMP1          - VERB COMP
 1017   REF  61  LAST  328   41,2425  22 002 0           LXCH    Q
 1022   REF   1              41,2426  0 2515 1  COMPTST1 TC      GETCOMP
 1023   REF   1              41,2427  0 4345 1           TC      LEFT5
 1024   REF   9  LAST  323   41,2430  7 6214 1           MASK    THREE            NOUN COMP
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 1025   REF   5  LAST  331   41,2431  6 0123 1           AD     SFTEMP1          NOUN COMP - VERB COMP
 1026   REF  91  LAST  331   41,2432  10 000 0           CCS    A
 1027   REF  28  LAST  322   41,2433  0 0001 0           TC     L                NOUN COMP G/ VERB COMP
 1028   REF   3  LAST  321   41,2434  0 5747 0           TC     CCSHOLE
 1029   REF  16  LAST  327   41,2435  0 2351 1           TC     GODSPALM         NOUN COMP L/ VERB COMP
 1030   REF  29  LAST  332   41,2436  0 0001 0 NDCMPTST  TC     L                NOUN COMP = VERB COMP

R1031   DCOMPTST ALARMS IF DECIMAL ONLY BIT (BIT4 OF COMP CODE NUMBER) = 1.
R1032   IF NOT, IT PERFORMS REGULAR COMPTEST.
 1033   REF   6  LAST  332   41,2437  54 123 0 DCOMPTST  TS     SFTEMP1          - VERB COMP
 1034   REF  62  LAST  331   41,2440  22 002 0           LXCH   Q
 1035   REF   2  LAST  331   41,2441  0 2443 0           TC     DECTEST
 1036   REF   1              41,2442  0 2426 0           TC     COMPTST1

 1037                        41,2443  0 0006 1 DECTEST   EXTEND                  ALARMS IF DEC ONLY BIT = 1 (BIT4 OF COMP
 1038   REF  73  LAST  325   41,2444  22 156 0           QXCH   MPAC    +2       CODE NUMBER). RETURNS IF NOT.
 1039   REF   2  LAST  331   41,2445  0 2515 1           TC     GETCOMP
 1040   REF  27  LAST  251   41,2446  7 5002 1           MASK   BIT14
 1041   REF  92  LAST  332   41,2447  10 000 0           CCS    A
 1042   REF  17  LAST  332   41,2450  0 2351 1           TC     GODSPALM
 1043   REF  74  LAST  332   41,2451  0 0156 0           TC     MPAC    +2

 1044   REF  63  LAST  332   41,2452  22 002 0 DCTSTCYC  LXCH   Q                ALARMS AND RECYCLES IF DEC ONLY BIT = 1
 1045   REF   3  LAST  332   41,2453  0 2515 1           TC     GETCOMP          ( BIT4 OF COMP CODE NUMBER). RETURNS
 1046   REF  28  LAST  332   41,2454  7 5002 1           MASK   BIT14            IF NOT.  USED BY LOAD VERBS.
 1047   REF  93  LAST  332   41,2455  10 000 0           CCS    A
 1048   REF   3  LAST  329   41,2456  0 4161 0           TC     ALMCYCLE
 1049   REF  30  LAST  332   41,2457  0 0001 0           TC     L

R1050   NOUNTEST ALARMS IF NO-LOAD BIT (BIT5 OF COMP CODE NUMBER) = 1.
R1051   IF NOT, IT RETURNS.
 1052   REF  64  LAST  332   41,2460  22 002 0 NOUNTEST  LXCH   Q
 1053   REF   4  LAST  332   41,2461  0 2515 1           TC     GETCOMP
 1054   REF  94  LAST  332   41,2462  10 000 0           CCS    A
 1055   REF  31  LAST  332   41,2463  0 0001 0           TC     L
 1056   REF  32  LAST  332   41,2464  0 0001 0           TC     L
 1057   REF  18  LAST  332   41,2465  0 2351 1           TC     GODSPALM

 1058   REF  65  LAST  332   41,2466  22 002 0 TSTFORDP  LXCH   Q                TEST FOR DP. IF SO, GET MINOR PART ONLY.
 1059   REF   6  LAST  328   41,2467  3 0146 1           CA     NNADTEM
 1060   REF  27  LAST  331   41,2470  6 5017 1           AD     ONE              IF NNADTEM = -1, CHANNEL TO BE SPECIFIED
 1061                        41,2471  0 0006 1           EXTEND
 1062   REF   1              41,2472  1 2504 0           BZF    CHANDSP
 1063   REF   4  LAST  324   41,2473  50 140 1           INDEX  MIXBR
 1064                        41,2474  0 2474 1           TC     +0
 1065                        41,2475  0 2477 1           TC     +2               NORMAL
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1066   REF  33  LAST  332   41,2476  0 0001 0          TC     L              MIXED CASE ALREADY HANDLED IN MIXNOUN
1067   REF   1               41,2477  0 3026 0          TC     SFRUTNOR
1068   REF   2  LAST  327   41,2500  0 2261 0          TC     DPTEST
1069   REF  34  LAST  333   41,2501  0 0001 0          TC     L              NO DP
1070   REF   8  LAST  331   41,2502  24 145 1          INCR   NOUNADD        DP    E+1 INTO NOUNADD FOR MINOR PART.
1071   REF  35  LAST  333   41,2503  0 0001 0          TC     L

1072   REF   3  LAST  325   41,2504  3 1017 0  CHANDSP  CA     NOUNCADR
1073   REF   5  LAST  232   41,2505  7 5046 1          MASK   LOW9
10731                       41,2506  0 0006 1          EXTEND
10732  REF  95  LAST  332   41,2507  5 0000 1          INDEX  A
1074                        41,2510  00 000 1          READ   0
1075   REF  96  LAST  333   41,2511  4 0000 0          CS     A
1076   REF   3  LAST  331   41,2512  1 2371 1          TCF    DSPCOM1

1077   REF   2  LAST  270   41,2513   00147 0  COMPICK  ADRES  NNTYPTEM
1078   REF   7  LAST  332   41,2514   00146 1           ADRES  NNADTEM

1079   REF   5  LAST  332   41,2515  50 140 1  GETCOMP  INDEX  MIXBR         NORMAL                 MIXED
1080   REF   1               41,2516  3 2512 0          CAF    COMPICK -1     ADRES NNTYPTEM         ADRES NNADTEM
1081   REF  97  LAST  333   41,2517  50 000 1          INDEX  A
1082                        41,2520  3 0000 1          CA     0              C(NNTYPTEM)            C(NNADTEM)
1083   REF   4  LAST  202   41,2521  7 4364 0          MASK   HI5            GET HI5 OF NNTYPTAB(NORM)OF NNADTAB(MIX)
1084   REF  66  LAST  332   41,2522  0 0002 0          TC     0

1085   REF   5  LAST  332   41,2523  0 2515 1  DECDSP   TC     GETCOMP
1086   REF   2  LAST  331   41,2524  0 4345 1          TC     LEFT5
1087   REF  10  LAST  331   41,2525  7 6214 1          MASK   THREE
1088   REF   4  LAST  327   41,2526  54 117 1          TS     DECOUNT        COMP NUMBER INTO DECOUNT
1089   REF   1               41,2527  54 122 1  DSPDCGET TS     DECTEM         PICKS UP DATA
1090   REF   9  LAST  333   41,2530  6 0145 1          AD     NOUNADD        DECTEM  1COMP +0, 2COMP +1, 3COMP +2
1091   REF  98  LAST  333   41,2531  50 000 1          INDEX  A
1092                        41,2532  4 0000 0          CS     0
1093   REF   2  LAST  333   41,2533  50 122 0          INDEX  DECTEM
1094   REF   2  LAST  271   41,2534  57'003 0          XCH    XREG           CANT USE BUF SINCE DMP USES IT.
1095   REF   3  LAST  333   41,2535  10 122 1          CCS    DECTEM
1096   REF   1               41,2536  0 2527 0          TC     DSPDCGET       MORE TO GET
1097   REF  44  LAST  324   41,2537  3 5021 1  DSPDCPUT CAF    ZERO           DISPLAYS DATA
1098   REF  75  LAST  332   41,2540  54 155 1          TS     MPAC     +1    DECOUNT 1COMP +0, 2COMP +1, 3COMP +2
1099   REF  76  LAST  333   41,2541  54 156 1          TS     MPAC     +2
1100   REF   5  LAST  333   41,2542  50 117 0          INDEX  DECOUNT
1101   REF   6  LAST  331   41,2543  3 4333 0          CAF    RID1
1102   REF  28  LAST  331   41,2544  54 777 1          TS     DSPCOUNT
1103   REF   6  LAST  333   41,2545  50 117 0          INDEX  DECOUNT
1104   REF   3  LAST  333   41,2546  4 1003 1          CS     XREG
1105   REF  77  LAST  333   41,2547  54 154 0          TS     MPAC
1106   REF   1               41,2550  0 3047 1          TC     SFCONUM        2X( SF CON NUMB ) IN A
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1107   REF   7  LAST  332   41,2551  54 123 0           TS      SFTEMP1
1108                        41,2552  0 0006 1           EXTEND                  SWITCH BANKS TO SF CONSTANT TABLE
1109   REF   1              41,2553  3 2565 0           DCA     GTSFOUTL          READING ROUTINE.
1110   REF   6  LAST  328   41,2554  52 006 0           DXCH    Z               LOADS SFTEMP1, SFTEMP2.
1111   REF   6  LAST  333   41,2555  50 140 1           INDEX   MIXBR
1112                        41,2556  0 2556 0           TC      +0
1113   REF   1              41,2557  0 2562 1           TC      DSPSFNOR
1114   REF   2  LAST  327   41,2560  0 3034 0           TC      SFRUTMIX
1115   REF   1              41,2561  0 2575 1           TC      DECDSP3

1116   REF   2  LAST  333   41,2562  0 3026 0  DSPSFNOR TC      SFRUTNOR
1117   REF   2  LAST  334   41,2563  0 2575 1           TC      DECDSP3

1118   REF  29  LAST  333      0777                     EBANK=  DSPCOUNT
1119   REF   1              41,2564   02120 0  GTSFOUTL 2CADR   GTSFOUT
1119   REF   1              41,2565   64101 0


1120   REF  39  LAST  323   41,2566  0 4662 1  DSPDCEND TC      BANKCALL        ALL SFOUT ROUTINES END HERE
1121   REF   1              41,2567   61133 1           CADR    DSPDECWD
1122   REF   7  LAST  333   41,2570  10 117 1           CCS     DECOUNT
1123                        41,2571  0 2573 1           TC      +2
1124   REF   4  LAST  331   41,2572  0 0136 0           TC      ENTEXIT
1125   REF   8  LAST  334   41,2573  54 117 1           TS      DECOUNT
1126   REF   1              41,2574  0 2537 1           TC      DSPDCPUT        MORE TO DISPLAY

1127   REF  99  LAST  333   41,2575  50 000 1  DECDSP3  INDEX   A
1128   REF   1              41,2576  3 2600 0           CAF     SFOUTABR
1129   REF   2  LAST  325   41,2577  0 4704 0           TC      BANKJUMP

1130   REF   1              41,2600   61323 1  SFOUTABR CADR    PREDSPAL        ALARM IF DEC DISP WITH OCTAL ONLY NOUN
1131   REF   1              41,2601   62566 0           CADR    DSPDCEND
1132   REF   1              41,2602   60516 0           CADR    DEGOUTSF
1133   REF   1              41,2603   60603 1           CADR    ARTOUTSF
1134   REF   1              41,2604   60614 1           CADR    DP1OUTSF
1135   REF   1              41,2605   60621 1           CADR    DP2OUTSF
1136   REF   1              41,2606   60524 1           CADR    DPDEGOUT
1137   REF   1              41,2607   60623 0           CADR    DP3OUTSF
1138   REF   1              41,2610   65143 1           CADR    HMSOUT
1139   REF   1              41,2611   65216 1           CADR    M/SOUT
1140   REF   2  LAST  334   41,2612   60621 1           CADR    DP2OUTSF
11401  REF   1              41,2613   60610 0           CADR    AROUT1SF
11402  REF   1              41,2614   60636 1           CADR    2INTOUT
11403  REF   1              41,2615   60653 1           CADR    DPFRACOT
1141                        41,2616             ENDRTOUT EQUALS


R1142           THE FOLLOWING IS ATYPICAL SF ROUTINE . IT USES MPAC. LEAVES RESU
R1143   LTS IN MPAC, MPAC+1. ENDS WITH TC DSPDCEND
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 1144   REF   2  LAST  322   40,2516                    SETLOC BLANKCON +1

 11445  REF   2 LAST  315 TO  323:   334   334*         COUNT  40/PIN

R1145       DEGOUTSF SCALES BY .18 THE LOW 14 BITS OF ANGLE , ADDING .18 FOR
R1146   NUMBERS IN THE NEGATIVE (AGC) RANGE.

 1147   REF  45  LAST  333   40,2516  3 5021 1  DEGOUTSF CAF    ZERO
 1148   REF  78  LAST  333   40,2517  54 156 1           TS     MPAC    +2      SET INDEX FOR FULL SCALE
 1149   REF   1               40,2520  0 2555 0           TC     FIXRANGE
 1150                        40,2521  0 2523 1           TC     +2              NO AUGMENT NEEDED (SFTEMP1 AND 2 ARE 0)
 1151   REF   1               40,2522  0 2550 0           TC     SETAUG          SET AUGMENTER ACCORDING TO C(MPAC +2)
 1152   REF   1               40,2523  0 2566 0           TC     DEGCOM

R1153   OPDEGOUT SCALES BY .45 (THE RANGE IS 90 DEGREES) AND ADDS A 20 DEG BIAS.

 1154   REF  79  LAST  335   40,2524  10 154 0  OPDEGOUT CCS    MPAC            RANGE IS 90 DEG
 1155   REF  80  LAST  335   40,2525  56 154 1           XCH    MPAC            IF POS OR POS 0 THEN ADD BIAS AND
 1156                        40,2526  0 2531 1           TC     +3              CORRECT FOR POSSIBLE OVERFLOW
 1157   REF   1               40,2527  0 2540 1           TC     NEGOPT          IF NEG NON ZERO
 1158   REF   4  LAST  303   40,2530  6 7716 0           AD     NEGI            IF NEG ZERO SUBTRACT 1
 1159   REF   1               40,2531  6 2602 1           AD     20BIAS
 1160   REF  81  LAST  335   40,2532  54 154 0  BIASCOM  TS     MPAC            TEST FOR OVERFLOW
 1161                        40,2533  0 2536 0           TC     +3              NO OVFLOW
 1162   REF  23  LAST  324   40,2534  3 5001 0           CAF    BIT15           IF OVFLOW
 1163   REF  82  LAST  335   40,2535  26 154 0           ADS    MPAC
 1164   REF  14  LAST  331   40,2536  3 5016 0           CAF    TWO             SET MULTIPLIER TO .45
 1165   REF   2  LAST  334   40,2537  0 2517 0           TC     DEGOUTSF +1

 1166   REF  83  LAST  335   40,2540  56 154 1  NEGOPT   XCH    MPAC            NEGATIVE CASE
 1167   REF   2  LAST  335   40,2541  6 2602 1           AD     20BIAS
 1168   REF 100  LAST  334   40,2542  10 000 0           CCS    A
 1169   REF   1               40,2543  0 2532 1           TC     BIASCOM         IF POS THEN SUBTRACT 1 BECAUSE OF 2SCOM
 1170   REF   4  LAST  332   40,2544  0 5747 0           TC     CCSHOLE
 1171   REF  28  LAST  332   40,2545  6 5017 1           AD     ONE             IF NEG RESTORE SUM
 1172                        40,2546  4 0000 0           COM                    IF NEG 0 LEAVE NEG 0
 1173   REF   2  LAST  335   40,2547  0 2532 1           TC     BIASCOM

 1174                        40,2550  0 0006 1  SETAUG   EXTEND                 LOADS SFTEMP1 AND SFTEMP2 WITH THE
 1175   REF  84  LAST  335   40,2551  5 0156 0           INDEX  MPAC    +2      DP AUGMENTER CONSTANT
 1176   REF   1               40,2552  3 2577 0           DCA    DEGTAB
 1177   REF   8  LAST  334   40,2553  52 124 1           DXCH   SFTEMP1
 1178   REF  67  LAST  333   40,2554  0 0002 0           TC     Q

 1179   REF  85  LAST  335   40,2555  10 154 0  FIXRANGE CCS    MPAC            IF MPAC IS + RETURN TO L+1
 1180   REF  68  LAST  335   40,2556  0 0002 0           TC     Q               IF MPAC IS - RETURN TO L+2 AFTER
 1181   REF  69  LAST  335   40,2557  0 0002 0           TC     Q               MASKING OUT THE SIGN BIT
 1182                        40,2560  1 2561 0           TCF    +1
 1183   REF  24  LAST  335   40,2561  4 5001 1           CS     BIT15
 1184   REF  86  LAST  335   40,2562  7 0154 0           MASK   MPAC
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1185  REF  87  LAST  335   40,2563  54 154 0          TS      MPAC
1186  REF  70  LAST  335   40,2564  50 002 0          INDEX   Q
1187                        40,2565  0 0001 0          TC      1

1188                        40,2566  0 0006 1  DEGCOM  EXTEND                  LOADS MULTIPLIER , DOES SHORTMP, AND
1189  REF  88  LAST  336   40,2567  5 0156 0          INDEX   MPAC     +2      ADDS AUGMENTER.
1190  REF   2  LAST  335   40,2570  3 2577 0          DCA     DEGTAB
1191  REF  89  LAST  336   40,2571  52 155 1          DXCH    MPAC            ADJUSTED ANGLE IN A
1192  REF   4  LAST  317   40,2572  0 7256 1          TC      SHORTMP
1193  REF   9  LAST  335   40,2573  52 124 1          DXCH    SFTEMP1
1194  REF  90  LAST  336   40,2574  20 155 1          DAS     MPAC
1195  REF   1             40,2575  0 2606 0          TC      SCOUTEND


1196                        40,2576   05605 1  DEGTAB  OCT     05605           HI PART OF     .18
1197                        40,2577   03656 1          OCT     03656           LOW PART OF    .18
1198                        40,2600   16314 0          OCT     16314           HI PART OF     .45
1199                        40,2601   31463 1          OCT     31463           LO PART OF     .45

1200                        40,2602   16040 1  20BIAS  OCT     16040           20 DEG BIAS FOR OPTICS

1201  REF  10  LAST  336   40,2603  52 124 1  ARTOUTSF DXCH   SFTEMP1         ASSUMES POINT AT LEFT OF DP SFCON
1202  REF  91  LAST  336   40,2604  52 155 1           DXCH   MPAC
1203  REF   1             40,2605  0 4431 0           TC     PRSHRTMP        IF C(A) = -0. SHORTMP FAILS TO GIVE -0.
1204  REF  20  LAST  329   40,2606  0 4701 0  SCOUTEND TC     POSTJUMP
1205  REF   2  LAST  334   40,2607   62566 0           CADR   DSPDCEND

12051 REF  11  LAST  336   40,2610  52 124 1  AROUT1SF DXCH   SFTEMP1         ASSUMES POINT BETWEEN HI AND LO PARTS OF
12052 REF  92  LAST  336   40,2611  52 155 1           DXCH   MPAC            DP SFCON. SHIFTS RESULTS LEFT 14, BY
12053 REF   2  LAST  336   40,2612  0 4431 0           TC     PRSHRTMP        TAKING RESULTS FROM MPAC+1, MPAC+2.
12054 REF   1             40,2613  0 2615 1           TC     L14/OUT


1206  REF   1             40,2614  0 2627 0  DP1OUTSF TC     DPOUT           SCALES MPAC, MPAC +1 BY DP SCALE FACTOR
1207  REF  93  LAST  336   40,2615  56 156 0  L14/OUT  XCH    MPAC     +2     IN SFTEMP1, SFTEMP2. THEN SCALE RESULT
1208  REF  94  LAST  336   40,2616  56 155 0           XCH    MPAC     +1     BY 814.
1209  REF  95  LAST  336   40,2617  54 154 0           TS     MPAC
1210  REF   2  LAST  336   40,2620  0 2606 0           TC     SCOUTEND


1211  REF   2  LAST  336   40,2621  0 2627 0  DP2OUTSF TC     DPOUT           SCALES MPAC , MPAC +1 BY DP SCALE FACTOR
1212  REF   3  LAST  336   40,2622  0 2606 0           TC     SCOUTEND


1213  REF   3  LAST  336   40,2623  0 2627 0  DP3OUTSF TC     DPOUT           ASSUMES POINT BETWEEN BITS 7-8 OF HIGH
1214  REF  12  LAST  327   40,2624  3 6211 0           CAF    SIX             LEFT BY 7, ROUNDS MPAC+2 INTO MPAC+1.
1215  REF   1             40,2625  0 3060 1           TC     TPLEFTN         SHIFT LEFT 7.
1216  REF   4  LAST  336   40,2626  0 2606 0           TC     SCOUTEND
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 12165  REF  96  LAST  336      0162            MPAC+6   =      MPAC +6          USE MPAC +6 INSTEAD OF OVFIND

 1217   REF  71  LAST  336   40,2627  56 002 0  DPOUT    XCH    Q
 1218   REF   1              40,2630  54 162 0           TS     MPAC+6
 1219   REF   1              40,2631  0 2655 0           TC     READLO           GET FRESH DATA FOR BOTH HI AND LO.
 1220   REF   2  LAST  246   40,2632  0 7226 0           TC     TPAGREE          MAKE DP DATA AGREE
 1221   REF   2  LAST  317   40,2633  0 7052 1           TC     DMP
 1222   REF  12  LAST  336   40,2634   00123 1           ADRES  SFTEMP1
 1223   REF   2  LAST  337   40,2635  0 0162 1           TC     MPAC+6
R12231  THE FOLLOWING ROUTINE DISPLAYS TWO CONTIGUOUS SP POSITIVE INTEGERS
R12232  AS TWO POSITIVE DECIMAL INTEGERS IN RXD1-RXD2 AND RXD4-RXD5 (RXD3 IS
R12233  BLANKED). THE INTEGER IN THE LOWER NUMBERED ADDRESS IS DISPLAYED IN
R12234  RXD1-RXD2.

 12235  REF   3  LAST  328   40,2636  0 2437 0  2INTOUT  TC     5BLANK           TO BLANK RXD3
 122355 REF   2  LAST  319   40,2637  0 2314 0           TC     +ON              TURN ON + SIGN
 12236  REF  97  LAST  337   40,2640  3 0154 1           CA     MPAC
 12237  REF   1              40,2641  0 3213 1           TC     DSPDECVN         DISPLAY 1ST INTEGER (LIKE VERB AND NOUN)
 122371 REF  11  LAST  333   40,2642  4 6214 1           CS     THREE
 122372 REF   9  LAST  334   40,2643  50 117 0           INDEX  DECOUNT
 122373 REF   7  LAST  333   40,2644  6 4333 0           AD     R1D1             RXD4
 122374 REF  30  LAST  334   40,2645  54 777 1           TS     DSPCOUNT
 122375 REF   2  LAST  337   40,2646  0 2655 0           TC     READLO           GET 2ND INTEGER
 122376 REF  98  LAST  337   40,2647  3 0155 0           CA     MPAC +1
 122377 REF   2  LAST  337   40,2650  0 3213 1           TC     DSPDECVN         DISPLAY 2ND INTEGER (LIKE VERB AND NOUN)
 122378 REF  21  LAST  336   40,2651  0 4701 0           TC     POSTJUMP
 122379 REF   3  LAST  336   40,2652   62570 1           CADR   DSPDCEND +2

 12238  REF   3  LAST  337   40,2653  0 2655 0  DPFRACOT TC     READLO           DP FRACTION TO MPAC,+1
 122381 REF   5  LAST  336   40,2654  0 2606 0           TC     SCOUTEND

R1224   READLO PICKS UP FRESH DATA FOR BOTH HI AND LO AND LEAVES IT IN
R1225   MPAC, MPAC+1. THIS IS NEEDED FOR TIME DISPLAY. IT ZEROES MPAC+2, BUT
R1226   DOES NOT FORCE TPAGREE.

 1227   REF  72  LAST  337   40,2655  56 002 0  READLO   XCH    Q
 1228   REF   8  LAST   71   40,2656  54 144 1           TS     TEM4
 1229   REF   7  LAST  334   40,2657  50 140 1           INDEX  MIXBR
 1230                        40,2660  0 2660 0           TC     +0
 1231   REF   1              40,2661  0 2675 1           TC     RDLONOR
 1232   REF  10  LAST  337   40,2662  50 117 0           INDEX  DECOUNT
 1233   REF   3  LAST  327   40,2663  3 0150 0           CA     IDAD1TEM         GET IDADDTAB ENTRY FOR COMP K OF NOUN.
 1234   REF   4  LAST  327   40,2664  7 4372 1           MASK   LOW11            E SUBK
 1235   REF   2  LAST  327   40,2665  0 4327 0           TC     SETEBANK         SET EB, LEAVE EADRES IN A.
 1236                        40,2666  0 0006 1  READLO1  EXTEND                  MIXED          NORMAL
 1237   REF 101  LAST  335   40,2667  5 0000 1           INDEX  A                C(ESUBK)       C(E)
 1238                        40,2670  3 0001 0           DCA    0                C((E SUBK)+1)      C(E+1)
 1239   REF  99  LAST  337   40,2671  52 155 1           DXCH   MPAC
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 1240   REF  46  LAST  335   40,2672  3 5021 1          CAF    ZERO
 1241   REF 100  LAST  337   40,2673  54 156 1          TS     MPAC    +2
 1242   REF   9  LAST  337   40,2674  0 0144 0          TC     TEM4

 1243   REF  10  LAST  333   40,2675  3 0145 1  RDLONOR CA     NOUNADD         E
 1244   REF   1              40,2676  0 2666 0  ENDRDLO TC     READLO1


 1245                        42,3143                    BANK   42
124501 REF   2  LAST  270   42,2000                    SETLOC PINBALL3
124502                      42,3143                    BANK

 12455  REF   1                                        COUNT  42/PIN

 1246   REF  40  LAST  334   42,3143  0 4662 1  HMSOUT  TC     BANKCALL        READ FRESH DATA FOR HI AND LO INTO MPAC,
 1247   REF   4  LAST  337   42,3144   60655 1          CADR   READLO          MPAC+1.
 1248   REF   3  LAST  337   42,3145  0 7226 0          TC     TPAGREE         MAKE DP DATA AGREE
 1249   REF   1              42,3146  0 3332 0          TC     SEPSECNR        LEAVE FRACT SEC/60 IN MPAC, MPAC+1.LEAVE
A1250                                                                        WHOLE MIN IN BIT13 OF LOTEMOUT AND ABOVE
 1251   REF   3  LAST  337   42,3147  0 7052 1          TC     DMP             USE ONLY FRACT SEC/60 MOD 60
 1252   REF   1              42,3150   03204 1          ADRES  SECON2          MULT BY .06
 1253   REF   4  LAST  328   42,3151  3 4335 0          CAF    R3D1            GIVES CENTI-SEC/10EXP5 MOD 60
 1254   REF  31  LAST  337   42,3152  54 777 1          TS     DSPCOUNT
 1255   REF  41  LAST  338   42,3153  0 4662 1          TC     BANKCALL        DISPLAY SEC MOD 60
 1256   REF   2  LAST  334   42,3154   61133 1          CADR   DSPDECWD
 1257   REF   1              42,3155  0 3350 1          TC     SEPMIN          REMOVE REST OF SECONDS
 1258   REF   1              42,3156  3 3206 0          CAF    MINCON2         LEAVE FRACT MIN/60 IN MPAC+1. LEAVE
 1259   REF 101  LAST  338   42,3157  56 154 1          XCH    MPAC            WHOLE HOURS IN MPAC.
 1260   REF   1              42,3160  55'007 0          TS     HITEMOUT        SAVE WHOLE HOURS.
 1261   REF   2  LAST  338   42,3161  3 3207 1          CAF    MINCON2 +1
 1262   REF 102  LAST  338   42,3162  56 155 0          XCH    MPAC    +1      USE ONLY FRACT MIN/60 MOD 60
 1263   REF   3  LAST  336   42,3163  0 4431 0          TC     PRSHRTMP        IF C(A) = -0, SHORTMP FAILS TO GIVE -0.
A1264                                                                        MULT BY .0006
 1265   REF   3  LAST  328   42,3164  3 4334 1          CAF    R2D1            GIVES MIN/10EXP5 MOD 60
 1266   REF  32  LAST  338   42,3165  54 777 1          TS     DSPCOUNT
 1267   REF  42  LAST  338   42,3166  0 4662 1          TC     BANKCALL        DISPLAY MIN MOD 60
 1268   REF   3  LAST  338   42,3167   61133 1          CADR   DSPDECWD
 1269                        42,3170  0 0006 1          EXTEND                 MINUTES, SECONDS HAVE BEEN REMOVED
 1270   REF   1              42,3171  3 3213 1          DCA    HRCON1
 1271   REF 103  LAST  338   42,3172  52 155 1          DXCH   MPAC
 1272   REF   2  LAST  338   42,3173  3 1007 1          CA     HITEMOUT        USE WHOLE HOURS
 1273   REF   4  LAST  338   42,3174  0 4431 0          TC     PRSHRTMP        IF C(A) = -0, SHORTMP FAILS TO GIVE -0.
A1274                                                                        MULT BY .16384
 1275   REF   8  LAST  337   42,3175  3 4333 0          CAF    R1D1            GIVES HOURS/10EXP5
 1276   REF  33  LAST  338   42,3176  54 777 1          TS     DSPCOUNT
 1277   REF  43  LAST  338   42,3177  0 4662 1          TC     BANKCALL        USE REGULAR DSPDECWD, WITH ROUND OFF.
 1278   REF   4  LAST  338   42,3200   61133 1          CADR   DSPDECWD
 1279   REF   5  LAST  334   42,3201  0 0136 0          TC     ENTEXIT

 1280                        42,3202   25660 0  SECON1  2DEC*  1.666666666 E-4 B12*  2EXP12/6000
 1280                        42,3203   31742 1
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1281                          42,3204   01727 1  SECON2   OCT    01727          .06 FOR SECONDS DISPLAY
1282                          42,3205   01217 1           OCT    01217
1283                          42,3206   00011 1  MINCON2  OCT    00011          .0006 FOR MINUTES DISLPAY
1284                          42,3207   32445 0           OCT    32445
1285                          42,3210   02104 0  MINCON1  OCT    02104          .066..66 UPPED BY 2EXP-28
1286                          42,3211   10422 1           OCT    10422
1287                          42,3212   05174 0  HRCON1   2DEC   .16384
1287                          42,3213   13261 0
1288                          42,3214   00000 1           OCT    00000
1289                          42,3215   00062 0  RNDCON   OCT    00062          .5 SEC

1290  REF  44  LAST  338      42,3216  0 4662 1  M/SOUT   TC     BANKCALL       READ FRESH DATA FOR HI AND LO INTO MPAC.
1291  REF   5  LAST  338      42,3217   60655 1           CADR   READLO         MPAC+1.
1292  REF   4  LAST  338      42,3220  0 7226 0           TC     TPAGREE        MAKE DP DATA AGREE
1293  REF 104  LAST  338      42,3221  10 154 0           CCS    MPAC           IF MAG OF (MPAC, MPAC+1) G/ 59 M 59 S,
1294                          42,3222  0 3224 0           TC     +2             DISPLAY 59859, WITH PROPER SIGN.
1295  REF   1                 42,3223  0 3255 0           TC     M/SNORM        MPAC = +0. L/ 59M58.5S
1296  REF   1                 42,3224  6 3312 1           AD     M/SCON1        - HI PART OF (59M58.5S) +1  FOR CCS
1297  REF 102  LAST  337      42,3225  10 000 0           CCS    A              MAG OF MPAC - HI PART OF (59M58.5S)
1298  REF   1                 42,3226  0 3241 0           TC     M/SLIMIT       G/ 59M58.5S
1299  REF   2  LAST  339      42,3227  0 3255 0           TC     M/SNORM        ORIGINAL MPAC = -0. L/ 59M58.5S
1300  REF   3  LAST  339      42,3230  0 3255 0           TC     M/SNORM        L/ 59M58.5S
1301  REF 105  LAST  339      42,3231  10 155 1           CCS    MPAC    +1     MAG OF MPAC = HI PART OF 59M58.5S
1302                          42,3232  0 3234 1           TC     +2
1303  REF   4  LAST  339      42,3233  0 3255 0           TC     M/SNORM        MPAC+1 = +0. L/ 59M58.5S
1304  REF   1                 42,3234  6 3313 0           AD     M/SCON2        - LO PART OF (59M58.5S) +1  FOR CCS
1305  REF 103  LAST  339      42,3235  10 000 0           CCS    A              MAG OF MPAC+1 - LO PART OF (59M58.5S)
1306  REF   2  LAST  339      42,3236  0 3241 0           TC     M/SLIMIT       G/ 59M58.5S
1307  REF   5  LAST  339      42,3237  0 3255 0           TC     M/SNORM        ORIGINAL MPAC+1 = -0. L/ 59M58.5S
1308  REF   6  LAST  339      42,3240  0 3255 0           TC     M/SNORM        L/ 59M58.5S
1309  REF 106  LAST  339      42,3241  10 154 0  M/SLIMIT CCS    MPAC           = 59M58.5S    LIMIT
1310  REF   1                 42,3242  3 3315 0           CAF    M/SCON3        MPAC CANNOT BE +/- 0 AT THIS POINT.
1311  REF   1                 42,3243  0 3252 1           TC     +LIMIT         FORCE MPAC, MPAC+1 TO +/- 59M59.5S
1312  REF   2  LAST  339      42,3244  4 3315 1           CS     M/SCON3
1313  REF 107  LAST  339      42,3245  54 154 0           TS     MPAC           WILL DISPLAY 59M59S IN DSPDECNR
1314  REF   3  LAST  339      42,3246  4 3316 1           CS     M/SCON3 +1
1315  REF 108  LAST  339      42,3247  54 155 1  LIMITCOM TS     MPAC    +1
1316  REF   1                 42,3250  3 3314 1           CAF    NORMADR        SET RETURN TO M/SNORM+1.
1317  REF   2  LAST  338      42,3251  0 3333 1           TC     SEPSECNR +1
1318  REF 109  LAST  339      42,3252  54 154 0  +LIMIT   TS     MPAC
1319  REF   4  LAST  339      42,3253  3 3316 0           CAF    M/SCON3 +1
1320  REF   1                 42,3254  0 3247 0           TC     LIMITCOM
1321  REF   1                 42,3255  0 3317 1  M/SNORM  TC     SEPSEC         LEAVE FRACT SEC/60 IN MPAC,MPAC+1. LEAVE
A1322                                                                            WHOLE MIN IN BIT13 OF LOTEMOUT AND ABOVE
1323  REF   1                 42,3256  3 3310 0           CAF    HISECON        USE ONLY FRACT SEC/60 MOD 60
1324  REF   5  LAST  336      42,3257  0 7256 1           TC     SHORTMP        MULT BY .6 + 2EXP-14
1325  REF  12  LAST  337      42,3260  4 6214 1           CS     THREE          GIVES SEC/100 MOD 60
1326  REF  34  LAST  338      42,3261  26 777 1           ADS    DSPCOUNT       DSPCOUNT ALREADY SET TO RXD1
1327  REF  45  LAST  339      42,3262  0 4662 1           TC     BANKCALL       DISPLAY SEC MOD 60 IN D4D5.
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1328   REF   1                  42,3263   61173 0          CADR    DSPDC2NR
1329   REF  47  LAST  338       42,3264  3 5021 1          CAF     ZERO
1330   REF   5  LAST  322       42,3265  54 124 1          TS      CODE
1331   REF  15  LAST  335       42,3266  4 5016 1          CS      TWO
1332   REF  11  LAST  337       42,3267  50 117 0          INDEX   DECOUNT
1333   REF   9  LAST  338       42,3270  6 4333 0          AD      R1D1            RXD3
1334   REF   3  LAST  322       42,3271  54 143 0          TS      COUNT
1335   REF  46  LAST  339       42,3272  0 4662 1          TC      BANKCALL        BLANK MIDDLE CHAR
1336   REF   3  LAST  322       42,3273   61227 1          CADR    DSPIN
1337   REF   2  LAST  338       42,3274  0 3350 1          TC      SEPMIN          REMOVE REST OF SECONDS
1338   REF 110  LAST  339       42,3275  56 155 0          XCH     MPAC    +1      LEAVE FRACT MIN/60 IN MPAC+1
1339                            42,3276  0 0006 1          EXTEND                  USE ONLY FRACT MIN/60 MOD 60
1340   REF   1                  42,3277  7 3311 0          MP      HIMINCON        MULT BY .6 + 2EXP-7
1341   REF 111  LAST  340       42,3300  52 155 1          DXCH    MPAC            GIVES MIN/100 MOD 60
1342   REF  12  LAST  340       42,3301  50 117 0          INDEX   DECOUNT
1343   REF  10  LAST  340       42,3302  3 4333 0          CAF     R1D1            RXD1
1344   REF  35  LAST  339       42,3303  54 777 1          TS      DSPCOUNT
1345   REF  47  LAST  340       42,3304  0 4662 1          TC      BANKCALL        DISPLAY MIN MOD 60 IN D1D2.
1346   REF   2  LAST  340       42,3305   61173 0          CADR    DSPDC2NR
1347   REF  22  LAST  337       42,3306  0 4701 0          TC      POSTJUMP
1348   REF   4  LAST  337       42,3307   62570 1          CADR    DSPDCEND +2

1349                            42,3310   23147 1 HISECON  OCT     23147           .6 + 2EXP-14
1350                            42,3311   23346 1 HIMINCON OCT     23346           .6 + 2EXP-7

1351                            42,3312   77753 0 M/SCON1  OCT     77753           - HI PART OF (59M58.5S) +1
1352                            42,3313   41126 1 M/SCON2  OCT     41126           - LO PART OF (59M58.5S) +1
1353   REF   7  LAST  339       42,3314   03256 0 NORMADR  ADRES   M/SNORM +1
1354                            42,3315   00025 0 M/SCON3  OCT     00025           59M 59.5S
1355                            42,3316   37016 1          OCT     37016


1356   REF 112  LAST  340       42,3317  10 155 1 SEPSEC   CCS     MPAC    +1      IF +, ROUND BY ADDING .5 SEC
1357   REF   1                  42,3320  1 3327 0          TCF     POSEC           IF -, ROUND BY SUBTRACTING .5 SEC
1358   REF   2  LAST  340       42,3321  1 3327 0          TCF     POSEC           FINDS TIME IN MPAC, MPAC+1
1359                            42,3322  1 3323 1          TCF     +1              ROUNDS OFF BY +/- .5 SEC
1360                            42,3323  0 0006 1          EXTEND                  LEAVES WHOLE MIN IN BIT13 OF
1361   REF   1                  42,3324  4 3215 0          DCS     RNDCON  -1      LOTEMOUT AND ABOVE.
1362   REF 113  LAST  340       42,3325  20 155 1 SEPSEC1  DAS     MPAC            LEAVES FRACT SEC/60 IN MPAC, MPAC+1.
1363   REF   3  LAST  339       42,3326  1 3332 1          TCF     SEPSECNR
1364                            42,3327  0 0006 1 PDSEC    EXTEND
1365   REF   2  LAST  340       42,3330  3 3215 1          DCA     RNDCON  -1
1366   REF   1                  42,3331  1 3325 1          TCF     SEPSEC1
1367   REF  73  LAST  337       42,3332  56 002 0 SEPSECNR XCH     Q               THIS ENTRY AVOIDS ROUNDING BY .5 SEC
1368   REF   1                  42,3333  54 144 1          TS      SEPSCRET
1369   REF   4  LAST  338       42,3334  0 7052 1          TC      DMP             MULT BY 2EXP12/6000
1370   REF   1                  42,3335   03202 1          ADRES   SECON1          GIVES FRACT SEC/60 IN BIT12 OF MPAC+1
1371                            42,3336  0 0006 1          EXTEND                  AND BELOW.
1372   REF 114  LAST  340       42,3337  3 0155 0          DCA     MPAC            SAVE MINUTES AND HOURS
1373   REF   3  LAST  338       42,3340  53'010 0          DXCH    HITEMOUT
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 1374   REF   1                 42,3341  0 4420 0            TC     TPSL1
 1375   REF   2  LAST  341      42,3342  0 4420 0            TC     TPSL1          GIVES FRACT SEC/60 IN MPAC+1, MPAC+2.
 1376   REF  48  LAST  340      42,3343  3 5021 1            CAF    ZERO
 1377   REF 115  LAST  340      42,3344  56 156 0            XCH    MPAC    +2     LEAVE FRACT SEC/60 IN MPAC, MPAC+1.
 1378   REF 116  LAST  341      42,3345  56 155 0            XCH    MPAC    +1
 1379   REF 117  LAST  341      42,3346  56 154 1            XCH    MPAC
 1380   REF   2  LAST  340      42,3347  0 0144 0            TC     SEPSCRET


 1381   REF  74  LAST  340      42,3350  56 002 0  SEPMIN     XCH    Q              FINDS WHOLE MINUTES IN BIT13
 1382   REF   1                 42,3351  54 144 1            TS     SEPMNRET       OF LOTEMOUT AND ABOVE.
 1383   REF   1                 42,3352  3 1010 1            CA     LOTEMOUT       REMOVES REST OF SECONDS.
 1384                           42,3353  0 0006 1            EXTEND                LEAVES FRACT MIN/60 IN MPAC+1.
 1385   REF  12  LAST  187      42,3354  7 5015 1            MP     BIT3           LEAVES WHOLE HOURS IN MPAC.
 1386                           42,3355  0 0006 1            EXTEND                SR 12, THROW AWAY LP.
 1387   REF  20  LAST  197      42,3356  7 5003 0            MP     BIT13          SR 2, TAKE FROM LP. = SL 12.
 1388   REF 118  LAST  341      42,3357  22 155 0            LXCH   MPAC    +1     THIS FORCES BITS 12-1 TO 0 IF +,
A1389                                                                             FORCES BITS 12-1 TO 1 IF -.
 1390   REF   4  LAST  340      42,3360  3 1007 1            CA     HITEMOUT
 1391   REF 119  LAST  341      42,3361  54 154 0            TS     MPAC
 1392   REF   5  LAST  340      42,3362  0 7052 1            TC     DMP            MULT BY 1/15
 1393   REF   1                 42,3363   03210 1           ADRES  MINCON1        GIVES FRACT MIN/60 IN MPAC+1.
 1394   REF   2  LAST  341      42,3364  0 0144 0  ENDSPMIN  TC     SEPMNRET       GIVES WHOLE HOURS IN MPAC.
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R1395   THIS IS A SPECIAL PURPOSE VERB FOR DISPLAYING A DOUBLE PRECISION AGC
R1396   WORD AS 10 DECIMAL DIGITS ON THE AGC DISPLAY PANEL.  IT CAN BE USED WITH
R1397   ANY NOUN, EXCEPT MIXED NOUNS. IT DISPLAYS THE CONTENTS
R1398   OF THE REGISTER NOUNADD IS POINTING TO .  IF USED WITH NOUNS WHICH ARE
R1399   INHERENTLY NOT DP SUCH AS THE CDU COUNTERS THE DISPLAY WILL BE GARBAGE.
R1400   DISPLAY IS IN R1 AND R2 ONLY WITH THE SIGN IN R1.


 1401   REF   1                 40,2677                     SETLOC ENDROLO  +1

14015   REF   3 LAST  335 TO  338:   113   447*             COUNT  40/PIN

 1402   REF   8  LAST  337      40,2677  50 140 1  DSPDPDEC INDEX  MIXBR
 1403                           40,2700  0 2700 1            TC     +0
 1404                           40,2701  0 2703 1            TC     +2             NORMAL NOUN
 1405   REF   3  LAST  329      40,2702  0 3325 0            TC     DSPALARM
 1406                           40,2703  0 0006 1            EXTEND
 1407   REF  11  LAST  338      40,2704  5 0145 1            INDEX  NOUNADD
 1408                           40,2705  3 0001 0            DCA    0
 1409   REF 120  LAST  341      40,2706  52 155 1            DXCH   MPAC
 1410   REF  11  LAST  340      40,2707  3 4333 0            CAF    R1D1
 1411   REF  36  LAST  340      40,2710  54 777 1            TS     DSPCOUNT
 1412   REF  49  LAST  341      40,2711  3 5021 1            CAF    ZERO
 1413   REF 121  LAST  341      40,2712  54 156 1            TS     MPAC   +2
 1414   REF   5  LAST  339      40,2713  0 7226 0            TC     TPAGREE
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1415   REF   1              40,2714  0 3200 0           TC     DSP2DEC
1416   REF   6  LAST  338   40,2715  0 0136 0 ENDDPDEC TC     ENTEXIT
```

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P1417   LOAD VERBS            IF ALARM CONDITION IS DETECTED DURING EXECUTE,
R1418   CHECK FAIL LIGHT IS TURNED ON AND ENDOFJOB. IF ALARM CONDITION IS
R1419   DETECTED DURING ENTER OF DATA, CHECK FAIL IS TURNED ON AND IT RECYCLES
R1420   TO EXECUTE  OF ORIGINAL LOAD VERB. RECYCLE CAUSED BY  1) DECIMAL MACHINE
R1421   CADR  2) MIXTURE OF OCTAL/DECIMAL DATA  3) OCTAL DATA INTO DECIMAL
R1422   ONLY NOUN  4) DEC DATA INTO OCT ONLY NOUN  5) DATA TOO LARGE FOR SCALE
R1423   6) FEWER THAN 3 DATA WORDS LOADED FOR HRS. MIN. SEC NOUN.#(2)-(6) ALARM
R1424   AND RECYCLE OCCUR AT FINAL ENTER OF SET. (1) ALARM AND RECYCLE OCCUR AT
R1425   ENTER OF CADR.


 1426   REF   1              41,2616                    SETLOC ENDRTOUT

 14265  REF   2 LAST  323 TO  335:   398   398*         COUNT  41/PIN

 1427   REF  16  LAST  340   41,2616  4 5016 1  ABCLOAD  CS     TWO
 1428   REF   3  LAST  331   41,2617  0 2424 1           TC     COMPTEST
 1429   REF   1              41,2620  0 2460 1           TC     NOUNTEST        TEST IF NOUN CAN BE LOADED.
 1430   REF   1              41,2621  3 3006 1           CAF    V8SP1LD
 1431   REF   2  LAST  321   41,2622  0 2337 1           TC     UPDATV8  -1
 1432   REF   1              41,2623  0 2303 0           TC     REQDATX
 1433   REF   1              41,2624  3 3007 0           CAF    V8SP2LD
 1434   REF   3  LAST  343   41,2625  0 2337 1           TC     UPDATV8  -1
 1435   REF   1              41,2626  0 2305 0           TC     REQDATY
 1436   REF   1              41,2627  3 3010 0           CAF    V8SP3LD
 1437   REF   4  LAST  343   41,2630  0 2337 1           TC     UPDATV8 -1
 1438   REF   2  LAST  324   41,2631  0 2307 1           TC     REQDATZ


 1439   REF  13  LAST  336   41,2632  4 6211 1  PUTXYZ   CS     SIX             TEST THAT THE 3 DATA WORDS LOADED ARE
 1440   REF   1              41,2633  0 3011 1           TC     ALLDC/OC        ALL DEC OR ALL OCT.
 1441                        41,2634  0 0006 1           EXTEND
 1442   REF   4  LAST  328   41,2635  3 2114 1           DCA    LODNNLOC        SWITCH BANKS TO NOUN TABLE READING
 1443   REF   7  LAST  334   41,2636  52 006 0           DXCH   Z               ROUTINE.
 1444   REF  50  LAST  341   41,2637  3 5021 1           CAF    ZERO            X COMP
 1445   REF   1              41,2640  0 3075 0           TC     PUTCOM
 1446   REF  12  LAST  341   41,2641  50 145 1           INDEX  NOUNADD
 1447                        41,2642  54 000 0           TS     0
 1448   REF  29  LAST  335   41,2643  3 5017 1           CAF    ONE             Y COMP
 1449   REF   2  LAST  343   41,2644  0 3075 0           TC     PUTCOM
 1450   REF  13  LAST  343   41,2645  50 145 1           INDEX   NOUNADD
 1451                        41,2646  54 001 1           TS     1
 1452   REF  17  LAST  343   41,2647  3 5016 0           CAF    TWO             Z COMP
 1453   REF   3  LAST  343   41,2650  0 3075 0           TC     PUTCOM
 1454   REF  14  LAST  343   41,2651  50 145 1           INDEX  NOUNADD
 1455                        41,2652  54 002 1           TS     2
 145501 REF   5  LAST  231   41,2653  4 5023 1           CS     SEVEN           IF NOUN 7 HAS JUST BEEN LOADED, SET
 145502 REF  10  LAST  328   41,2654  6 1002 1           AD     NOUNREG          FLAG BITS AS SPECIFIED.
 145503                      41,2655  0 0006 1           EXTEND
 145504                      41,2656  1 2660 1           BZF    +2
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145505 REF   2  LAST  323   41,2657  0 2775 0          TC     LOADLV
145506 REF   4  LAST  333   41,2660  3 1003 0          CA     XREG          ECADR OF FLAG WORD.
145507 REF   5  LAST  328   41,2661  0 4320 1          TC     SETNCADR +1    SET EBANK, NOUNADD.
145508 REF   2  LAST  324   41,2662  3 1005 0          CA     ZREG          ZERO TO RESET BITS, NON-ZERO TO SET BITS
145509                      41,2663  0 0004 0          INHINT
14551                       41,2664  0 0006 1          EXTEND
145511 REF   1              41,2665  1 2674 1          BZF    BITSOFF
145512 REF  15  LAST  343   41,2666  50 145 1          INDEX  NOUNADD
145513                      41,2667  4 0000 0          CS     0
145514 REF   1              41,2670  7 1004 0          MASK   YREG          BITS TO BE PROCESSED.
145515 REF  16  LAST  344   41,2671  50 145 1          INDEX  NOUNADD
145516                      41,2672  26 000 0          ADS    0             SET BITS.
145517 REF   1              41,2673  0 2701 0          TC     BITSOFF1
145518 REF   2  LAST  344   41,2674  4 1004 0  BITSOFF CS     YREG          BITS TO BE PROCESSED.
145519 REF  17  LAST  344   41,2675  50 145 1          INDEX  NOUNADD
14552                       41,2676  7 0000 0          MASK   0
145521 REF  18  LAST  344   41,2677  50 145 1          INDEX  NOUNADD
145522                      41,2700  54 000 0          TS     0             RESET BITS.
145523                      41,2701  0 0003 1  BITSOFF1 RELINT
1456   REF   3  LAST  344   41,2702  0 2775 0          TC     LOADLV

1457   REF  30  LAST  343   41,2703  4 5017 0  ABLOAD  CS     ONE
1458   REF   4  LAST  343   41,2704  0 2424 1          TC     COMPTEST
1459   REF   2  LAST  343   41,2705  0 2460 1          TC     NOUNTEST      TEST IF NOUN CAN BE LOADED.
1460   REF   2  LAST  343   41,2706  3 3006 1          CAF    VBSP1LD
1461   REF   5  LAST  343   41,2707  0 2337 1          TC     UPDATVB -1
1462   REF   2  LAST  343   41,2710  0 2303 0          TC     REQDATX
1463   REF   2  LAST  343   41,2711  3 3007 0          CAF    VBSP2LD
1464   REF   6  LAST  344   41,2712  0 2337 1          TC     UPDATVB -1
1465   REF   2  LAST  343   41,2713  0 2305 0          TC     REQDATY
1466   REF   7  LAST  325   41,2714  4 5022 0  PUTXY   CS     FIVE          TEST THAT THE 2 DATA WORDS LOADED ARE
1467   REF   2  LAST  343   41,2715  0 3011 1          TC     ALLDC/OC      ALL DEC OR ALL OCT.
1468                       41,2716  0 0006 1          EXTEND
1469   REF   5  LAST  343   41,2717  3 2114 1          DCA    LODNNLOC      SWITCH BANKS TO NOUN TABLE READING
1470   REF   8  LAST  343   41,2720  52 006 0          DXCH   Z             ROUTINE.
1471   REF  51  LAST  343   41,2721  3 5021 1          CAF    ZERO          X COMP
1472   REF   4  LAST  343   41,2722  0 3075 0          TC     PUTCOM
1473   REF  19  LAST  344   41,2723  50 145 1          INDEX  NOUNADD
1474                       41,2724  54 000 0          TS     0
1475   REF  31  LAST  344   41,2725  3 5017 1          CAF    ONE           Y COMP
1476   REF   5  LAST  344   41,2726  0 3075 0          TC     PUTCOM
1477   REF  20  LAST  344   41,2727  50 145 1          INDEX  NOUNADD
1478                       41,2730  54 001 1          TS     1
1479   REF   4  LAST  344   41,2731  0 2775 0          TC     LOADLV

1481   REF   3  LAST  344   41,2732  0 2303 0  ALOAD   TC     REQDATX
1482                       41,2733  0 0006 1          EXTEND
1483   REF   6  LAST  344   41,2734  3 2114 1          DCA    LODNNLOC      SWITCH BANKS TO NOUN TABLE READING
1484   REF   9  LAST  344   41,2735  52 006 0          DXCH   Z             ROUTINE.
1485   REF  52  LAST  344   41,2736  3 5021 1          CAF    ZERO          X COMP
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1486  REF   6  LAST  344   41,2737  0 3075 0          TC     PUTCOM
1487  REF  21  LAST  344   41,2740  50 145 1          INDEX  NOUNADD
1488                        41,2741  54 000 0          TS     0
1489  REF   5  LAST  344   41,2742  0 2775 0          TC     LOADLV

1490  REF  32  LAST  344   41,2743  4 5017 0  BLOAD   CS     ONE
1491  REF   5  LAST  344   41,2744  0 2424 1          TC     COMPTEST
1493  REF  25  LAST  335   41,2745  3 5001 0          CAF    BIT15          SET CLPASS FOR PASSO ONLY
1494  REF  10  LAST  324   41,2746  55'015 0          TS     CLPASS
1495  REF   3  LAST  344   41,2747  0 2305 0          TC     REQDATY
1496                        41,2750  0 0006 1          EXTEND
1497  REF   7  LAST  344   41,2751  3 2114 1          DCA    LOONNLOC       SWITCH BANKS TO NOUN TABLE READING
1498  REF  10  LAST  344   41,2752  52 006 0          DXCH   Z              ROUTINE.
1499  REF  33  LAST  345   41,2753  3 5017 1          CAF    ONE
1500  REF   7  LAST  345   41,2754  0 3075 0          TC     PUTCOM
1501  REF  22  LAST  345   41,2755  50 145 1          INDEX  NOUNADD
1502                        41,2756  54 001 1          TS     1
1503  REF   6  LAST  345   41,2757  0 2775 0          TC     LOADLV

1504  REF  18  LAST  343   41,2760  4 5016 1  CLOAD   CS     TWO
1505  REF   6  LAST  345   41,2761  0 2424 1          TC     COMPTEST
1507  REF  26  LAST  345   41,2762  3 5001 0          CAF    BIT15          SET CLPASS FOR PASSO ONLY
1508  REF  11  LAST  345   41,2763  55'015 0          TS     CLPASS
1509  REF   3  LAST  343   41,2764  0 2307 1          TC     REQDATZ
1510                        41,2765  0 0006 1          EXTEND
1511  REF   8  LAST  345   41,2766  3 2114 1          DCA    LOONNLOC       SWITCH BANKS TO NOUN TABLE READING
1512  REF  11  LAST  345   41,2767  52 006 0          DXCH   Z              ROUTINE.
1513  REF  19  LAST  345   41,2770  3 5016 0          CAF    TWO
1514  REF   8  LAST  345   41,2771  0 3075 0          TC     PUTCOM
1515  REF  23  LAST  345   41,2772  50 145 1          INDEX  NOUNADD
1516                        41,2773  54 002 1          TS     2
1517  REF   7  LAST  345   41,2774  0 2775 0          TC     LOADLV

1518  REF  53  LAST  344   41,2775  3 5021 1  LOADLV  CAF    ZERO
1519  REF  13  LAST  324   41,2776  55'000 1          TS     DECBRNCH
1520  REF  54  LAST  345   41,2777  4 5021 0          CS     ZERO
1521  REF   1               41,3000  55'014 1          TS     LOADSTAT
15215 REF   5  LAST  325   41,3001  0 4473 0          TC     RELDSP         RELEASE FOR PRIORITY DISPLAY PROBLEM.
1522  REF   6  LAST  328   41,3002  4 4374 1          CS     V01            TO BLOCK NUMERICAL CHARACTERS AND
1523  REF  37  LAST  341   41,3003  54 777 1          TS     DSPCOUNT       CLEARS AFTER A COMPLETED LOAD
1524  REF  23  LAST  340   41,3004  0 4701 0          TC     POSTJUMP       AFTER COMPLETED LOAD, GO TO RECALTST
1525  REF   1               41,3005  61454 0           CADR   RECALTST       TO SEE IF THERE IS RECALL FROM ENDIDLE.

1526                        41,3006   00025 0  VBSP1LD DEC    21             VB21 = ALOAD
1527                        41,3007   00026 0  VBSP2LD DEC    22             VB22 = BLOAD
1528                        41,3010   00027 1  VBSP3LD DEC    23             VB23 = CLOAD

1529  REF  13  LAST  340   41,3011  54 117 1  ALLOC/OC TS     DECOUNT        TESTS THAT DATA WORDS LOADED ARE EITHER
1530  REF  14  LAST  345   41,3012  4 1000 1          CS     DECBRNCH       ALL DEC OR ALL OCT. ALARMS IF NOT.
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 1531   REF   6  LAST  322   41,3013  54 021 0          TS      SR
 1532   REF   7  LAST  346   41,3014  4 0021 0          CS      SR
 1533   REF   8  LAST  346   41,3015  4 0021 0          CS      SR              SHIFTED RIGHT 2
 1534   REF 104  LAST  339   41,3016  10 000 0          CCS     A               DEC COMP BITS IN LOW 3
 1535                        41,3017  1 3021 0          TCF     +2              SOME ONES IN LOW 3
 1536   REF  75  LAST  341   41,3020  0 0002 0          TC      Q               ALL ZEROS. ALL OCTAL.  OK
 1537   REF  14  LAST  345   41,3021  6 0117 0          AD      DECOUNT         DEC COMP = 7 FOR 3COMP, =6 FOR 2COMP
 1538                        41,3022  0 0006 1          EXTEND                  (BUT IT HAS BEEN DECREMENTED BY CCS)
 1539                        41,3023  1 3025 1          BZF     +2              MUST MATCH 6 FOR 3COMP, 5 FOR 2COMP.
 1540   REF   4  LAST  332   41,3024  0 4161 0          TC      ALMCYCLE        ALARM AND RECYCLE.
 1541   REF  76  LAST  346   41,3025  0 0002 0  GOQ     TC      Q               ALL REQUIRED ARE DEC. OK

 1542   REF  77  LAST  346   41,3026  56 002 0  SFRUTNOR XCH    Q               GETS SF ROUTINE NUMBER FOR NORMAL CASE
 1543   REF   1              41,3027  54 114 1          TS      EXITEM          CANT USE L FOR RETURN. TSTFORDP USES L.
 1544   REF   1              41,3030  3 4363 0          CAF     MID5
 1545   REF   3  LAST  333   41,3031  7 0147 1          MASK    NNTYPTEM
 1546   REF   1              41,3032  0 4336 0          TC      RIGHT5
 1547   REF   2  LAST  346   41,3033  0 0114 0          TC      EXITEM          SF ROUTINE NUMBER IN A

 1548   REF  78  LAST  346   41,3034  56 002 0  SFRUTMIX XCH    Q               GETS SF ROUTINE NUMBER FOR MIXED CASE
 1549   REF   3  LAST  346   41,3035  54 114 1          TS      EXITEM
 1550   REF  15  LAST  346   41,3036  50 117 0          INDEX   DECOUNT
 1551   REF   1              41,3037  3 3066 1          CAF     DISPLACE        PUT TC GOQ, TC RIGHT5, OR TC LEFT5 IN L
 1552   REF  36  LAST  333   41,3040  54 001 1          TS      L
 1553   REF  16  LAST  346   41,3041  50 117 0          INDEX   DECOUNT
 1554   REF   3  LAST  316   41,3042  3 4362 1          CAF     LOW5            LOW5, MID5, OR HI5 IN A
 1555   REF   2  LAST  270   41,3043  7 0153 1          MASK    RUTMXTEM        GET HI5, MID5, OR LOW5 OF RUTMXTAB ENTRY
 1556   REF  37  LAST  346   41,3044  50 001 0          INDEX   L
 1557                        41,3045  0 0000 1          TC      0
R1558   DO TC GOQ(DECOUNT=0), DO TC RIGHT5(DECOUNT=1), DO TC LEFT5(DECOUNT=2).
 1559   REF   4  LAST  346   41,3046  0 0114 0  SFRET1  TC      EXITEM          SF ROUTINE NUMBER IN A

 1560   REF  79  LAST  346   41,3047  56 002 0  SFCONUM  XCH    Q               GETS 2X( SF CONSTANT NUMBER)
 1561   REF   5  LAST  346   41,3050  54 114 1          TS      EXITEM
 1562   REF   9  LAST  341   41,3051  50 140 1          INDEX   MIXBR
 1563                        41,3052  0 3052 0          TC      +0
 1564   REF   1              41,3053  0 3071 1          TC      CONUMNOR        NORMAL NOUN
 1565   REF  17  LAST  346   41,3054  50 117 0          INDEX   DECOUNT         MIXED NOUN
 1566   REF   2  LAST  346   41,3055  3 3066 1          CAF     DISPLACE
 1567   REF  38  LAST  346   41,3056  54 001 1          TS      L               PUT TC GOQ, TC RIGHT5, OR TC LEFT5 IN L
 1568   REF  18  LAST  346   41,3057  50 117 0          INDEX   DECOUNT
 1569   REF   4  LAST  346   41,3060  3 4362 1          CAF     LOW5
 1570   REF   4  LAST  346   41,3061  7 0147 1          MASK    NNTYPTEM
 1571   REF  39  LAST  346   41,3062  50 001 0          INDEX   L
 1572                        41,3063  0 0000 1          TC      0
R1573   DO TC GOQ(DECOUNT=0), DO TC RIGHT5(DECOUNT=1), DO TC LEFT5(DECOUNT=2).
 1574                        41,3064  6 0000 1  SFRET   DOUBLE                  2X(SF CONSTANT NUMBER ) IN A
 1575   REF   6  LAST  346   41,3065  0 0114 0          TC      EXITEM
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 1576   REF   1                    41,3066  0 3025 0  DISPLACE TC      GOO
 1577   REF   2  LAST  346         41,3067  0 4336 0           TC      RIGHT5
 1578   REF   3  LAST  333         41,3070  0 4345 1           TC      LEFT5

 1579   REF   5  LAST  346         41,3071  3 4362 1  CONUMNOR CAF     LOW5          NORMAL NOUN ALWAYS GETS LOW 5 OF
 1580   REF   5  LAST  346         41,3072  7 0147 1           MASK    NNTYPTEM      NNTYPTAB FOR SF CONUM.
 1581                              41,3073  6 0000 1           DOUBLE
 1582   REF   7  LAST  346         41,3074  0 0114 0           TC      EXITEM        2X( SF CONSTANT NUMBER) IN A


 1583   REF  19  LAST  346         41,3075  54 117 1  PUTCOM   TS      DECOUNT
 1584   REF  80  LAST  346         41,3076  56 002 0           XCH     Q
 1585   REF   1                    41,3077  54 115 0           TS      DECRET
 1586   REF  55  LAST  345         41,3100  3 5021 1           CAF     ZERO
 1587   REF   3  LAST  337         41,3101  54 162 0           TS      MPAC+6
 1588   REF  20  LAST  347         41,3102  50 117 0           INDEX   DECOUNT
 1589   REF   3  LAST  322         41,3103  57'006 0           XCH     XREGLP
 1590   REF 122  LAST  341         41,3104  54 155 1           TS      MPAC  +1
 1591   REF  21  LAST  347         41,3105  50 117 0           INDEX   DECOUNT
 1592   REF   5  LAST  344         41,3106  57'003 0           XCH     XREG
 1593   REF 123  LAST  347         41,3107  54 154 0           TS      MPAC
 1594   REF  10  LAST  346         41,3110  50 140 1           INDEX   MIXBR
 1595                              41,3111  0 3111 0           TC      +0
 1596   REF   1                    41,3112  0 3137 1           TC      PUTNORM       NORMAL NOUN
R1597   IF MIXNOUN, PLACE ADDRESS FOR COMPONENT K INTO NOUNADD, SET EBANK BITS.
 1598   REF  22  LAST  347         41,3113  50 117 0           INDEX   DECOUNT       GET IOADDTAB ENTRY FOR COMPONENT K
 1599   REF   4  LAST  337         41,3114  3 0150 0           CA      IOADITEM              OF NOUN.
 1600   REF   5  LAST  337         41,3115  7 4372 1           MASK    LOW11         (ECADR)SUBK FOR CURRENT COMP OF NOUN
 1601   REF   6  LAST  344         41,3116  0 4317 0           TC      SETNCADR      ECADR INTO NOUNCADR. SETS EB, NOUNADD.
 1602                              41,3117  0 0006 1           EXTEND                C(NOUNADD) IN A UPON RETURN
 1603   REF  23  LAST  347         41,3120  60 117 0           SU      DECOUNT       PLACE (ESUBK)-K INTO NOUNADD
 1604   REF  24  LAST  345         41,3121  54 145 0           TS      NOUNADD
 1605   REF  15  LAST  345         41,3122  11'000 1           CCS     DECBRNCH
 1606   REF   1                    41,3123  0 3174 0           TC      PUTDECSF      +  DEC
 1607   REF   1                    41,3124  0 2452 0           TC      DCTSTCYC      +0 OCTAL
 1608   REF   3  LAST  334         41,3125  0 3034 0           TC      SFRUTMIX      TEST IF DEC ONLY BIT = 1. IF SO,
 1609   REF   3  LAST  333         41,3126  0 2261 0           TC      DPTEST        ALARM AND RECYCLE. IF NOT, CONTINUE.
 1610   REF   1                    41,3127  0 3155 0           TC      PUTCOM2       NO DP
A1611                                                                                 TEST FOR DP SCALE FOR OCT LOAD. IF SO,
A1612                                                                                 +0 INTO MAJOR PART. SET NOUNADD FOR
A1613                                                                                 LOADING OCTAL WORD INTO MINOR PART.
 1614   REF  25  LAST  347         41,3130  24 145 1  PUTDPCOM INCR    NOUNADD       DP  (ESUBK)-K+1  OR  E+1
 1615   REF  26  LAST  347         41,3131  3 0145 1           CA      NOUNADD       NOUNADD NOW SET FOR MINOR PART
 1616   REF  24  LAST  347         41,3132  26 117 1           ADS     DECOUNT       (ESUBK)+1  OR  E+1  INTO DECOUNT
 1617   REF  56  LAST  347         41,3133  3 5021 1           CAF     ZERO          NOUNADD SET FOR MINOR PART
 1618   REF  25  LAST  347         41,3134  50 117 0           INDEX   DECOUNT
 1619                              41,3135  53'777 0           TS      0       -1    ZERO MAJOR PART(ESUBK OR E)
 1620   REF   2  LAST  347         41,3136  0 3155 0           TC      PUTCOM2

 1621   REF   2  LAST  324         41,3137  0 4325 1  PUTNORM  TC      SETNADD       ECADR FROM NOUNCADR. SETS EB, NOUNADD.
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 1622   REF  16  LAST  347   41,3140  11'000 1          CCS    DECBRNCH
 1623   REF   2  LAST  347   41,3141  0 3174 0          TC     PUTDECSF       +  DEC
 1624   REF   2  LAST  347   41,3142  0 2452 0          TC     OCTSTCYC       +0 OCTAL
 1625   REF   3  LAST  334   41,3143  0 3026 0          TC     SFRUTNOR       TEST IF DEC ONLY BIT = 1. IF SO,
 1626   REF   4  LAST  347   41,3144  0 2261 0          TC     DPTEST         ALARM AND RECYCLE. IF NOT, CONTINUE.
 1627   REF   3  LAST  347   41,3145  0 3151 1          TC     PUTCOM2 -4     NO DP
 1628   REF  57  LAST  347   41,3146  3 5021 1          CAF    ZERO           DP
 1629   REF  26  LAST  347   41,3147  54 117 1          TS     DECOUNT
 1630   REF   1              41,3150  0 3130 0          TC     PUTDPCOM

 1631   REF   8  LAST  333   41,3151  3 0146 1          CA     NNADTEM
 1632   REF  34  LAST  345   41,3152  6 5017 1          AD     ONE            IF NNADTEM = -1. CHANNEL TO BE SPECIFIED
 1633                        41,3153  0 0006 1          EXTEND
 1634   REF   1              41,3154  1 3161 0          BZF    CHANLOAD
 1635   REF 124  LAST  347   41,3155  56 154 1 PUTCOM2  XCH    MPAC
 1636   REF   2  LAST  347   41,3156  0 0115 1          TC     DECRET

 1637   REF  38  LAST  345     0777                     EBANK= DSPCOUNT
 1638   REF   1              41,3157   02126 0 GTSFINLC 2CADR  GTSFIN
 1638   REF   1              41,3160   64101 0

 1639   REF   6  LAST  343   41,3161  4 5023 1 CHANLOAD CS     SEVEN          DONT LOAD CHAN 7. (IT = SUPERBANK).
 16391  REF   4  LAST  333   41,3162  6 1017 0          AD     NOUNCADR
 16392                       41,3163  0 0006 1          EXTEND
 16393  REF   8  LAST  345   41,3164  1 2775 1          BZF    LOADLV
 16394  REF   5  LAST  348   41,3165  3 1017 0          CA     NOUNCADR
 1640   REF   6  LAST  333   41,3166  7 5046 1          MASK   LOW9
 1641   REF 125  LAST  348   41,3167  56 154 1          XCH    MPAC
 16411                       41,3170  0 0006 1          EXTEND
 16412  REF 126  LAST  348   41,3171  5 0154 1          INDEX  MPAC
 1642                        41,3172  01 000 0          WRITE  0
 1643   REF   9  LAST  348   41,3173  0 2775 0          TC     LOADLV

R1644   PUTDECSF FINDS MIXBR AND DECOUNT STILL SET FROM PUTCOM

 1645   REF   2  LAST  333   41,3174  0 3047 1 PUTDECSF TC     SFCONUM        2X(SF CON NUMB) IN A
 1646   REF  13  LAST  337   41,3175  54 123 0          TS     SFTEMP1
 1647                        41,3176  0 0006 1          EXTEND                SWITCH BANKS TO SF CONSTANT TABLE
 1648   REF   1              41,3177  3 3160 0          DCA    GTSFINLC       READING ROUTINE.
 1649   REF  12  LAST  345   41,3200  52 006 0          DXCH   7              LOADS SFTEMP1, SFTEMP2.
 1650   REF  11  LAST  347   41,3201  50 140 1          INDEX  MIXBR
 1651                        41,3202  0 3202 1          TC     +0
 1652   REF   1              41,3203  0 3206 0          TC     PUTSFNOR
 1653   REF   4  LAST  347   41,3204  0 3034 0          TC     SFRUTMIX
 1654   REF   1              41,3205  0 3207 1          TC     PUTDCSF2
 1655   REF   4  LAST  348   41,3206  0 3026 0 PUTSFNOR TC     SFRUTNOR

 1656   REF 105  LAST  346   41,3207  50 000 1 PUTDCSF2 INDEX  A
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 1657   REF   1                  41,3210  3 3212 0            CAF     SFINTABR
 1658   REF   3  LAST  334       41,3211  0 4704 0            TC      BANKJUMP       SWITCH BANKS FOR EXPANSHION ROOM
 1659   REF   1                  41,3212   62350 0  SFINTABR  CADR    GOALMCYC       ALARM AND RECYCLE IF DEC LOAD
A1660                                                                                 WITH OCTAL ONLY NOUN.
 1661   REF   1                  41,3213   60776 1            CADR    BINROUND
 1662   REF   1                  41,3214   60716 1            CADR    DEGINSF
 1663   REF   1                  41,3215   60766 0            CADR    ARTHINSF
 1664   REF   1                  41,3216   61021 0            CADR    DPINSF
 1665   REF   1                  41,3217   61046 1            CADR    DPINSF2
 1666   REF   1                  41,3220   61004 1            CADR    DPTDEGIN
 1667   REF   2  LAST  349       41,3221   61021 0            CADR    DPINSF         SAME AS ARITHDP1
 1668   REF   1                  41,3222   65365 1            CADR    HMSIN
 1669   REF   4  LAST  341       41,3223   61325 1            CADR    DSPALARM       MIN/SEC CANT BE LOADED.
 1671   REF   1                  41,3224   61053 0            CADR    DPINSF4
16711   REF   1                  41,3225   61001 1            CADR    ARTINISF
16712   REF   5  LAST  349       41,3226   61325 1            CADR    DSPALARM       2INTOUT CANT BE LOADED.
16713   REF   1                  41,3227   61032 1            CADR    DPFRACIN
 1672                            41,3230              ENDRUTIN EQUALS

R1673   SCALE FACTORS FOR THOSE ROUTINES NEEDING THEM ARE AVAILABLE IN SFTEMP1.
R1674   ALL SFIN ROUTINES USE MPAC MPAC+1. LEAVE RESULT IN A. END WITH TC DECRET

 1675   REF   1                  40,2716                      SETLOC  ENDDPDEC +1

16755   REF   4 LAST  341 TO  343:    15   452*              COUNT   40/PIN

R1676   DEGINSF APPLIES 1000/180 =5.55555(10) = 5.43434(8)

 1677   REF   6  LAST  341       40,2716  0 7052 1  DEGINSF  TC      DMP            SF ROUTINE FOR DEC DEGREES
 1678   REF   1                  40,2717   02761 0            ADRES   DEGCON1        MULT BY 5.5  5(10)X2EXP-3
 1679   REF 127  LAST  348       40,2720  10 155 1            CCS     MPAC    +1     THIS ROUNDS OFF MPAC+1 BEFORE SHIFT
 1680   REF  14  LAST  320       40,2721  3 5005 1            CAF     BIT11          LEFT 3, AND CAUSES 360.00 TO OF/UF
 1681                            40,2722  0 2724 1            TC      +2             WHEN SHIFTED LEFT AND ALARM.
 1682   REF  15  LAST  349       40,2723  4 5005 0            CS      BIT11
 1683   REF 128  LAST  349       40,2724  6 0155 0            AD      MPAC    +1
 1684   REF   1                  40,2725  0 3072 1            TC      2ROUND  +2
 1685   REF   3  LAST  341       40,2726  0 4420 0            TC      TPSL1          LEFT 1
 1686   REF   4  LAST  349       40,2727  0 4420 0  DEGINSF2  TC      TPSL1          LEFT 2
 1687   REF   1                  40,2730  0 3101 1            TC      TESTOFUF
 1688   REF   5  LAST  349       40,2731  0 4420 0            TC      TPSL1          RETURNS IF NO OF/UF (LEFT3)
 1689   REF 129  LAST  349       40,2732  10 154 0            CCS     MPAC
 1690   REF   1                  40,2733  0 2737 0            TC      SIGNFIX        IF+, GO TO SIGNFIX
 1691   REF   2  LAST  349       40,2734  0 2737 0            TC      SIGNFIX        IF +0, GO TO SIGNFIX
 1692                            40,2735  4 0000 0            COM                    IF - , USE -MAGNITUDE +1
 1693   REF 130  LAST  349       40,2736  54 154 0            TS      MPAC           IF -0, USE +0
 1694   REF   4  LAST  347       40,2737  10 162 0  SIGNFIX  CCS     MPAC+6
 1695   REF   1                  40,2740  0 2755 1            TC      SGNTO1         IF OVERFLOW
 1696   REF   1                  40,2741  0 2751 0            TC      ENDSCALE       NO OVERFLOW/UNDERFLOW
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1697   REF 131  LAST  349   40,2742  10 154 0          CCS    MPAC            IF UF FORCE SIGN TO 0 EXCEPT -180
1698   REF   5  LAST  335   40,2743  0 5747 0          TC     CCSHOLE
1699   REF   1               40,2744  0 2753 1          TC     NEG180
1700                         40,2745  0 2746 0          TC     +1
1701   REF 132  LAST  350   40,2746  56 154 1          XCH    MPAC
1702   REF   7  LAST  304   40,2747  7 4777 0          MASK   POSMAX
1703   REF 133  LAST  350   40,2750  54 154 0          TS     MPAC
1704   REF  24  LAST  345   40,2751  0 4701 0  ENDSCALE TC     POSTJUMP
1705   REF   4  LAST  348   40,2752   63155 0          CADR   PUTCOM2

1706   REF   8  LAST  350   40,2753  4 4777 0  NEG180   CS     POSMAX
1707   REF   2  LAST  349   40,2754  0 2750 1          TC     ENDSCALE  -1

1708   REF 134  LAST  350   40,2755  4 0154 0  SGNTO1   CS     MPAC            IF OF FORCE SIGN TO 1
1709   REF   9  LAST  350   40,2756  7 4777 0          MASK   POSMAX
1710   REF 106  LAST  348   40,2757  4 0000 0          CS     A
1711   REF   3  LAST  350   40,2760  0 2750 1          TC     ENDSCALE  -1

1712                         40,2761   26161 0  DEGCON1  2DEC   5.555555555 B-3
1712                         40,2762   30707 1

1713                         40,2763   21616 0  DEGCON2  2DEC   2.222222222 B-2
1713                         40,2764   07071 0
1714                         40,2765   71527 1  NEG.2    OCT    -06250          = .197753906  I.E. THE BIAS SCALED

1715   REF   7  LAST  349   40,2766  0 7052 1  ARTHINSF TC     DMP             SCALES MPAC, +1 BY SFTEMP1, SFTEMP2.
1716   REF  14  LAST  348   40,2767   00123 1          ADRES  SFTEMP1         ASSUMES POINT BETWEEN HI AND LO PARTS
1717   REF 135  LAST  350   40,2770  56 156 0          XCH    MPAC     +2     OF SFCON. SHIFTS RESULTS LEFT BY 14.
1718   REF 136  LAST  350   40,2771  56 155 0          XCH    MPAC     +1     (BY TAKING RESULTS FROM MPAC+1, MPAC+2)
1719   REF 137  LAST  350   40,2772  56 154 1          XCH    MPAC
1720                         40,2773  0 0006 1          EXTEND
1721   REF   2  LAST  349   40,2774  1 2776 1          BZF    BINROUND
1722   REF   5  LAST  346   40,2775  0 4161 0          TC     ALMCYCLE        TOO LARGE A LOAD. ALARM AND RECYCLE.
1723   REF   2  LAST  349   40,2776  0 3070 0  BINROUND TC     2ROUND
1724   REF   2  LAST  349   40,2777  0 3101 1          TC     TESTOFUF
1725   REF   4  LAST  350   40,3000  0 2751 0          TC     ENDSCALE        RETURNS IF NO OF/UF

17251  REF   8  LAST  350   40,3001  0 7052 1  ARTIN1SF TC     DMP             SCALES MPAC, +1 BY SFTEMP1, SFTEMP2.
17252  REF  15  LAST  350   40,3002   00123 1          ADRES  SFTEMP1         ROUNDS MPAC+1 INTO MPAC.
17253  REF   3  LAST  350   40,3003  0 2776 0          TC     BINROUND

1726   REF 138  LAST  350   40,3004  10 154 0  OPTDEGIN CCS    MPAC            OPTICS SCALING ROUTINE
1727                         40,3005  0 3011 1          TC     +4
1728                         40,3006  0 3011 1          TC     +3
1729   REF   6  LAST  350   40,3007  0 4161 0          TC     ALMCYCLE        REJECT - INPUT. ALARM AND RECYCLE.
1730   REF   7  LAST  350   40,3010  0 4161 0          TC     ALMCYCLE        REJECT - INPUT. ALARM AND RECYCLE.
1731   REF   1               40,3011  3 2765 1  OPDEGIN2 CAF    NEG.2           RANGE IS 90 DEG
1732   REF 139  LAST  350   40,3012  26 154 0          ADS    MPAC            SUBTRACT BIAS
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1733   REF   9  LAST  350   40,3013  0 7052 1           TC     DMP             MULT BY 100 / 45  B-2
1734   REF   1              40,3014   02763 1           ADRES  DEGCON2
1735   REF  19  LAST  301   40,3015  3 5004 0           CAF    BIT12           ROUND AS IN DEGINSF
1736   REF 140  LAST  350   40,3016  6 0155 0           AD     MPAC    +1
1737   REF   3  LAST  350   40,3017  0 3072 1           TC     2ROUND  +2
1738   REF   1              40,3020  0 2727 1           TC     DEGINSF2

1739   REF  10  LAST  351   40,3021  0 7052 1  DPINSF   TC     DMP             SCALES MPAC, MPAC +1 BY SFTEMP1,
1740   REF  16  LAST  350   40,3022   00123 1           ADRES  SFTEMP1         SFTEMP2.  STORES LOW PART OF RESULT
1741   REF 141  LAST  351   40,3023  56 156 0           XCH    MPAC    +2      IN (E SUBK) +1 OR E+1
1742                        40,3024  6 0000 1           DOUBLE
1743   REF 142  LAST  351   40,3025  54 156 1           TS     MPAC    +2
1744   REF  58  LAST  348   40,3026  3 5021 1           CAF    ZERO
1745   REF 143  LAST  351   40,3027  6 0155 0           AD     MPAC    +1
1746   REF   4  LAST  351   40,3030  0 3072 1           TC     2ROUND  +2
1747   REF   3  LAST  350   40,3031  0 3101 1           TC     TESTOFUF
1748   REF  12  LAST  348   40,3032  50 140 1  DPFRACIN INDEX  MIXBR           RETURNS IF NO OF/UF
1749                        40,3033  0 3033 1           TC     +0
1750   REF   1              40,3034  0 3044 1           TC     DPINORM
1751   REF  27  LAST  348   40,3035  3 0117 0           CA     DECOUNT         MIXEDNOUN
1752   REF  27  LAST  347   40,3036  6 0145 1  DPINCOM  AD     NOUNADD             MIXED               NORMAL
1753   REF  81  LAST  347   40,3037  54 002 1           TS     Q                 E SUBK            E
1754   REF 144  LAST  351   40,3040  56 155 0           XCH    MPAC    +1
1755   REF  82  LAST  351   40,3041  50 002 0           INDEX  Q
1756                        40,3042  54 001 1           TS     1               PLACE LOW PART IN
1757   REF   5  LAST  350   40,3043  0 2791 0           TC     ENDSCALE        (E SUBK) +1    MIXED
1758   REF  59  LAST  351   40,3044  3 5021 1  DPINORM  CAF    ZERO            E +1           NORMAL
1759   REF   1              40,3045  0 3036 1           TC     DPINCOM

1760   REF  11  LAST  351   40,3046  0 7052 1  DPINSF2  TC     DMP             ASSUMES POINT BETWEEN BITS 7-8 OF HIGH
1761   REF  17  LAST  351   40,3047   00123 1           ADRES  SFTEMP1         PART OF SF CONST. DPINSF2 SHIFTS RESULTS
1762   REF  14  LAST  343   40,3050  3 6211 0           CAF    SIX             LEFT BY 7, ROUNDS MPAC+2 INTO MPAC+1
1763   REF   2  LAST  336   40,3051  0 3060 1           TC     TPLEFTN         SHIFT LEFT 7.
1764   REF   3  LAST  349   40,3052  0 3023 0           TC     DPINSF  +2

1765   REF  12  LAST  351   40,3053  0 7052 1  DPINSF4  TC     DMP             ASSUMES POINT BETWEEN BITS 11-12 OF HIGH
1766   REF  18  LAST  351   40,3054   00123 1           ADRES  SFTEMP1         PART OF SF CONST. DPINSF2 SHIFTS RESULTS
1767   REF  20  LAST  345   40,3055  3 5016 0           CAF    TWO             LEFT BY 3, ROUNDS MPAC+2 INTO MPAC+1.
1768   REF   3  LAST  351   40,3056  0 3060 1           TC     TPLEFTN         SHIFT LEFT 3.
1769   REF   4  LAST  351   40,3057  0 3023 0           TC     DPINSF  +2

1770   REF  83  LAST  351   40,3060  56 002 0  TPLEFTN  XCH    Q               SHIFTS MPAC, +1, +2 LEFT N. SETS OVFIND
1771   REF   1              40,3061  54 124 1           TS     SFTEMP2         TO +1 FOR OF, -1 FOR UF.
1772   REF  84  LAST  351   40,3062  56 002 0           XCH    Q               CALL WITH N-1 IN A.
1773   REF  19  LAST  351   40,3063  54 123 0  LEFTNCOM TS     SFTEMP1             LOOP TIME .37 MSEC.
1774   REF   6  LAST  349   40,3064  0 4420 0           TC     TPSL1
1775   REF  20  LAST  351   40,3065  10 123 0           CCS    SFTEMP1
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 1776   REF   1                40,3066  0 3063 1           TC     LEFTNCOM
 1777   REF   2  LAST  351     40,3067  0 0124 0           TC     SFTEMP2

 1778   REF 145  LAST  351     40,3070  56 155 0  2ROUND   XCH    MPAC    +1
 1779                          40,3071  6 0000 1           DOUBLE
 1780   REF 146  LAST  352     40,3072  54 155 1           TS     MPAC    +1
 1781   REF  85  LAST  351     40,3073  0 0002 0           TC     Q               IF MPAC+1 DOES NOT OF/UF
 1782   REF 147  LAST  352     40,3074  6 0154 1           AD     MPAC
 1783   REF 148  LAST  352     40,3075  54 154 0           TS     MPAC
 1784   REF  86  LAST  352     40,3076  0 0002 0           TC     Q               IF MPAC DOES NOT OF/UF
 1785   REF   5  LAST  349     40,3077  54 162 0           TS     MPAC+6
 1786   REF  87  LAST  352     40,3100  0 0002 0  2RNDEND  TC     Q

 1787   REF   6  LAST  352     40,3101  10 162 0  TESTOFUF CCS    MPAC+6          RETURNS IF NO OF/UF
 1788   REF   8  LAST  350     40,3102  0 4161 0           TC     ALMCYCLE        OF   ALARM AND RECYCLE.
 1789   REF  88  LAST  352     40,3103  0 0002 0           TC     Q
 1790   REF   9  LAST  352     40,3104  0 4161 0           TC     ALMCYCLE        UF   ALARM AND RECYCLE.

 1791   REF   1                42,3365                     SETLOC ENDSPMIN +1
17915   REF   2 LAST  338 TO  341:   146   146*           COUNT  42/PIN

 1792   REF   1                42,3365  0 3506 1  HMSIN    TC     ALL3DEC         IF ALL 3 WORDS WERE NOT LOADED, ALARM.
 1793   REF  13  LAST  351     42,3366  0 7052 1           TC     DMP             XREG, XREGLP (=HOURS) WERE ALREADY PUT
 1794   REF   1                42,3367   03447 0          ADRES  WHOLECON        INTO MPAC, MPAC+1.
 1795   REF   1                42,3370  0 3456 0           TC     RND/TST         ROUND OFF TO WHOLE HRS IN MPAC+1.
 1796   REF  60  LAST  351     42,3371  3 5021 1           CAF    ZERO            ALARM IF MPAC NON ZERO (G/ 16383 ).
 1797   REF 149  LAST  352     42,3372  54 156 1           TS     MPAC    +2
 1798   REF   1                42,3373  3 3451 1           CAF    HRCON
 1799   REF 150  LAST  352     42,3374  54 154 0           TS     MPAC
 1800   REF   2  LAST  352     42,3375  3 3452 1           CAF    HRCON   +1
 1801   REF 151  LAST  352     42,3376  56 155 0           XCH    MPAC    +1
 1802   REF   6  LAST  339     42,3377  0 7256 1           TC     SHORTMP
 1803   REF   1                42,3400  0 3467 1           TC     MPACTST         ALARM IF MPAC NON ZERO (G/ 745)
 1804   REF 152  LAST  352     42,3401  52 156 1           DXCH   MPAC    +1      STORE HOURS CONTRIBUTION
 1805   REF   1                42,3402  52 124 1           DXCH   HITEMIN
 1806   REF   3  LAST  344     42,3403  3 1004 1           CA     YREG            PUT YREG, YREGLP INTO MPAC, +1.
 1807   REF   2  LAST   75     42,3404  23'007 1           LXCH   YREGLP
 1808   REF 153  LAST  352     42,3405  52 155 1           DXCH   MPAC
 1809   REF  14  LAST  352     42,3406  0 7052 1           TC     DMP
 1810   REF   2  LAST  352     42,3407   03447 0          ADRES  WHOLECON
 1811   REF   2  LAST  352     42,3410  0 3456 0           TC     RND/TST         ROUND OFF TO WHOLE MIN IN MPAC+1
 1812   REF   1                42,3411  4 3454 0           CS     59MIN           ALARM IF MPAC NON ZERO (G/16383)
 1813   REF   1                42,3412  0 3474 0           TC     SIZETST         ALARM IF MPAC+1 G/ 59MIN
 1814   REF 154  LAST  352     42,3413  56 155 0           XCH    MPAC    +1
 1815                          42,3414  0 0006 1           EXTEND
 1816   REF   1                42,3415  7 3453 1           MP     MINCON          LEAVES MINUTES CONTRIBUTION IN A,L
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1817   REF   2  LAST  352   42,3416  20 124 1          DAS    HITEMIN        ADD IN MINUTES CONTRIBUTION
1818                        42,3417  0 0006 1          EXTEND                IF THIS DAS OVERFLOWS, G/ 745HR,39MIN
1819                        42,3420  1 3422 1          BZF    +2
1820   REF  10  LAST  352   42,3421  0 4161 0          TC     ALMCYCLE
1821   REF   3  LAST  344   42,3422  3 1005 0          CA     ZREG           PUT ZREG, ZREGLP INTO MPAC, +1.
1822   REF   2  LAST   75   42,3423  23'010 1          LXCH   ZREGLP
1823   REF 155  LAST  352   42,3424  52 155 1          DXCH   MPAC
1824   REF  15  LAST  352   42,3425  0 7052 1          TC     DMP
1825   REF   3  LAST  352   42,3426   03447 0          ADRES  WHOLECON
1826   REF   3  LAST  352   42,3427  0 3456 0          TC     RND/TST        ROUND OFF TO WHOLE CENTI-SEC IN MPAC+1
1827   REF   1               42,3430  4 3455 1          CS     59.99SEC       ALARM IF MPAC NON ZERO (G/163.83 SEC)
1828   REF   2  LAST  352   42,3431  0 3474 0          TC     SIZETST        ALARM IF MPAC+1 G/59.99 SEC
1829   REF   3  LAST  353   42,3432  52 124 1          DXCH   HITEMIN        ADD IN SECONDS CONTRIBUTION
1830   REF 156  LAST  353   42,3433  20 155 1          DAS    MPAC           IF THIS DAS OVERFLOWS,
1831                        42,3434  0 0006 1          EXTEND                G/ 745 HR, 39 MIN, 14.55 SEC.
1832                        42,3435  1 3437 0          BZF    +2
1833   REF  11  LAST  353   42,3436  0 4161 0          TC     ALMCYCLE       ALARM AND RECYCLE
1834   REF  61  LAST  352   42,3437  3 5021 1          CAF    ZERO
1835   REF 157  LAST  353   42,3440  54 156 1          TS     MPAC    +2
1836   REF   6  LAST  341   42,3441  0 7226 0          TC     TPAGREE
1837   REF 158  LAST  353   42,3442  52 155 1          DXCH   MPAC
1838   REF  28  LAST  351   42,3443  50 145 1          INDEX  NOUNADD
1839                        42,3444  52 001 1          DXCH   0
1840   REF  25  LAST  350   42,3445  0 4701 0          TC     POSTJUMP
1841   REF  10  LAST  348   42,3446   62775 0          CADR   LOADLV

1842                        42,3447   00006 1 WHOLECON OCT    00006          (10EXP5/2EXP14)2EXP14
1843                        42,3450   03240 1          OCT    03240
1844                        42,3451   00025 0 HRCON    OCT    00025          1 HOUR IN CENTI-SEC
1845                        42,3452   37100 1          OCT    37100
1846                        42,3453   13560 0 MINCON   OCT    13560          1 MINUTE IN CENTI-SEC
1847                        42,3454   00073 0 59MIN    OCT    00073          59 AS WHOLE
1848                        42,3455   13557 1 59.99SEC OCT    13557          5999 CENTI-SEC

1849   REF 159  LAST  353   42,3456  56 156 0 RND/TST  XCH    MPAC    +2     ROUNDS MPAC+2 INTO MPAC+1.
1850                        42,3457  6 0000 1          DOUBLE                ALARMS IF MPAC NOT 0
1851   REF 160  LAST  353   42,3460  54 156 1          TS     MPAC    +2
1852   REF  62  LAST  353   42,3461  3 5021 1          CAF    ZERO
1853   REF 161  LAST  353   42,3462  6 0155 0          AD     MPAC    +1
1854   REF 162  LAST  353   42,3463  54 155 1          TS     MPAC    +1
1855   REF  63  LAST  353   42,3464  3 5021 1          CAF    ZERO
1856   REF 163  LAST  353   42,3465  6 0154 1          AD     MPAC           CANT OVFLOW
1857   REF 164  LAST  353   42,3466  56 154 1          XCH    MPAC
1858   REF 165  LAST  353   42,3467  10 154 0 MPACTST  CCS    MPAC           ALARM IF MPAC NON ZERO
1859   REF  12  LAST  353   42,3470  0 4161 0          TC     ALMCYCLE       ALARM AND RECYCLE.
1860   REF  89  LAST  352   42,3471  0 0002 0          TC     Q
1861   REF  13  LAST  353   42,3472  0 4161 0          TC     ALMCYCLE       ALARM AND RECYCLE.
1862   REF  90  LAST  353   42,3473  0 0002 0          TC     Q
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 1863   REF 166  LAST  353   42,3474  54 156 1  SIZETST  TS     MPAC     +2      CALLED WITH - CON IN A
 1864   REF 167  LAST  354   42,3475  10 155 1           CCS    MPAC     +1      GET MAG OF MPAC+1
 1865   REF  35  LAST  348   42,3476  6 5017 1           AD     ONE
 1866                        42,3477  1 3501 1           TCF    +2
 1867   REF  36  LAST  354   42,3500  6 5017 1           AD     ONE
 1868   REF 168  LAST  354   42,3501  6 0156 0           AD     MPAC     +2
 1869                        42,3502  0 0006 1           EXTEND                  MAG OF MPAC+1 - CON
 1870                        42,3503  6 3505 1           BZMF   +2
 1871   REF  14  LAST  353   42,3504  0 4161 0           TC     ALMCYCLE        MAG OF MPAC+1 G/ CON. ALARM AND RECYCLE.
 1872   REF  91  LAST  353   42,3505  0 0002 0           TC     Q               MAG OF MPAC+1 L/= CON

R1873   ALL3DEC TESTS THAT ALL 3 WORDS ARE LOADED IN DEC (FOR HMSIN).
R1874   ALARM IF NOT.( TEST THAT BITS 3,4,5 OF DECBRNCH ARE ALL = 1)
 1875   REF   1                  42,3506  4 3513 1  ALL3DEC  CS     OCT348AR        GET BITS 3,4,5 IN A
 1876   REF  17  LAST  348   42,3507  7 1000 1           MASK   DECBRNCH        GET BITS 3,4,5 OF DECBRNCH IN A
 1877   REF   2  LAST  354   42,3510  6 3513 0           AD     OCT348AR        BITS 3,4,5 OF DECBRNCH MUST ALL = 1
 1878   REF 107  LAST  350   42,3511  10 000 0           CCS    A
 1879   REF   1                  42,3512  0 3516 0           TC     FORCEV25
 1880                        42,3513   77743 1  OCT348AR OCT    77743
 1881   REF   2  LAST  354   42,3514  0 3516 0           TC     FORCEV25
 1882   REF  92  LAST  354   42,3515  0 0002 0           TC     Q

18825   REF   1                  42,3516  4 4113 1  FORCEV25 CS     OCT31           FORCE VERB 25 TO BE EXECUTED BY RECYCLE
18826   REF   2  LAST  324   42,3517  55'041 1           TS     VERBSAVE         IN CASE OPERATOR EXECUTED A LOWER LOAD
18827   REF  15  LAST  354   42,3520  0 4161 0           TC     ALMCYCLE         VERB.  ALARM AND RECYCLE.
1883                        42,3521            ENDHMSS  EQUALS
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P1884   MONITOR ALLOWS OTHER KEYBOARD ACTIVITY. IT IS ENDED BY VERB TERMINATE,
R1885   VERB PROCEED WITHOUT DATA, VERB RESEQUENCE,
R1886   ANOTHER MONITOR, OR ANY NVSUB CALL THAT PASSES THE OSPLOCK (PROVIDED
R18861  THAT THE OPERATOR HAS SOMEHOW ALLOWED THE ENDING OF A MONITOR WHICH
R18862  HE HAS INITIATED THROUGH THE KEYBOARD).

R1887   MONITOR ACTION IS SUSPENDED, BUT NOT ENDED, BY ANY KEYBOARD ACTION,
R1888   EXCEPT ERROR LIGHT RESET. IT BEGINS AGAIN WHEN KEY RELEASE IS PERFORMED.
R1889   MONITOR SAVES THE NOUN AND APPROPRIATE DISPLAY VERB IN MONSAVE. IT SAVES
R1890   NOUNCADR IN MONSAVE1. IF NOUN = MACHINE CADR TO BE SPECIFIED. BIT 15 OF
R1891   MONSAVE1 IS THE KILL MONITOR SIGNAL (KILLER BIT). BIT 14 OF MONSAVE1
R18911  INDICATES THE CURRENT MONITOR WAS EXTERNALLY INITIATED (EXTERNAL
R18912  MONITOR BIT). IT IS TURNED OFF BY RELDSP AND KILMONON.

R1892   MONSAVE INDICATES IF MONITOR IS ON(+=ON, +0=OFF)
R1893   IF MONSAVE IS +, MONITOR ENTERS NO REQUEST, BUT TURNS KILLER BIT OFF.
R1894   IF MONSAVE IS +0, MONITOR ENTERS REQUEST AND TURNS KILLER BIT OFF.

R1895   NVSUB (IF EXTERNAL MONITOR BIT IS OFF), VB=PROCEED WITHOUT DATA,
R1896   VB=RESEQUENCE, AND VB=TERMINATE TURN KILL MONITOR BIT ON.

R1897   IF KILLER BIT IS ON, MONREQ ENTERS NO FURTHER REQUESTS, ZEROS MONSAVE
R1898   AND MONSAVE1 (TURNING OFF KILLER BIT AND EXTERNAL MONITOR BIT).

R1899   MONITOR DOSENT TEST FOR MATBS SINCE NVSUB CAN HANDLE INTERNAL MATBS NOW
 1900   REF   1                41,3230                      SETLOC ENDRUTIN

 19005  REF   3 LAST  343 TO  349:   266   664*            COUNT  41/PIN

 1901   REF   1                41,3230  4 3237 0  MONITOR  CS     BIT15/14
 1902   REF   6  LAST  348     41,3231  7 1017 1           MASK   NOUNCADR
 1903   REF 169  LAST  354     41,3232  54 155 1  MONIT1   TS     MPAC    +1      TEMP STORAGE
 19031  REF   7  LAST  342     41,3233  4 0136 1           CS     ENTEXIT
 19032  REF   4  LAST  324     41,3234  6 4233 1           AD     ENDINST
 19033  REF 108  LAST  354     41,3235  10 000 0           CCS    A
 19034  REF   1                41,3236  0 3245 1           TC     MONIT2
 19035                          41,3237   60000 1  BIT15/14 OCT    60000
 19036  REF   2  LAST  355     41,3240  0 3245 1           TC     MONIT2
 19037  REF  29  LAST  332     41,3241  3 5002 0           CAF    BIT14           EXTERNALLY INITIATED MONITOR.
 19038  REF 170  LAST  355     41,3242  26 155 1           ADS    MPAC +1         SET BIT 14 FOR MONSAVE1.
 190381 REF  64  LAST  353     41,3243  3 5021 1           CAF    ZERO
 190382 REF   1                41,3244  55'022 1           TS     MONSAVE2        ZERO NVMONOPT OPTIONS
 1904   REF   3  LAST  202     41,3245  3 6043 0  MONIT2   CAF    LOW7
 1905   REF  17  LAST  331     41,3246  7 1001 0           MASK   VERBREG
 1906   REF   4  LAST  347     41,3247  0 4345 1           TC     LEFT5
 1907   REF   5  LAST  317     41,3250  54 022 0           TS     CYL
 1908   REF   6  LAST  355     41,3251  4 0022 0           CS     CYL
 1909   REF   7  LAST  355     41,3252  56 022 1           XCH    CYL
 1910   REF  11  LAST  343     41,3253  6 1002 1           AD     NOUNREG
 1911   REF 171  LAST  355     41,3254  54 154 0           TS     MPAC            TEMP STORAGE
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1912  REF  65  LAST  355   41,3255  3 5021 1          CAF     ZERO
1913  REF   3  LAST  315   41,3256  55'012 1          TS      DSPLOCK       +0 INTO DSPLOCK SO MONITOR CAN RUN.
1914  REF   4  LAST  324   41,3257  11'042 1          CCS     CADRSTOR      TURN OFF KR LITE IF CADRSTOR AND DSPLIST
1915                       41,3260  0 3262 1          TC      +2            ARE BOTH EMPTY. (LITE COMES ON IF NEW
1916  REF   1               41,3261  0 4515 1          TC      RELDSP1       MONITOR IS KEYED IN OVER OLD MONITOR.)
1917                       41,3262  0 0004 0          INHINT
1918  REF   2  LAST  192   41,3263  11'020 0          CCS     MONSAVE
1919                       41,3264  0 3271 0          TC      +5            IF MONSAVE WAS +, NO REQUEST
1920  REF  37  LAST  354   41,3265  3 5017 1          CAF     ONE           IF MONSAVE WAS 0, REQUEST MONREQ
1921  REF  11  LAST  249   41,3266  0 5245 1          TC      WAITLIST
1922  REF  39  LAST  348      0777                    EBANK=  DSPCOUNT
1923  REF   1               41,3267   03275 1         2CADR   MONREQ
1923  REF   1               41,3270   62101 0
1924  REF 172  LAST  355   41,3271  52 155 1          DXCH    MPAC          PLACE MONITOR VERB AND NOUN INTO MONSAVE
1925  REF   3  LAST  356   41,3272  53'021 1          DXCH    MONSAVE       ZERO THE KILL MONITOR BIT
1926                       41,3273  0 0003 1          RELINT                SET UP EXTERNAL MONITOR BIT
1927  REF   4  LAST  323   41,3274  0 0136 0          TC      ENTRET


1928  REF   1               41,3275  0 4414 1  MONREQ  TC      LODSAMPT      CALLED BY WAITLIST
1929  REF   2  LAST  192   41,3276  11'021 1          CCS     MONSAVE1      TIME IS SNATCHED IN RUPT FOR NOUN 65
1930                       41,3277  0 3303 1          TC      +4            IF KILLER BIT = 0, ENTER REQUESTS
1931                       41,3300  0 3303 1          TC      +3            IF KILLER BIT = 0, ENTER REQUESTS
1932  REF   1               41,3301  0 3314 1          TC      KILLMON       IF KILLER BIT = 1, NO REQUESTS
1933  REF   2  LAST  356   41,3302  0 3314 1          TC      KILLMON       IF KILLER BIT = 1, NO REQUESTS
1934  REF   1               41,3303  3 3320 0          CAF     MONDEL
1935  REF  12  LAST  356   41,3304  0 5245 1          TC      WAITLIST      ENTER WAITLIST REQUEST FOR MONREQ
1936  REF  40  LAST  356      0777                    EBANK=  DSPCOUNT
1937  REF   2  LAST  356   41,3305   03275 1         2CADR   MONREQ
1937                       41,3306   62101 0
1938  REF   2  LAST  136   41,3307  3 4371 0          CAF     CHRPRIO
1939  REF  11  LAST  301   41,3310  0 5134 1          TC      NOVAC         ENTER EXEC REQUEST FOR MONDO
1940  REF  41  LAST  356      0777                    EBANK=  DSPCOUNT
1941  REF   1               41,3311   03321 1         2CADR   MONDO
1941  REF   1               41,3312   62101 0
1942  REF  12  LAST  250   41,3313  0 5324 1          TC      TASKOVER

1943  REF  66  LAST  356   41,3314  3 5021 1  KILLMON CAF     ZERO          ZERO MONSAVE AND TURN KILLER BIT OFF
1944  REF   4  LAST  356   41,3315  55'020 0          TS      MONSAVE
1945  REF   3  LAST  356   41,3316  55'021 1          TS      MONSAVE1      TURN OFF KILL MONITOR BIT.
1946  REF  13  LAST  356   41,3317  0 5324 1          TC      TASKOVER      TURN OFF EXTERNAL MONITOR BIT.
1947                       41,3320   00144 0  MONDEL  OCT     144           FOR 1 SEC MONITOR INTERVALS


1948  REF   4  LAST  356   41,3321  11'021 1  MONDO   CCS     MONSAVE1      CALLED BY EXEC
1949                       41,3322  0 3326 0          TC      +4            IF KILLER BIT = 0, CONTINUE
1950                       41,3323  0 3326 0          TC      +3            IF KILLER BIT = 0, CONTINUE
1951  REF  31  LAST  321   41,3324  0 5217 0          TC      ENDOFJOB      IN CASE TERMINATE CAME SINCE LAST MONREQ
1952  REF  32  LAST  355   41,3325  0 5217 0          TC      ENDOFJOB      IN CASE TERMINATE CAME SINCE LAST MONREQ
1953  REF   4  LAST  356   41,3326  11'012 1          CCS     DSPLOCK
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 1954   REF   1                 41,3327  0 3351 0            TC     MONBUSY          NVSUB IS BUSY
 1955   REF   4  LAST  355      41,3330  3 6043 0            CAF    LOW7
 1956   REF   5  LAST  356      41,3331  7 1020 0            MASK   MONSAVE
 1958   REF   1                 41,3332  0 2317 0            TC     UPDATNN -1       PLACE NOUN INTO NOUNREG AND DISPLAY IT
 1960   REF   1                 41,3333  3 4160 1            CAF    MID7
 1961   REF   6  LAST  357      41,3334  7 1020 0            MASK   MONSAVE          CHANGE MONITOR VERB TO DISPLAY VERB
 1962   REF   1                 41,3335  6 3347 1            AD     MONREF           -DEC10, STARTING IN BIT8
 1963   REF   1                 41,3336  54 023 1            TS     EDOP             RIGHT 7
 1964   REF   2  LAST  357      41,3337  3 0023 0            CA     EDOP
 1965   REF  18  LAST  355      41,3340  55'001 0            TS     VERBREG
 1966   REF   1                 41,3341  3 3350 1            CAF    MONBACK          SET RETURN TO PASTEVB AFTER DATA DISPLAY
 1967   REF   5  LAST  356      41,3342  54 136 1            TS     ENTRET
 1968   REF   2  LAST  355      41,3343  4 3237 0            CS     BIT15/14
 1969   REF   5  LAST  356      41,3344  7 1021 1            MASK   MONSAVE1         PUT ECADR INTO MPAC +2. INTMCTBS WILL
 1970   REF 173  LAST  356      41,3345  54 156 1            TS     MPAC    +2       DISPLAY IT AND SET NOUNCADR, NOUNADD,
 1971   REF   1                 41,3346  0 2046 1  ENDMONDO  TC     TESTNN           EBANK.

 1972                             4140                      BLOCK  2

 197201 REF   1                  4000                      SETLOC FFTAG8
 197202                           4140                      BANK

 19725  REF   1                                            COUNT  02/PIN

 1973   REF   2  LAST  357       4140  3 4160 1  PASTEVB   CAF    MID7
 1974   REF   2  LAST  355       4141  7 1022 1            MASK   MONSAVE2         NVMONOPT PASTE OPTION
 1975                            4142  0 0006 1            EXTEND
 1976                            4143  1 4145 1            BZF    +2
 1977   REF   1                  4144  0 4146 0            TC     PASTEOPT         PASTE PLEASE VERB FOR NVMONOPT
 1978   REF   7  LAST  357       4145  3 1020 1            CA     MONSAVE          PASTE MONITOR VERB - PASTE OPTION IS 0
 19782  REF   3  LAST  357       4146  54 023 1  PASTEOPT  TS     EDOP             RIGHT 7
 19783  REF   4  LAST  357       4147  3 0023 0            CA     EDOP             PLACE MONITOR VERB OR PLEASE VERB INTO
 197832 REF  48  LAST  340       4150  0 4682 1            TC     BANKCALL          VERBREG AND DISPLAY IT.
 197833 REF   7  LAST  344       4151   62337 1            CADR   UPDATVB -1
 197835 REF  67  LAST  356       4152  3 5021 1            CAF    ZERO             ZERO REQRET SO THAT PASTED VERBS CAN
 197838 REF  10  LAST  328       4153  55'013 0            TS     REQRET            BE EXECUTED BY OPERATOR.
 19784  REF   3  LAST  357       4154  3 1022 0            CA     MONSAVE2
 19785  REF   1                  4155  0 4271 1            TC     BLANKSUB         PROCESS NVMONOPT BLANK OPTION IF ANY
 19786                           4156  0 4157 0            TC     +1
 19787  REF  33  LAST  356       4157  0 5217 0  ENDPASTE  TC     ENDOFJOB

 1979                             4160   37600 0  MID7      OCT    37600


 1980   REF   1                 41,3347                     SETLOC ENDMONDO +1
 19805  REF   4 LAST  355 TO  357:     79   743*            COUNT  41/PIN

 1981                           41,3347   75377 0  MONREF    OCT    75377            -DEC10, STARTING IN BIT8
 1982   REF   1                41,3350   04140 0  MONBACK   ADRES  PASTEVB
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 1983   REF   2  LAST  315   41,3351  0 4410 0  MONBUSY  TC     RELDSPON        TURN KEY RELEASE LIGHT
 1984   REF  34  LAST  357   41,3352  0 5217 0           TC     ENDOFJOB


R1985   DSPFMEM IS USED TO DISPLAY (IN OCTAL) ANY FIXED REGISTER.
R1986   IT IS USED WITH NOUN = MACHINE CADR TO BE SPECIFIED. THE FCADR OF THE
R1987   DESIRED LOCATION IS THEN PUNCHED IN. IT HANDLES F/F ( FCADR 4000-7777)

R19871  FOR BANKS L/E 27. THIS IS ENOUGH.

R19872  FOR BANKS G/E 30, THE THIRD COMPONENT OF NOUN 26 (PRIO, ADRES, BBCON)
R19873  MUST BE PRELOADED WITH THE DESIRED SUPERBANK BITS (BITS 5,6,7).
R19874          V23N26 SHOULD BE USED.

R19875  SUMMARY
R19876  FOR BANKS L/E 27,                          V27N01E(FCADR)E
R19877  FOR BANKS G/E 30,    V23N26E(SUPERBITS)E   V27N01E(FCADR)E

 1988   REF  12  LAST  341   41,3353  3 4333 0  DSPFMEM  CAF    R1D1            IF F/F, DATACALL USES BANK 02 OR 03.
 1989   REF  42  LAST  356   41,3354  54 777 1           TS     DSPCOUNT
 19891  REF  15  LAST  283   41,3355  3 1047 0           CA     DSPTEM1 +2      SUPERBANK BITS WERE PRELOADED INTO
 19892  REF  40  LAST  346   41,3356  54 001 1           TS     L               3RD COMPONENT OF NOUN 26.
 1990   REF   7  LAST  355   41,3357  3 1017 0           CA     NOUNCADR        ORIGINAL FCADR LOADED STILL IN NOUNCADR.
 1991   REF   1              41,3360  0 4715 0           TC     SUPDACAL        CALL WITH FCADR IN A, SUPERBITS IN L.
 1992   REF   3  LAST  331   41,3361  0 3363 1           TC     DSPOCTWO
 1993   REF  35  LAST  358   41,3362  0 5217 0  ENDSPF   TC     ENDOFJOB
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P1994   WORD DISPLAY ROUTINES

 1995   REF   4  LAST  351   40,3105                        SETLOC TESTOFUF +4
 19955  REF   5 LAST  349 TO  352:   119   581*             COUNT  40/PIN

 1996   REF  93  LAST  354   40,3105  56 002 0  DSPSIGN    XCH    Q
 1997   REF   1               40,3106  54 144 1            TS     DSPWDRET
 1998   REF 174  LAST  357   40,3107  10 154 0            CCS    MPAC
 1999                        40,3110  0 3120 1            TC     +8D
 2000                        40,3111  0 3120 1            TC     +7
 2001   REF  38  LAST  356   40,3112  6 5017 1            AD     ONE
 2002   REF 175  LAST  359   40,3113  54 154 0            TS     MPAC
 2003   REF   2  LAST  319   40,3114  0 2334 1            TC     -ON
 2004   REF 176  LAST  359   40,3115  4 0155 1            CS     MPAC  +1
 2005   REF 177  LAST  359   40,3116  54 155 1            TS     MPAC    +1
 2006   REF   2  LAST  359   40,3117  0 0144 0            TC     DSPWDRET
 2007   REF   3  LAST  337   40,3120  0 2314 0            TC     +ON
 2008   REF   3  LAST  359   40,3121  0 0144 0            TC     DSPWDRET

 2009                        40,3122  0 0006 1  DSPRND    EXTEND                 ROUND BY 5 EXP-6
 2010   REF   1               40,3123  3 3166 0            DCA    DECROUND -1
 2011   REF 178  LAST  359   40,3124  20 155 1            DAS    MPAC
 2012                        40,3125  0 0006 1            EXTEND
 2013                        40,3126  1 3132 0            BZF    +4
 2014                        40,3127  0 0006 1            EXTEND
 2015   REF   1               40,3130  3 4777 1            DCA    DPOSMAX
 2016   REF 179  LAST  359   40,3131  52 155 1            DXCH   MPAC
 2017   REF  94  LAST  359   40,3132  0 0002 0            TC     Q

R2018   DSPDECWD CONVERTS CI MPAC, MPAC+1) INTO A SIGN AND 5 CHAR DECIMAL
R2019   STARTING IN LOC SPECIFIED IN DSPCOUNT. IT ROUNDS BY 5 EXP-6.

 2020   REF  95  LAST  359   40,3133  56 002 0  DSPDECWD   XCH    Q
 2021   REF   1               40,3134  54 115 0            TS     WDRET
 2022   REF   1               40,3135  0 3105 0            TC     DSPSIGN
 2023   REF   1               40,3136  0 3122 0            TC     DSPRND
 2024   REF   4  LAST  303   40,3137  3 5015 0            CAF    FOUR
 2025   REF   1               40,3140  54 137 0  DSPDCWD1  TS     WDCNT
 2026   REF   1               40,3141  3 4377 0            CAF    BINCON
 2027   REF   7  LAST  352   40,3142  0 7256 1            TC     SHORTMP
 2028   REF 180  LAST  359   40,3143  50 154 1  TRACE1     INDEX  MPAC
 2029   REF   3  LAST  316   40,3144  3 4072 0            CAF    RELTAB
 2030   REF   6  LAST  347   40,3145  7 4362 0            MASK   LOW5
 2031   REF   6  LAST  340   40,3146  54 124 1            TS     CODE
 2032   REF  68  LAST  357   40,3147  3 5021 1            CAF    ZERO
 2033   REF 181  LAST  359   40,3150  56 156 0            XCH    MPAC    +2
 2034   REF 182  LAST  359   40,3151  56 155 0            XCH    MPAC    +1
 2035   REF 183  LAST  359   40,3152  54 154 0            TS     MPAC
 2036   REF  43  LAST  353   40,3153  56 777 0            XCH    DSPCOUNT
 2037   REF   4  LAST  340   40,3154  54 143 0  TRACE15    TS     COUNT
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 2038   REF 109  LAST  355   40,3155  10 000 0           CCS    A              DECREMENT DSPCOUNT EXCEPT AT +0
 2039   REF  44  LAST  359   40,3156  54 777 1           TS     DSPCOUNT
 2040   REF   4  LAST  340   40,3157  0 3227 0           TC     DSPIN
 2041   REF   2  LAST  359   40,3160  10 137 0           CCS    WDCNT
 2042   REF   1               40,3161  0 3140 1           TC     DSPDCWD1
 2043   REF   7  LAST  345   40,3162  4 4374 1           CS     VD1
 2044   REF  45  LAST  360   40,3163  54 777 1           TS     DSPCOUNT
 2045   REF   2  LAST  359   40,3164  0 0115 1           TC     WDRET

 2046                         40,3165   00000 1           OCT    00000
 2047                         40,3166   02476 0  DECROUND OCT    02476

R2048   DSPDECNR CONVERTS C( MPAC,MPAC+1) INTO A SIGN AND 5 CHAR DECIMAL
R2049   STARTING IN LOC SPECIFIED IN DSPCOUNT. IT DOES NOT ROUND

 2050   REF  96  LAST  359   40,3167  56 002 0  DSPDECNR XCH    Q
 2051   REF   3  LAST  360   40,3170  54 115 0           TS     WDRET
 2052   REF   2  LAST  359   40,3171  0 3105 0           TC     DSPSIGN
 2053   REF   2  LAST  360   40,3172  0 3137 1           TC     DSPDCWD1 -1

R2054   DSPDC2NR CONVERTS C( MPAC,MPAC+1) INTO A SIGN AND 2 CHAR DECIMAL
R2055   STARTING IN LOC SPECIFIED IN DSPCOUNT. IT DOES NOT ROUND

 2056   REF  97  LAST  360   40,3173  56 002 0  DSPDC2NR XCH    Q
 2057   REF   4  LAST  360   40,3174  54 115 0           TS     WDRET
 2058   REF   3  LAST  360   40,3175  0 3105 0           TC     DSPSIGN
 2059   REF  39  LAST  359   40,3176  3 5017 1           CAF    ONE
 2060   REF   3  LAST  360   40,3177  0 3140 1           TC     DSPDCWD1

R2061   DSP2DEC CONVERTS C(MPAC) AND C(MPAC+1) INTO A SIGN AND 10 CHAR DECIMAL
R2062   STARTING IN THE LOC SPECIFIED IN DSPCOUNT.

 2063   REF  98  LAST  360   40,3200  56 002 0  DSP2DEC  XCH    Q
 2064   REF   5  LAST  360   40,3201  54 115 0           TS     WDRET
 2065   REF  69  LAST  359   40,3202  3 5021 1           CAF    ZERO
 2066   REF   7  LAST  359   40,3203  54 124 1           TS     CODE
 2067   REF  13  LAST  339   40,3204  3 6214 0           CAF    THREE
 2068   REF   3  LAST  320   40,3205  0 3311 1           TC     11DSPIN         -R2 OFF
 2069   REF   5  LAST  359   40,3206  3 5015 0           CAF    FOUR
 2070   REF   4  LAST  360   40,3207  0 3311 1           TC     11DSPIN         +R2 OFF
 2071   REF   4  LAST  360   40,3210  0 3105 0           TC     DSPSIGN
 2072   REF   4  LAST  338   40,3211  3 4334 1           CAF    R2D1
 2073   REF   4  LAST  360   40,3212  0 3140 1  END2DEC  TC     DSPDCWD1

R2074   DSPDECVN DISPLAYS C(A) UPON ENTRY AS A 2 CHAR DECIMAL BEGINNING IN THE
R2075   DSP LOC SPECIFIED IN DSPCOUNT.
R2076   C(A) SHOULD BE IN FORM N X 2EXP-14. THIS IS SCALED TO FORM N/100 BEFORE
R2077   DISPLAY CONVERSION.
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 2078                          40,3213  0 0006 1  DSPDECVN EXTEND
 2079   REF   1                40,3214  7 3223 0           MP     VNDSPCON        MULT BY .01
 2080   REF 184  LAST  359     40,3215  22 154 1           LXCH   MPAC            TAKE RESULTS FROM L.(MULT BY 2EXP14).
 2081   REF  70  LAST  360     40,3216  3 5021 1           CAF    ZERO
 2082   REF 185  LAST  361     40,3217  54 155 1           TS     MPAC    +1
 2083   REF  99  LAST  360     40,3220  56 002 0           XCH    Q
 2084   REF   6  LAST  360     40,3221  54 115 0           TS     WDRET
 2085   REF   3  LAST  340     40,3222  0 3176 1           TC     DSPDC2NR +3     NO SIGN, NO ROUND, 2 CHAR

 2086                          40,3223   00244 0  VNDSPCON OCT    00244           .01 ROUNDED UP


 2087   REF   3  LAST  337     40,3224  0 3213 1  GOVNUPDT TC     DSPDECVN        THIS IS NOT FOR GENERAL USE. REALLY PART
 2088   REF  26  LAST  353     40,3225  0 4701 0           TC     POSTJUMP        OF UPDATVB.
 2089   REF   2  LAST  328     40,3226   62347 0           CADR   UPDAT1  +2

 2090                          40,3227           ENDECVN  EQUALS


 2091   REF   1                41,3363                    SETLOC ENDSPF  +1
 20915  REF   5 LAST  357 TO  359:    12   755*           COUNT  41/PIN

R2092   DSPOCTWD DISPLAYS C(A) UPON ENTRY AS A 5 CHAR OCT STARTING IN THE DSP
R2093   CHAR SPECIFIED IN DSPCOUNT. IT STOPS AFTER 5 CHAR HAVE BEEN DISPLAYED.

 2094   REF   8  LAST  355     41,3363  54 022 0  DSPOCTWD TS     CYL
 2095   REF 100  LAST  361     41,3364  56 002 0           XCH    Q
 2096   REF   7  LAST  361     41,3365  54 115 0           TS     WDRET           MUST USE SAME RETURN AS DSP2BIT.
 2097   REF  30  LAST  355     41,3366  3 5002 0           CAF    BIT14           TO BLANK SIGNS
 2098   REF  46  LAST  360     41,3367  26 777 1           ADS    DSPCOUNT
 2099   REF   6  LAST  360     41,3370  3 5015 0           CAF    FOUR
 2100   REF   3  LAST  360     41,3371  54 137 0  WDAGAIN  TS     WDCNT
 2101   REF   9  LAST  361     41,3372  4 0022 0           CS     CYL
 2102   REF  10  LAST  361     41,3373  4 0022 0           CS     CYL
 2103   REF  11  LAST  361     41,3374  4 0022 0           CS     CYL
 2104   REF 110  LAST  360     41,3375  4 0000 0           CS     A
 2105   REF   1                41,3376  7 5023 1           MASK   DSPMSK
 2106   REF 111  LAST  361     41,3377  50 000 1           INDEX  A
 2107   REF   4  LAST  359     41,3400  3 4072 0           CAF    RELTAB
 2108   REF   7  LAST  359     41,3401  7 4362 0           MASK   LOW5
 2109   REF   8  LAST  360     41,3402  54 124 1           TS     CODE
 2110   REF  47  LAST  361     41,3403  56 777 0           XCH    DSPCOUNT
 2111   REF   5  LAST  359     41,3404  54 143 0           TS     COUNT
 2112   REF 112  LAST  361     41,3405  10 000 0           CCS    A               DECREMENT DSPCOUNT EXCEPT AT +0
 2113   REF  48  LAST  361     41,3406  54 777 1           TS     DSPCOUNT
 2114   REF  27  LAST  361     41,3407  0 4701 0           TC     POSTJUMP
 2115   REF   1                41,3410   61317 0           CADR   DSPOCTIN
 2116   REF   4  LAST  361     41,3411  10 137 0  OCTBACK  CCS    WDCNT
 2117   REF   1                41,3412  0 3371 1           TC     WDAGAIN         +
 2118   REF   8  LAST  360     41,3413  4 4374 1  DSPLV    CS     VD1             TO BLOCK NUMERICAL CHARACTERS, CLEARS,
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 2119   REF  49  LAST  361   41,3414  54 777 1           TS     DSPCOUNT        AND SIGNS AFTER A COMPLETED DISPLAY.
 2120   REF   8  LAST  361   41,3415  0 0115 1           TC     WDRET

 2121   REF   7  LAST  348      5023            DSPMSK   =      SEVEN


R2122   DSP2BIT DISPLAYS C(A) UPON ENTRY AS A 2 CHAR OCT BEGINNING IN THE DSP
R2123   LOC SPECIFIED IN DSPCOUNT BY PRF CYCLING RIGHT C(A) AND USING THE LOGIC
R2124   OF THE 5 CHAR OCTAL DISPLAY

 2125   REF   3  LAST  202   41,3416  54 020 1  DSP2BIT   TS     CYR
 2126   REF 101  LAST  361   41,3417  56 002 0            XCH    Q
 2127   REF   9  LAST  362   41,3420  54 115 0            TS     WDRET
 2128   REF  40  LAST  360   41,3421  3 5017 1            CAF    ONE
 2129   REF   5  LAST  361   41,3422  54 137 0            TS     WDCNT
 2130   REF   4  LAST  362   41,3423  4 0020 1            CS     CYR
 2131   REF   5  LAST  362   41,3424  4 0020 1            CS     CYR
 2132   REF   6  LAST  362   41,3425  56 020 0            XCH    CYR
 2133   REF  12  LAST  361   41,3426  54 022 0            TS     CYL
 2134   REF   2  LAST  361   41,3427  0 3376 0            TC     WDAGAIN +5


R2135   FOR DSPIN PLACE 0/25 OCT INTO COUNT, 5 BIT RELAY CODE INTO CODE. BOTH
R2136   ARE DESTROYED. IF BIT14 OF COUNT IS 1, SIGN IS BLANKED WITH LEFT CHAR.
R2137   FOR DSPIN1 PLACE 0,1 INTO BIT11 OF CODE, 2 INTO COUNT, REL ADDRESS OF
R2138   DSPTAB ENTRY INTO DSREL.

 2139   REF   1                40,3227                     SETLOC ENDECVN

21395   REF   6 LAST  359 TO  361:     82   663*           COUNT  40/PIN

 2140   REF 102  LAST  362   40,3227  56 002 0  DSPIN     XCH    0               CANT USE L FOR RETURN, SINCE MANY OF THE
 2141   REF   1                40,3230  54 114 1            TS     DSEXIT          ROUTINES CALLING DSPIN USE L AS RETURN.
 2142   REF   8  LAST  361   40,3231  3 4362 1            CAF    LOW5
 2143   REF   6  LAST  361   40,3232  7 0143 0            MASK   COUNT
 2144   REF   9  LAST  346   40,3233  54 021 0            TS     SR
 2145   REF  10  LAST  362   40,3234  56 021 1            XCH    SR
 2146   REF   1                40,3235  54 141 1            TS     DSREL
 2147   REF  24  LAST  297   40,3236  3 5017 1            CAF    BIT1
 2148   REF   7  LAST  362   40,3237  7 0143 0            MASK   COUNT
 2149   REF 113  LAST  361   40,3240  10 000 0            CCS    A
 2150                          40,3241  0 3243 1            TC     +2              LEFT IF COUNT IS ODD
 2151   REF   1                40,3242  0 3253 0            TC     DSPIN1  -1      RIGHT IF COUNT IS EVEN
 2152   REF   9  LAST  361   40,3243  56 124 0            XCH    CODE
 2153   REF   1                40,3244  0 4354 1            TC     SLEFT5          DOES NOT USE CYL
 2154   REF  10  LAST  362   40,3245  54 124 1            TS     CODE
 2155   REF  31  LAST  361   40,3246  3 5002 0            CAF    BIT14
 2156   REF   8  LAST  362   40,3247  7 0143 0            MASK   COUNT
 2157   REF 114  LAST  362   40,3250  10 000 0            CCS    A
 2158   REF  21  LAST  351   40,3251  3 5016 0            CAF    TWO             BIT14 = 1, BLANK SIGN
```

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 2159   REF  41  LAST  362   40,3252  6 5017 1          AD      ONE          BIT14 = 0, LEAVE SIGN ALONE
 2160   REF   9  LAST  362   40,3253  54 143 0          TS      COUNT        +0 INTO COUNT FOR RIGHT
A2161                                                                      +1 INTO COUNT FOR LEFT(SIGN LEFT ALONE)
A2162                                                                      +3 INTO COUNT FOR LEFT(TO BLANK SIGN)
 2163                          40,3254  0 0004 0  DSPIN1   INHINT
 2164   REF   2  LAST  362   40,3255  50 141 0          INDEX   DSREL
 2165   REF  26  LAST  322   40,3256  11'023 0          CCS     DSPTAB
 2166                          40,3257  0 3261 1          TC      +2           IF +
 2167   REF   6  LAST  350   40,3260  0 5747 0          TC      CCSHOLE
 2168   REF  42  LAST  363   40,3261  6 5017 1          AD      ONE          IF-
 2169   REF   1               40,3262  54 142 1          TS      DSMAG
 2170   REF  10  LAST  363   40,3263  50 143 1          INDEX   COUNT
 2171   REF   1               40,3264  7 3305 0          MASK    DSMSK
 2172                          40,3265  0 0006 1          EXTEND
 2173   REF  11  LAST  362   40,3266  60 124 0          SU      CODE
 2174                          40,3267  0 0006 1          EXTEND
 2175   REF   1               40,3270  1 3303 0          BZF     DSLV         SAME
 2176   REF  11  LAST  363   40,3271  50 143 1  DFRNT    INDEX   COUNT
 2177   REF   2  LAST  363   40,3272  4 3305 0          CS      DSMSK        MASK WITH 77740,76037,75777, OR 74037
 2178   REF   2  LAST  363   40,3273  7 0142 1          MASK    DSMAG
 2179   REF  12  LAST  363   40,3274  6 0124 0          AD      CODE
 2180   REF 115  LAST  362   40,3275  4 0000 0          CS      A
 2181   REF   3  LAST  363   40,3276  50 141 0          INDEX   DSREL
 2182   REF  27  LAST  363   40,3277  57'023 1          XCH     DSPTAB
 2183                          40,3300  0 0006 1          EXTEND
 2184   REF   2  LAST  363   40,3301  6 3303 1          BZMF    DSLV         DSPTAB ENTRY WAS -
 2185   REF   7  LAST  322   40,3302  25'016 1          INCR    NOUT         DSPTAB ENTRY WAS +
 2186                          40,3303  0 0003 1  DSLV    RELINT
 2187   REF   2  LAST  362   40,3304  0 0114 0          TC      DSEXIT

 2188                          40,3305   00037 0  DSMSK    OCT     37
 2189                          40,3306   01740 0           OCT     1740
 2190                          40,3307   02000 0           OCT     2000
 2191                          40,3310   03740 1           OCT     3740


R2192   FOR 11DSPIN, PUT REL ADDRESSS OF DSPTAB ENTRY INTO A, 1 IN BIT11 OR 0 IN
R2193   BIT11 OF CODE.

 2194   REF   4  LAST  363   40,3311  54 141 1  11DSPIN  TS      DSREL
 2195   REF  22  LAST  362   40,3312  3 5016 0          CAF     TWO
 2196   REF  12  LAST  363   40,3313  54 143 0          TS      COUNT
 2197   REF 103  LAST  362   40,3314  56 002 0          XCH     0            MUST USE SAME RETURN AS DSPIN
 2198   REF   3  LAST  363   40,3315  54 114 1          TS      DSEXIT
 2199   REF   2  LAST  362   40,3316  0 3254 1          TC      DSPIN1

 2200   REF   5  LAST  360   40,3317  0 3227 0  DSPOCTIN TC      DSPIN        SO DSPOCTWD DOESNT USE SWCALL
 2201                          40,3320  3 3322 1          CAF     +2
 2202   REF   4  LAST  349   40,3321  0 4704 0          TC      BANKJUMP
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 2203   REF   1              40,3322   63411 0  ENDSPOCT CADR   OCTBACK


R2204   DSPALARM FINDS TC NVSUBEND IN ENTRET FOR NVSUB INITIATED ROUTINES.
R2205   ABORT WITH 01501.
R2206   DSPALARM FINDS TC ENDOFJOB IN ENTRET FOR KEYBOARD INITIATED ROUTINES.
R2207   DO TC ENTRET.

 22075  REF   9  LAST  361   40,3323   4 4374 1  PREDSPAL CS     VD1
 22076  REF  50  LAST  362   40,3324   54 777 1            TS     DSPCOUNT
 2208   REF   1              40,3325   4 3346 1  DSPALARM CS     NVSBENDL
 2209   REF   8  LAST  355   40,3326   6 0136 0            AD     ENTEXIT
 2210                        40,3327   0 0006 1            EXTEND
 2211   REF  16  LAST  316   40,3330   1 3343 1            BZF    CHARALRM +2
 22111  REF   1              40,3331   4 3345 1            CS     MONADR          IF THIS IS A MONITOR, KILL IT
 22112  REF   9  LAST  364   40,3332   6 0136 0            AD     ENTEXIT
 22113                       40,3333   0 0006 1            EXTEND
 22114                       40,3334   1 3336 0            BZF    +2
 22115  REF  17  LAST  364   40,3335   0 3341 1            TC     CHARALRM
 22116  REF   1              40,3336   0 4220 0            TC     KILMONON
 22117  REF   5  LAST  242   40,3337   0 4400 1            TC     FALTON
 22118  REF   2  LAST  357   40,3340   0 4140 0            TC     PASTEVB         PUT MONITOR VERB BACK IN VERBREG
 2212   REF   6  LAST  364   40,3341   0 4400 1  CHARALRM TC     FALTON          NOT NVSUB INITIATED. TURN ON OPR ERROR
 2213   REF  36  LAST  358   40,3342   0 5217 0            TC     ENDOFJOB
 2214   REF   2  LAST  247   40,3343   0 5721 0            TC     POODOO
 2217                        40,3344    01501 1            OCT    01501
 22171  REF   3  LAST  364   40,3345    04140 0  MONADR   GENADR  PASTEVB
 2218   REF   1              40,3346   0 4216 0  NVSBENDL TC     NVSUBEND


R2219   ALMCYCLE TURNS ON CHECK FAIL LIGHT, REDISPLAYS THE ORIGINAL VERB THAT
R2220   WAS EXECUTED, AND RECYCLES TO EXECUTE THE ORIGINAL VERB/NOUN COMBINATION
R2221   THAT WAS LAST EXECUTED. USED FOR BAD DATA DURING LOAD VERBS AND BY
R2222   MCTBS. ALSO BY MMCHANG IF 2 NUMERICAL CHARACTERS WERE NOT PUNCHED IN
R2223   FOR MM CODE.

 2224   REF   3  LAST  357      4161                       SETLOC MID7    +1
 22245  REF   2 LAST  357 TO  357:    17    17*           COUNT  02/PIN

 2225   REF   7  LAST  364      4161   0 4400 1  ALMCYCLE TC     FALTON          TURN ON CHECK FAIL LIGHT.
 2228   REF   3  LAST  354      4162   4 1041 1            CS     VERBSAVE        GET ORIGINAL VERB THAT WAS EXECUTED
 2229   REF  11  LAST  357      4163   55'013 0            TS     REQRET          SET FOR ENTPASO
 2230   REF  49  LAST  357      4164   0 4662 1            TC     BANKCALL        PUTS ORIGINAL VERB INTO VERBREG AND
 2231   REF   8  LAST  357      4165    62337 1            CADR   UPDATVB -1      DISPLAYS IT IN VERB LIGHTS.
 2232   REF  28  LAST  361      4166   0 4701 0            TC     POSTJUMP
 2233   REF   2  LAST  316      4167    62002 1  ENDALM   CADR   ENTER


R2234   MMCHANG USES NOUN DISPLAY UNTIL ENTER. THEN IT USES MODE DISP.
R2235   IT GOES TO MODROUT WITH THE NEW M M CODE IN A, BUT NOT DISPLAYED IN
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R2236   MM LIGHTS.
R2237   IT DEMANDS 2 NUMERICAL CHARACTERS BE PUNCHED IN FOR NEW MM CODE.
R2238   IF NOT, IT RECYCLES.

 2239   REF   1                41,3430                        SETLOC DSP2BIT  +10D

 22395  REF   6 LAST  361 TO  362:    37   792*              COUNT  41/PIN

 2240   REF   1                41,3430  0 3452 1  MMCHANG    TC     REQMM           ENTPASHI ASSUMES THE TC REQMM AT MMCHANG
A2241                                                                               IF THIS MOVES AT ALL, MUST CHANGE
A2242                                                                               MMADREF AT ENTPASHI.
 2243   REF  13  LAST  250    41,3431  3 5013 0                CAF    BIT5            OCT20 = ND2.
 2244   REF  51  LAST  364    41,3432  6 0777 0                AD     DSPCOUNT        DSPCOUNT MUST = -ND2.
 2245                         41,3433  0 0006 1                EXTEND                 DEMAND THAT 2 NUM CHAR WERE PUNCHED IN.
 2246                         41,3434  1 3436 1                BZF    +2
 2247   REF  16  LAST  354    41,3435  0 4161 0                TC     ALMCYCLE        DSPCOUNT NOT= -ND2. ALARM AND RECYCLE.
 2248   REF  71  LAST  361    41,3436  3 5021 1                CAF    ZERO            DSPCOUNT = -ND2.
 2249   REF  12  LAST  355    41,3437  57'002 1                XCH    NOUNREG
 2250   REF 186  LAST  361    41,3440  54 154 0                TS     MPAC
 2251   REF   3  LAST  328    41,3441  3 4375 1                CAF    ND1
 2252   REF  52  LAST  365    41,3442  54 777 1                TS     DSPCOUNT
 2253   REF  50  LAST  364    41,3443  0 4662 1                TC     BANKCALL
 2254   REF   4  LAST  322    41,3444   60502 0                CADR   2BLANK
 2255   REF  10  LAST  364    41,3445  4 4374 1                CS     VD1             BLOCK NUM CHAR IN
 2256   REF  53  LAST  365    41,3446  54 777 1                TS     DSPCOUNT
 2257   REF 187  LAST  365    41,3447  3 0154 1                CA     MPAC
 2258   REF  29  LAST  364    41,3450  0 4701 0                TC     POSTJUMP
 2259   REF   1               41,3451   10011 0                CADR   MODROUTB        GO THRU STANDARD LOC.

 2260   REF   2  LAST  266    04,2011                MODROUTB =      V37
 2261   REF 104  LAST  363    41,3452  4 0002 1      REQMM    CS     Q
 2262   REF  12  LAST  364    41,3453  55'013 0               TS     REQRET
 2263   REF   4  LAST  365    41,3454  3 4375 1               CAF    ND1
 2264   REF  54  LAST  365    41,3455  54 777 1               TS     DSPCOUNT
 2265   REF  72  LAST  365    41,3456  3 5021 1               CAF    ZERO
 2266   REF  13  LAST  365    41,3457  55'002 0               TS     NOUNREG
 2267   REF  51  LAST  365    41,3460  0 4662 1               TC     BANKCALL
 2268   REF   5  LAST  365    41,3461   60502 0               CADR   2BLANK
 2269   REF   3  LAST  328    41,3462  0 4443 0               TC     FLASHON
 2270   REF  43  LAST  363    41,3463  3 5017 1               CAF    ONE
 2271   REF  18  LAST  354    41,3464  55'000 1               TS     DECBRNCH        SET FOR DEC
 2272   REF  10  LAST  364    41,3465  0 0136 0               TC     ENTEXIT

R2273   V88DEXEC ENTERS REQUEST TO EXEC      FOR ANY ADDRESS WITH ANY PRIORITY.
R2274   IT DOES ENDOFJOB AFTER ENTERING REQUEST. DISPLAY SYST IS RELEASED.
R2275   IT ASSUMES NOUN 26 HAS BEEN PRELOADED WITH
R2276   COMPONENT 1  PRIORITY(BITS 10-14) BIT1=0 FOR NOVAC, BIT1=1 FOR FINDVAC.
R2277   COMPONENT 2  JOB ADRES (12 BIT )
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R2278   COMPONENT 3  BBCON

 2279   REF  25  LAST  362   41,3466  3 5017 1  VBRQEXEC CAF    BIT1
 2280   REF  16  LAST  358   41,3467  7 1045 0           MASK   DSPTEM1
 2281   REF 116  LAST  363   41,3470  10 000 0           CCS    A
 2282   REF   1              41,3471  0 3510 0           TC     SETVAC          IF BIT1 = 1, FINDVAC
 2283   REF   1              41,3472  3 4365 0           CAF    TCNOVAC         IF BIT1 = 0, NOVAC
 2284   REF 188  LAST  365   41,3473  54 154 0  REQEX1    TS     MPAC            TC NOVAC  OR  TC FINDVAC INTO MPAC
 2285   REF  26  LAST  366   41,3474  4 5017 0           CS     BIT1
 2286   REF  17  LAST  366   41,3475  7 1045 0           MASK   DSPTEM1
 2287   REF 189  LAST  366   41,3476  54 160 1           TS     MPAC    +4      PRIO INTO MPAC+4 AS A TEMP
 2288   REF   6  LAST  345   41,3477  0 4473 0  REQUESTC TC     RELDSP
 2289   REF   5  LAST  355   41,3500  3 4233 1           CA     ENDINST
 2290   REF 190  LAST  366   41,3501  54 157 0           TS     MPAC    +3      TC ENDOFJOB INTO MPAC+3
 2291                        41,3502  0 0006 1           EXTEND
 2292   REF  18  LAST  366   41,3503  3 1047 0           DCA    DSPTEM1 +1      JOB ADRES INTO MPAC+1
 2293   REF 191  LAST  366   41,3504  52 156 1           DXCH   MPAC    +1      BBCON INTO MPAC+2
 2294   REF 192  LAST  366   41,3505  3 0160 0           CA     MPAC    +4      PRIO IN A
 2295                        41,3506  0 0004 0           INHINT
 2296   REF 193  LAST  366   41,3507  0 0154 1           TC     MPAC

 2297   REF   1              41,3510  3 4370 1  SETVAC   CAF    TCFINDVC
 2298   REF   1              41,3511  0 3473 1           TC     REQEX1

R2299   VBRQWAIT ENTERS REQUEST TO WAITLIST FOR ANY ADDRESS WITH ANY DELAY.
R2300   IT DOES ENDOFJOB AFTER ENTERING REQUEST.DISPLAY SYST IS RELEASED.
R2301   IT ASSUMES NOUN 26 HAS BEEN PRELOADED WITH
R2302   COMPONENT 1  DELAY (LOW BITS)
R2303   COMPONENT 2  TASK ADRES (12 BIT)
R2304   COMPONENT 3  BBCON

 2305   REF   1              41,3512  3 4366 0  VBRQWAIT CAF    TCWAIT
 2306   REF 194  LAST  366   41,3513  54 154 0           TS     MPAC            TC WAITLIST INTO MPAC
 2307   REF  19  LAST  368   41,3514  3 1045 1           CA     DSPTEM1         TIME DELAY
 2308   REF   1              41,3515  0 3476 1  ENDRQWT  TC     REQUESTC -1

R2309   REQUESTC WILL PUT TASK ADRES INTO MPAC+1, BBCON INTO MPAC+2,
R2310   TC ENDOFJOB INTO MPAC+3. IT WILL TAKE TIME DELAY OUT OF MPAC+4 AND
R2311   LEAVE IT IN A, INHINT AND TC MPAC.


 2312   REF   2  LAST  364   40,3347                    SETLOC NVSBENDL +1
23125   REF   7 LAST  362 TO  364:    80   743*         COUNT  40/PIN

 2313   REF  44  LAST  365   40,3347  3 5017 1  VBPROC   CAF    ONE             PROCEED WITHOUT DATA
 2314   REF   2  LAST  345   40,3350  55'014 1           TS     LOADSTAT
 2315   REF   2  LAST  364   40,3351  0 4220 0           TC     KILMONON        TURN ON KILL MONITOR BIT
 2316   REF   7  LAST  366   40,3352  0 4473 0           TC     RELDSP
 2317   REF   3  LAST  323   40,3353  0 4447 1           TC     FLASHOFF
 2318   REF   2  LAST  345   40,3354  0 3454 1           TC     RECALTST        SEE IF THERE IS ANY RECALL FROM ENDIDLE
```

```
 2319   REF  45  LAST  366   40,3355  4 5017 0  VBTERM   CS     ONE
 2320   REF   2  LAST  326   40,3356  0 3350 1            TC     VBPROC  +1      TERM VERB SETS LOADSTAT NEG

R23201  PROCKEY PERFORMS THE SAME FUNCTION AS VBPROC.  IT MUST BE CALLED UNDER
R23202  EXECUTIVE CONTROL, WITH CHRPRIO.
 23205  REF  73  LAST  365   40,3357  3 5021 1  PROCKEY  CAF    ZERO            SET REQRET FOR ENTER PASS 0.
 23206  REF  13  LAST  365   40,3360  55'013 0            TS     REQRET
 23207  REF  11  LAST  365   40,3361  4 4374 1            CS     VD1             BLOCK NUMERICAL CHARACTERS, SIGNS, CLEAR
 23208  REF  55  LAST  365   40,3362  54 777 1            TS     DSPCOUNT
 23209  REF   3  LAST  367   40,3363  0 3347 1            TC     VBPROC

R2321   VBRESEQ WAKES ENDIDLE AT SAME LINE AS FINAL ENTER OF LOAD (L+3).
R2322   (MAIN USE IS INTENDED AS RESPONSE TO INTERNALLY INITIATED FLASHING
R2323    DISPLAYS IN ENDIDLE. SHOULD NOT BE USED WITH LOAD VERBS,PLEASE PERFORM,
R2324    OR PLEASE MARK VERBS BECAUSE THEY ALREADY USE L+3 IN ANOTHER CONTEXT.)

 2325   REF  74  LAST  367   40,3364  4 5021 0  VBRESEQ  CS     ZERO            MAKE IT LOOK LIKE DATA IN.
 2326   REF   4  LAST  367   40,3365  0 3350 1            TC     VBPROC +1

R2327   FLASH IS TURNED OFF BY PROCEED WITHOUT DATA, TERMINATE, RESEQUENCE,
R2328   END OF LOAD.
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P2329   KEY RELEASE ROUTINE

R2330   THIS ROUTINE ALWAYS TURNS OFF THE UPACT LIGHT AND ALWAYS CLEARS DSPLOCK.

R2331   THE HIGHEST PRIORITY FUNCTION OF THE KEY RELEASE BUTTON IS THE
R2332   UNSUSPENDING OF A SUSPENDED MONITOR WHICH WAS EXTERNALLY INITIATED.
R2333   THIS FUNCTION IS ACCOMPLISHED BY CLEARING DSPLOCK AND TURNING OFF
R2334   THE KEY RELEASE LIGHT IF BOTH DSPLIST AND CADRSTOR ARE EMPTY.

R2335   IF NO SUCH MONITOR EXISTS, THEN RELDSP IS EXECUTED TO CLEAR DSPLOCK
R2336   AND THE EXTERNAL MONITOR BIT (FREEING THE DISPLAY SYSTEM FOR INTERNAL
R2337   USE). TURN OFF THE KEY RELEASE LIGHT, AND WAKE UP ANY JOB IN DSPLIST.

R2338   IN ADDITION IF THERE IS A JOB IN ENDIDLE, THEN CONTROL IS TRANSFERRED
R2339   TO PINBRNCH (IN DISPLAY INTERFACE ROUTINE) TO RE-EXECUTE THE SERIES OF
R23391  NVSUB CALLS ETC. THAT PRECEDED THE ENDIDLE CALL STILL AWAITING RESPONSE.
R2340   THIS FEATURE IS INTENDED FOR USE WHEN THE OPERATOR HAS BEEN REQUESTED TO
R2341   RESPOND TO SOME INTERNAL ACTION THAT USED ENDIDLE. BUT HE HAS WRITTEN
R2342   OVER THE INFORMATION ON THE DISPLAY PANEL BY SOME DISPLAYS OF HIS OWN
R2343   INITIATION WHICH DO NOT SERVE AS RESPONSES. HITTING KEY RLSE WILL
R2344   RE-ESTABLISH THE DISPLAYS TO THE STATE THEY WERE IN BEFORE HE OBSCURED
R2345   THEM, SO THAT HE CAN SEE THE WAITING REQUEST.  THIS WORKS ONLY FOR
R2346   INTERNAL PROGRAMS THAT USED ENDIDLE THROUGH MARGARETS DISPLAY
R2347   SUBROUTINES.

 2348   REF  13  LAST  341   40,3366  4 5015 1  VBRELDSP CS      BIT3
 2349                        40,3367  0 0006 1           EXTEND
 2350   REF  10  LAST  197   40,3370  03 011 1           WAND    DSALMOUT        TURN OFF UPACT LITE
 2351   REF   2  LAST  315   40,3371  10 115 0           CCS     21/22REG        OLD DSPLOCK
 2352   REF  32  LAST  362   40,3372  3 5002 0           CAF     BIT14
 2353   REF   6  LAST  357   40,3373  7 1021 1           MASK    MONSAVE1        EXTERNAL MONITOR BIT (EMB)
 2354   REF 117  LAST  366   40,3374  10 000 0           CCS     A
 2355   REF   1              40,3375  0 3404 1           TC      UNSUSPEN        OLD DSPLOCK AND EMB BOTH 1, UNSUSPEND.
 2356   REF   8  LAST  366   40,3376  0 4473 0  TSTLTS4  TC      RELDSP          NOT UNSUSPENDING EXTERNAL MONITOR,
 2357   REF   5  LAST  356   40,3377  11'042 1           CCS     CADRSTOR         RELEASE DISPLAY SYSTEM AND
 2358                        40,3400  0 3402 1           TC      +2               DO RE-ESTABLISH IF CADRSTOR IS FULL.
 2359   REF  37  LAST  364   40,3401  0 5217 0           TC      ENDOFJOB
 2360   REF  30  LAST  365   40,3402  0 4701 0           TC      POSTJUMP
 2361   REF   4  LAST  265   40,3403   21272 0           CADR    PINBRNCH
 2362   REF  75  LAST  367   40,3404  3 5021 1  UNSUSPEN CAF     ZERO            EXTERNAL MONITOR IS SUSPENDED,
 2363   REF   5  LAST  356   40,3405  55'012 1           TS      DSPLOCK          JUST UNSUSPEND IT BY CLEARING DSPLOCK.
 2364   REF   6  LAST  368   40,3406  11'042 1           CCS     CADRSTOR         TURN KEY RELEASE LIGHT OFF IF BOTH
 2365   REF  38  LAST  368   40,3407  0 5217 0           TC      ENDOFJOB         CADRSTOR AND DSPLIST ARE EMPTY.
 2366   REF   2  LAST  356   40,3410  0 4516 1           TC      RELDSP1
 23661  REF  39  LAST  368   40,3411  0 5217 0           TC      ENDOFJOB

 2367                        40,3412           ENDPELDS EQUALS
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R2368   NVSUB IS USED FOR SUB ROUTINE CALLS FROM WITHIN COMPUTER. IT CAN BE
R2369   USED TO CALL THE COMBINATION OF ANY DISPLAY, LOAD, OR MONITOR VERB
R2370   TOGETHER WITH ANY NOUN AVAILABLE TO THE KEYBOARD.
R23701  PLACE 0VVVVVVVNNNNNNN INTO A.
R23702  V-S ARE THE 7 BIT VERB CODE.  N-S ARE THE 7 BIT NOUN CODE.

R23703  IF NVSUB IS CALLED WITH THE FOLLOWING NEGATIVE NUMBERS (RATHER THAN THE
R23704  VERB-NOUN CODE) IN A, THEN THE DISPLAY IS BLANKED AS FOLLOWS-
R23705   -4 FULL BLANK, -3 LEAVE MODE, -2 LEAVE MODE AND VERB, -1 BLANK R-S ONLY

R2371   NVSUB CAN BE USED WITH MACH CADR TO BE SPEC BY PLACING THE CADR INTO
R2372   MPAC+2 BEFORE THE STANDARD NVSUB CALL.

R2373    NVSUB RETURNS TO 2+ CALLING LOC AFTER PERFORMING TASK, IF DISPLAY
R2374   SYSTEM IS AVAILABLE. THE NEW NOUN AND VERB CODES ARE DISPLAYED.
R2375   IF V:S =0, THE NEW NOUN CODE IS DISPLAYED ONLY(RETURN WITH NO FURTHER
R2376   ACTION). IF N-S =0, THE NEW VERB CODE IS DISPLAYED ONLY(RETURN WITH NO
R2377   FURTHER ACTION).

R2378   IT RETURNS TO 1+ CALLING LOC WITHOUT PERFORMING TASK, IF DISPLAY
R2379   SYSTEM IS BLOCKED (NOTHING IS DISPLAYED IN THIS CASE).
R2380   IT DOES TC ABORT (WITH OCT 01501) IF IT ENCOUNTERS A DISPLAY PROGRAM
R2381   ALARM CONDITION BEFORE RETURN TO CALLER.

R2382   THE DISPLAY SYSTEM IS BLOCKED BY THE DEPRESSION OF ANY
R2383   KEY, EXCEPT ERROR LIGHT RESET
R2384   IT IS RELEASED BY THE KEY RELEASE BUTTON, ALL EXTENDED VERBS,
R2385   PROCEED WITHOUT DATA, TERMINATE, RESEQUENCE, INITIALIZE EXECUTIVE,
R2386   RECALL PART OF RECALTST IF ENDIDLE WAS USED,
R2387   VB = REQUEST EXECUTIVE, VB = REQUEST WAITLIST,
R2388   MONITOR SET UP.

R23881  THE DISPLAY SYSTEM IS ALSO BLOCKED BY THE EXTERNAL MONITOR BIT, WHICH
R23882  INDICATES AN EXTERNALLY INITIATED MONITOR IS RUNNING (SEE MONITOR)

R2389   A NVSUB CALL THAT PASSES DSPLOCK AND THE EXTERNAL MONITOR BIT ENDS OLD
R23891  MONITOR.

R2390   DSPLOCK IS THE INTERLOCK FOR USE OF KEYBOARD AND DISPLAY SYSTEM WHICH
R2391   LOCKS OUT INTERNAL USE WHENEVER THERE IS EXTERNAL KEYBOARD ACTION.

R23911  NVSUB SHOULD BE USED TWICE IN SUCCESSION FOR :PLEASE PERFORM: SITUATIONS
R23912  (SIMILARLY FOR PLEASE MARK). FIRST PLACE THE CODED NUMBER FOR WHAT
R23913  ACTION IS DESIRED OF OPERATOR INTO THE REGISTERS REFERRED TO BY THE
R23914  :CHECKLIST: NOUN. GO TO NVSUB WITH A DISPLAY VERB AND THE :CHECKLIST:
R23915  NOUN. GO TO NVSUB AGAIN WITH THE :PLEASE PERFORM: VERB AND ZEROS IN THE
R23916  LOW 7 BITS. THIS :PASTES UP: THE :PLEASE PERFORM: VERB INTO THE VERB
R23917  LIGHTS.

R23918  NVMONOPT IS AN ENTRY SIMILAR TO NVSUB, BUT REQUIRING AN ADDITIONAL
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R239181 PARAMETER IN L. IT SHOULD BE USED ONLY WITH A MONITOR VERB-NOUN CODE IN
R239182 A. AFTER EACH MONITOR DISPLAY A *PLEASE* VERB WILL BE PASTED IN THE VERB
R239183 LIGHTS OR DATA WILL BE BLANKED (OR BOTH) ACCORDING TO THE OPTIONS
R239184 SPECIFIED IN L. IF BITS 8-14 OF L ARE OTHER THAN ZERO, THEN THEY WILL
R239185 BE INTERPRETED AS A VERB CODE AND PASTED IN THE VERB LIGHTS. (THIS VERB
R239186 CODE SHOULD DESIGNATE ONE OF THE *PLEASE* VERBS.) IF BITS 1-3 OF L ARE
R239187 OTHER THAN ZERO, THEN THEY WILL BE USED TO BLANK DATA BY BEING FED TO
R239188 BLANKSUB. IF NVMONOPT IS USED WITH A VERB OTHER THAN A MONITOR VERB,
R239189 THE PARAMETER IN L HAS NO EFFECT.

R2392   NVSUB IN FIXED-FIXED PLACES 2+CALLING LOC INTO NVQTEM, TC NVSUBEND INTO
R2393   ENTRET. (THIS WILL RESTORE OLD CALLING BANK BITS)

 2394   REF   1                  4170                        SETLOC ENDALM +1

 23945  REF   3 LAST  364 TO  365:     7    24*             COUNT  02/PIN

 2395                            4170  22 007 0  NVSUB     LXCH   7              ZERO NVMONOPT OPTIONS
 2396   REF   1                  4171  54 123 0  NVMONOPT  TS     NVTEMP
 2397   REF  33  LAST  368       4172  3 5002 0            CAF    BIT14
 23971  REF   7  LAST  368       4173  7 1021 1            MASK   MONSAVE1       EXTERNAL MONITOR BIT
 23972  REF   6  LAST  368       4174  6 1012 0            AD     DSPLOCK
 23973  REF 118  LAST  368       4175  10 000 0            CCS    A
 23974  REF 105  LAST  365       4176  0 0002 0            TC     0              DSP SYST BLOCKED. RET TO 1+ CALLING LOC
 2398   REF  46  LAST  367       4177  3 5017 1            CAF    ONE            DSP SYST AVAILABLE
 2399   REF 106  LAST  370       4200  6 0002 0  NVSBCOM   AD     0
 2400   REF   1                  4201  55'037 0            TS     NVQTEM         2+ CALLING LOC INTO NVQTEM
 24001  REF   4  LAST  357       4202  23'022 0            LXCH   MONSAVE2       STORE NVMONOPT OPTIONS
 2401   REF   3  LAST  366       4203  0 4220 0            TC     KILMONON       TURN ON KILL MONITOR BIT
 2402   REF   1                  4204  3 4215 0  NVSUBCOM  CAF    NVSBBBNK

 2403   REF  10  LAST  132       4205  56 006 1            XCH    BBANK
 24031                           4206  0 0006 1            EXTEND                SAVE OLD SUPERBITS
 24032  REF   3  LAST  244       4207  04 007 1            ROR    SUPERBNK
 2404   REF   1                  4210  55'040 0            TS     NVBNKTEM
 24041  REF   2  LAST  244       4211  3 4215 0            CAF    PINSUPBT
 24042                           4212  0 0006 1            EXTEND
 24043  REF   4  LAST  370       4213  01 007 1            WRITE  SUPERBNK
 2405   REF   1                  4214  0 2000 0            TC     NVSUBB         GO TO NVSUB1 THRU STANDARD LOC
 2406   REF  56  LAST  367       0777                      EBANK= DSPCOUNT
 2407   REF   2  LAST  323       4215   62101 0  NVSBBBNK  BBCON  NVSUB1

 24071  REF   2  LAST  370       4215             PINSUPBT =      NVSBBBNK       CONTAINS THE PINBALL SUPERBITS.

 2412   REF   2  LAST  370       4216  53'040 0  NVSUBEND DXCH   NVQTEM         NVBNKTEM MUST = NVQTEM+1
 2413   REF   1                  4217  0 5227 0            TC     SUPDXCHZ       DTCB WITH SUPERBIT SWITCHING

 2414   REF   1              41,3516                       SETLOC ENDROWT +1

 241405 REF   7 LAST  365 TO  366:     54   846*            COUNT  41/PIN
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R241412 BLANKDSP BLANKS DISPLAY ACCORDING TO OPTION NUMBER IN NVTEMP AS FOLLOWS
R241415 -4 FULL BLANK, -3 LEAVE MODE, -2 LEAVE MODE AND VERB, -1 BLANK R-S ONLY

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 241419 REF   8  LAST  362   41,3516  5 5023 0  BLANKDSP AD      SEVEN          7,8,9,OR 10 (A HAD 0,1,2,OR 3)
 241422                     41,3517  0 0004 0           INHINT
 241425 REF  13  LAST  363   41,3520  54 124 1           TS      CODE           BLANK SPECIFIED DSPTABS
 241429 REF  20  LAST  351   41,3521  4 5004 1           CS      BIT12
 241432 REF  14  LAST  371   41,3522  50 124 0           INDEX   CODE
 241435 REF  28  LAST  363   41,3523  57'023 1           XCH     DSPTAB
 241439 REF 119  LAST  370   41,3524  10 000 0           CCS     A
 241442 REF   8  LAST  363   41,3525  25'016 1           INCR    NOUT
 241445                     41,3526  0 3527 1           TC      +1
 241449 REF  15  LAST  371   41,3527  10 124 1           CCS     CODE
 241452 REF   1              41,3530  0 3520 0           TC      BLANKDSP +2
 241455                     41,3531  0 0003 1           RELINT
 241459 REF   2  LAST  370   41,3532  50 123 1           INDEX   NVTEMP
 241462                     41,3533  0 3540 0           TC      +5
 241465                     41,3534  0 3535 1           TC      +1             NVTEMP HAS -4 (NEVER TOUCH MODREG)
 241469 REF  19  LAST  357   41,3535  55'001 0           TS      VERBREG                   -3
 241472 REF  14  LAST  365   41,3536  55'002 0           TS      NOUNREG                   -2
 241475 REF  12  LAST  345   41,3537  55'015 0           TS      CLPASS                    -1
 241479 REF  12  LAST  367   41,3540  4 4374 1           CS      VD1
 241482 REF  57  LAST  370   41,3541  54 777 1           TS      DSPCOUNT
 241485 REF   4  LAST  366   41,3542  0 4447 1           TC      FLASHOFF       PROTECT AGAINST INVISIBLE FLASH
 241489 REF   1              41,3543  0 3566 1           TC      ENTSET -2      ZEROS REQRET

 2415   REF   2  LAST  371   41,3544  3 3570 0  NVSUB1   CAF     ENTSET         IN BANK
 2416   REF   6  LAST  357   41,3545  54 136 1           TS      ENTRET         SET RETURN TO NVSUBEND
 24161  REF   3  LAST  371   41,3546  10 123 0           CCS     NVTEMP         WHAT NOW
 24162                      41,3547  0 3553 1           TC      +4             NORMAL NVSUB CALL (EXECUTE VN OR PASTE)
 24163  REF  19  LAST  332   41,3550  0 2351 1           TC      GODSPALM
 24164  REF   2  LAST  371   41,3551  0 3516 0           TC      BLANKDSP       BLANK DISPLAY AS SPECIFIED
 24165  REF  20  LAST  371   41,3552  0 2351 1           TC      GODSPALM
 2417   REF   5  LAST  357   41,3553  3 6043 0           CAF     LOW7
 2418   REF   4  LAST  371   41,3554  7 0123 0           MASK    NVTEMP
 2419   REF 195  LAST  366   41,3555  54 157 0           TS      MPAC    +3     TEMP FOR NOUN (CANT USE MPAC, DSPDECVN
 2420   REF   5  LAST  371   41,3556  3 0123 1           CA      NVTEMP                 USES MPAC, +1, +2
 2422   REF   5  LAST  357   41,3557  54 023 1           TS      EDOP           RIGHT 7
 2423   REF   6  LAST  371   41,3560  3 0023 0           CA      EDOP
 2424   REF 196  LAST  371   41,3561  54 160 1           TS      MPAC    +4     TEMP FOR VERB (CANT USE MPAC+1, DSPDECVN
A2425                                                                          USES MPAC, +1, +2).
 2426   REF 197  LAST  371   41,3562  10 157 0           CCS     MPAC    +3     TEST NOUN
 2427   REF   1              41,3563  0 3571 1           TC      NVSUB2         IF NOUN NOT +0, GO ON
 2428   REF 198  LAST  371   41,3564  3 0160 0           CA      MPAC    +4
 2429   REF   9  LAST  364   41,3565  0 2337 1           TC      UPDATVB -1     IF NOUN = +0, DISPLAY VERB . THEN RETURN
 24291  REF  76  LAST  368   41,3566  3 5021 1           CAF     ZERO           ZERO REQRET SO THAT PASTED VERBS CAN
 24292  REF  14  LAST  367   41,3567  55'013 0           TS      REQRET         BE EXECUTED BY OPERATOR.
 2430   REF   2  LAST  364   41,3570  0 4216 0  ENTSET   TC      NVSUBEND
 2431   REF 199  LAST  371   41,3571  10 160 1  NVSUB2   CCS     MPAC +4        TEST VERB
 2432                      41,3572  0 3576 0           TC      +4             IF VERB NOT +0, GO ON
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 2433   REF 200  LAST  371   41,3573  3 0157 1            CA     MPAC     +3
 2434   REF   2  LAST  357   41,3574  0 2317 0            TC     UPDATNN -1      IF VERB = +0, DISPLAY NOUN, THEN RETURN
 2435   REF   3  LAST  371   41,3575  0 4216 0            TC     NVSUBEND
 2436   REF 201  LAST  372   41,3576  3 0156 0            CA     MPAC     +2     TEMP FOR MACH CADR TO BE SPEC. (DSPDECVN
 2437   REF 202  LAST  372   41,3577  54 161 0            TS     MPAC     +5                 USES MPAC, +1, +2)
 2438   REF 203  LAST  372   41,3600  3 0160 0            CA     MPAC     +4
 2439   REF  10  LAST  371   41,3601  0 2337 1            TC     UPDATVB -1      IF BOTH NOUN AND VERB NOT +0, DISPLAY
 2440   REF 204  LAST  372   41,3602  3 0157 1            CA     MPAC     +3     BOTH AND GO TO ENTPASO.
 2441   REF   3  LAST  372   41,3603  0 2317 0            TC     UPDATNN -1
 2442   REF  77  LAST  371   41,3604  3 5021 1            CAF    ZERO
 2443   REF   3  LAST  366   41,3605  55'014 1            TS     LOADSTAT        SET FOR WAITING FOR DATA CONDITION
 2444   REF  13  LAST  371   41,3606  55'015 0            TS     CLPASS
 2445   REF  15  LAST  371   41,3607  55'013 0            TS     REQRET          SET REQRET FOR PASS 0.
 2446   REF 205  LAST  372   41,3610  3 0161 1            CA     MPAC     +5     RESTORES MACH CADR TO BE SPEC TO MPAC+2
 2447   REF 206  LAST  372   41,3611  54 156 1            TS     MPAC     +2     FOR USE IN INTMCTBS (IN ENTPASO).
 2448   REF   3  LAST  323   41,3612  0 2035 0  ENDNVSB1  TC     ENTPASO

R2449   IF INTERNAL MACH CADR TO BE SPECIFIED, MPAC+2 WILL BE PLACED INTO
R2450   NOUNCADR IN ENTPASO (INTMCTBS ).

 2451   REF   4  LAST  372      4220                      SETLOC NVSUBEND +2
 24515  REF   4 LAST  370 TO  370:    24    48*          COUNT  02/PIN

A2452                                                                   FORCE BIT 15 OF MONSAVE1 TO 1.
 2453   REF  27  LAST  345      4220  3 5001 0  KILMONON CAF    BIT15           THIS IS THE KILL MONITOR BIT.
 2454   REF   8  LAST  370      4221  55'021 1            TS     MONSAVE1        TURN OFF BIT 14, THE EXTERNAL
A2455                                                                    MONITOR BIT.
 2458   REF 107  LAST  370      4222  0 0002 0            TC     Q

R2459   LOADSTAT  +0 INACTIVE(WAITING FOR DATA). SET BY NVSUB
R2460             +1  PROCEED NO DATA. SET BY SPECIAL VERB
R2461            -1 TERMINATE   SET BY SPECIAL VERB
R2462            -0    DATA IN      SET BY END OF LOAD ROUTINE
R2463               OR RESEQUENCE   SET BY VERB 32

R2464   L  TC ENDIDLE  (FIXED FIXED)
R2465   ROUTINES THAT REQUEST LOADS THROUGH NVSUB SHOULD USE ENDIDLE WHILE
R2466   WAITING FOR THE DATA TO BE LOADED. ENDIDLE PUTS CURRENT JOB TO SLEEP.
R2467   ENDIDLE CANNOT BE CALLED FROM ERASABLE OR F/F MEMORY,
R2468   SINCE JOBSLEEP AND JOBWAKE CAN HANDLE ONLY FIXED BANKS.
R2469   RECALTST TESTS LOADSTAT AND WAKES JOB UP TO,
R2470   L+1      FOR TERMINATE
R2471   L+2      FOR PROCEED WITHOUT DATA
R2472   L+3      FOR DATA IN, OR RESEQUENCE
R2473   IT DOES NOTHING IF LOADSTAT INDICATES WAITING FOR DATA.
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R2474   ENDIDLE ABORTS (WITH CODE 01206) IF A SECOND JOB ATTEMPTS TO GO TO SLEEP
R2475   IN PINBALL. IN PARTICULAR, IF AN ATTEMPT IS MADE TO GO TO ENDIDLE WHEN
R2476   1) CADRSTOR NOT= +0. THIS IS THE CASE WHERE THE CAPACITY OF ENDIDLE IS
R2477   EXCEEDED. (+-NZ INDICATE A JOB IS ALREADY ASLEEP DUE TO ENDIDLE.)
R2478   2) DSPLIST NOT= +0. THIS INDICATES A JOB IS ALREADY ASLEEP DUE TO
R2479   NVSUBUSY.

 2480   REF 108  LAST  372     4223  22 002 0  ENDIDLE  LXCH   Q            RETURN ADDRESS INTO L.
 2481   REF   1                4224  0 4234 0           TC     ISCADR+0     ABORT IF CADRSTOR NOT= +0
 2482   REF   1                4225  0 4240 0           TC     ISLIST+0     ABORT IF DSPLIST NOT= +0
 2483   REF  41  LAST  358     4226  3 0001 0           CA     L            DONT SET DSPLOCK TO 1 SO CAN USE
 2484   REF   4  LAST  270     4227  7 5054 1           MASK   LOW10        ENDIDLE WITH NVSUB INITIATED MONITOR.
 2485   REF   1                4230  6 0004 0           AD     FBANK        SAME STRATEGY FOR CADR AS MAKECADR.
 2486   REF   7  LAST  368     4231  55'042 1           TS     CADRSTOR
 2487   REF   1                4232  0 5175 1           TC     JOBSLEEP


 2488   REF  40  LAST  368     4233  0 5217 0  ENDINST  TC     ENDOFJOB


 2489   REF   8  LAST  373     4234  11'042 1  ISCADR+0 CCS    CADRSTOR     ABORTS (CODE 01206) IF CADRSTOR NOT= +0.
 2490   REF   1                4235  0 4243 0           TC     DSPABORT     RETURNS IF CADRSTOR = +0.
 2491   REF 109  LAST  373     4236  0 0002 0           TC     Q
 2492   REF   2  LAST  373     4237  0 4243 0           TC     DSPABORT

 2493   REF   2  LAST  192     4240  11'043 0  ISLIST+0 CCS    DSPLIST      ABORTS (CODE 01206) IF DSPLIST NOT= +0.
 2494   REF   3  LAST  373     4241  0 4243 0           TC     DSPABORT     RETURNS IF DSPLIST = +0.
 2495   REF 110  LAST  373     4242  0 0002 0           TC     Q
 2496   REF   3  LAST  364     4243  0 5721 0  DSPABORT TC     POODOO
 2497                          4244   01206 1           OCT    01206


R2498   JAMTERM ALLOWS PROGRAMS TO PERFORM THE TERMINATE FUNCTION.
R2499   IT DOES ENDOFJOB.

 2500   REF   3  LAST  370     4245  3 4215 0  JAMTERM  CAF    PINSUPBT
 2501                          4246  0 0006 1           EXTEND
 25011  REF   5  LAST  370     4247  01 007 1           WRITE  SUPERBNK
 25012  REF   1                4250  3 4256 1           CAF    34DEC
 25013  REF  16  LAST  372     4251  55'013 0           TS     REQRET       LEAVE ENTER SET FOR ENTPASSO.
 2502   REF  13  LAST  371     4252  4 4374 1           CS     VD1
 2503   REF  58  LAST  371     4253  54 777 1           TS     DSPCOUNT
 2504   REF  31  LAST  368     4254  0 4701 0           TC     POSTJUMP
 2505   REF   2  LAST  326     4255   61355 0           CADR   VBTERM

 2506                          4256   00042 1  34DEC    DEC    34


R2507   JAMPROC ALLOWS PROGRAMS TO PERFORM THE PROCEED/PROCEED WITHOUT DATA
R2508   FUNCTION. IT DOES ENDOFJOB.
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 2509   REF   4  LAST  373      4257  3 4215 0  JAMPROC  CAF     PINSUPBT
 2510                          4260  0 0006 1           EXTEND
 25101  REF   6  LAST  373      4261  01 007 1           WRITE   SUPERBNK
 25102  REF   1                4262  3 4270 0           CAF     33DEC
 25103  REF  17  LAST  373      4263  55'013 0           TS      REQRET          LEAVE ENTER SET FOR ENTPASSO.
 2511   REF  14  LAST  373      4264  4 4374 1           CS      VD1
 2512   REF  59  LAST  373      4265  54 777 1           TS      DSPCOUNT
 2513   REF  32  LAST  373      4266  0 4701 0           TC      POSTJUMP
 2514   REF   5  LAST  367      4267   61347 0           CADR    VBPROC

 2515                          4270   00041 1  33DEC    DEC     33


R2532   BLANKSUB BLANKS ANY COMBINATION OF R1, R2, R3.
R2533   CALL WITH BLANKING CODE IN A.
R2534   BIT1=1 BLANKS R1, BIT2=1 BLANKS R2, BIT3=1 BLANKS R3.
R2535   ANY COMBINATION OF THESE BITS IS ACCEPTED.

R2536   DSPCOUNT IS RESTORED TO STATE IT WAS IN BEFORE BLANKSUB WAS EXECUTED.

 2538   REF   9  LAST  371      4271  7 5023 1  BLANKSUB MASK    SEVEN
 25381  REF   6  LAST  371      4272  54 123 0           TS      NVTEMP          STORE BLANKING CODE IN NVTEMP.
 2539   REF  34  LAST  370      4273  3 5002 0           CAF     BIT14
 2540   REF   9  LAST  372      4274  7 1021 1           MASK    MONSAVE1        EXTERNAL MONITOR BIT
 25401  REF   7  LAST  370      4275  6 1012 0           AD      DSPLOCK
 25402  REF 120  LAST  371      4276  10 000 0           CCS     A
 25403  REF 111  LAST  373      4277  0 0002 0           TC      Q               DSP SYST BLOCKED. RET TO 1+ CALLING LOC
 25404  REF 112  LAST  374      4300  24 002 0           INCR    Q               DSP SYST AVAILABLE
A2541                                                                           SET RETURN FOR 2+ CALLING LOC
 25411  REF   7  LAST  374      4301  10 123 0           CCS     NVTEMP
 25412                          4302  1 4304 0           TCF     +2
 25413  REF 113  LAST  374      4303  0 0002 0           TC      Q               NOTHING TO BLANK. RET TO 2+ CALLING LOC
 2542   REF 114  LAST  374      4304  22 002 0           LXCH    Q               SET RETURN FOR 2 + CALLING LOC
 2544   REF   1                4305  3 4316 1           CAF     BLNKBBNK
 2545   REF  11  LAST  370      4306  56 006 1           XCH     BBANK
 25451                          4307  0 0006 1           EXTEND
 25452  REF   7  LAST  374      4310  04 007 1           ROR     SUPERBNK        SAVE OLD SUPERBITS.
 2546   REF  40  LAST  331      4311  52 131 0           DXCH    BUF
 25461  REF   5  LAST  374      4312  3 4215 0           CAF     PINSUPBT
 25462                          4313  0 0006 1           EXTEND
 25463  REF   8  LAST  374      4314  01 007 1           WRITE   SUPERBNK
 2547   REF   1                4315  0 3412 0           TC      BLNKSUB1

 2548   REF  60  LAST  374      0777                     EBANK=  DSPCOUNT
 25481  REF   2  LAST  374      4316   60101 1  BLNKBBNK BBCON   BLNKSUB1
 2549                          4317            ENDBLFF  EQUALS

 2550   REF   1                40,3412                  SETLOC  ENDRELDS
 25505  REF   8 LAST  366 TO  370:     35   778*        COUNT   40/PIN
```

```
 2551   REF  61  LAST  374   40,3412  3 0777 0  BLNKSUB1 CA     DSPCOUNT       SAVE OLD DSPCOUNT FOR LATER RESTORATION
 25511  REF  41  LAST  374   40,3413  54 132 0            TS     BUF     +2
 25512  REF  27  LAST  366   40,3414  3 5017 1            CAF    BIT1           TEST BIT1. SEE IF R1 TO BE BLANKED.
 2552   REF   1              40,3415  0 3434 1            TC     TESTBIT
 2553   REF  13  LAST  358   40,3416  3 4333 0            CAF    R1D1
 2554   REF   4  LAST  337   40,3417  0 2436 1            TC     5BLANK -1
 2555   REF  21  LAST  224   40,3420  3 5016 0            CAF    BIT2           TEST BIT 2. SEE IF R2 TO BE BLANKED.
 2556   REF   2  LAST  375   40,3421  0 3434 1            TC     TESTBIT
 2557   REF   5  LAST  360   40,3422  3 4334 1            CAF    R2D1
 2558   REF   5  LAST  375   40,3423  0 2436 1            TC     5BLANK -1
 2559   REF  14  LAST  368   40,3424  3 5015 0            CAF    BIT3           TEST BIT3. SEE IF R3 TO BE BLANKED.
 2560   REF   3  LAST  375   40,3425  0 3434 1            TC     TESTBIT
 2561   REF   5  LAST  338   40,3426  3 4335 0            CAF    R3D1
 2562   REF   6  LAST  375   40,3427  0 2436 1            TC     5BLANK -1
 2563   REF  42  LAST  375   40,3430  3 0132 1            CA     BUF     +2     RESTORE DSPCOUNT TO STATE IT HAD
 2564   REF  62  LAST  375   40,3431  54 777 1            TS     DSPCOUNT           BEFORE BLANKSUB.
 2565   REF  43  LAST  375   40,3432  52 131 0            DXCH   BUF            CALL L+2 DIRECTLY.
 2566   REF   2  LAST  370   40,3433  0 5230 0            TC     SUPDXCHZ +1    DTCB WITH SUPERBIT SWITCHING

 2567   REF   8  LAST  374   40,3434  7 0123 0  TESTBIT   MASK   NVTEMP         NVTEMP CONTAINS BLANKING CODE.
 2568   REF 121  LAST  374   40,3435  10 000 0            CCS    A
 2569   REF 115  LAST  374   40,3436  0 0002 0            TC     Q              IF CURRENT BIT = 1, RETURN TO L+1.
 2570   REF 116  LAST  375   40,3437  50 002 0            INDEX  Q              IF CURRENT BIT = 0, RETURN TO L+3.
 2571                        40,3440  0 0002 0            TC     2

 2572                        40,3441           ENDBSUB1 EQUALS
```

R257205 DSPMM DOES NOT DISPLAY MODREG DIRECTLY. IT PUTS IN EXEC REQUEST WITH
R257206 PRIO 30000 FOR DSPMMJB AND RETURNS TO CALLER.

R257207 IF MODREG CONTAINS -0, DSPMMJB BLANKS THE MODE LIGHTS.

R257209 DSPMM MUST BE IN BANK 27 OR LOWER, SO IT CAN BE CALLED VIA BANKCALL.

```
 25721                       07,2441                    BANK   7
 257215 REF   1              04,2000                    SETLOC PINBALL4
 257217                      04,2566                    BANK

 257218 REF   1                                         COUNT  07/PIN

 25722  REF 117  LAST  375   04,2566  56 002 0  DSPMM    XCH    Q
 25723  REF 207  LAST  372   04,2567  54 154 0           TS     MPAC
 25724                       04,2570  0 0004 0           INHINT
 25725  REF   3  LAST  356   04,2571  3 4371 0           CAF    CHRPRIO
 25726  REF  12  LAST  356   04,2572  0 5134 1           TC     NOVAC
 25727  REF  63  LAST  375      0777                     EBANK= DSPCOUNT
 25728  REF   1              04,2573   03441 0           2CADR  DSPMMJB
 25728  REF   1              04,2574   60101 1
 257285                      04,2575  0 0003 1           RELINT
```

```
 25729  REF 208  LAST  375   04,2576  0 0154 1  ENDSPMM  TC     MPAC

R2573   DSPMM  PLACE MAJOR MODE CODE INTO MODREG

 25735  REF   1                40,3441                    SETLOC ENDBSUB1

 25736  REF   9 LAST  374 TO  375:    23   801*           COUNT  40/PIN

 2574   REF   1                40,3441  3 4376 1  DSPMMJB  CAF    MD1          GETS HERE THRU DSPMM
 2575   REF  64  LAST  375     40,3442  56 777 0           XCH    DSPCOUNT
 2576   REF   1                40,3443  54 140 0           TS     DSPMMTEM     SAVE DSPCOUNT
 2579   REF   6  LAST  261     40,3444  11'011 1           CCS    MODREG
 2580   REF  47  LAST  370     40,3445  6 5017 1           AD     ONE
 25801  REF   4  LAST  361     40,3446  0 3213 1           TC     DSPDECVN     IF MODREG IS + OR +0, DISPLAY MODREG
 25802                         40,3447  0 3451 1           TC     +2           IF MODREG IS -NZ, DO NOTHING
 25803  REF   6  LAST  365     40,3450  0 2502 1           TC     2BLANK       IF MODREG IS -0, BLANK MM
 2581   REF   2  LAST  376     40,3451  56 140 1           XCH    DSPMMTEM     RESTORE DSPCOUNT
 2582   REF  65  LAST  376     40,3452  54 777 1           TS     DSPCOUNT
 2583   REF  41  LAST  373     40,3453  0 5217 0           TC     ENDOFJOB


R2584   RECALTST IS ENTERED DIRECTLY AFTER DATA IS LOADED (OR RESEQUENCE VERB IS
R2585   EXECUTED), TERMINATE VERB IS EXECUTED, OR PROCEED WITHOUT DATA VERB IS
R2586   EXECUTED. IT WAKES UP JOB THAT DID TC ENDIDLE.

R2587   IF CADRSTOR NOT= +0, IT PUTS +0 INTO DSPLOCK, AND TURNS OFF KEY RLSE
R2588   LIGHT IF DSPLIST IS EMPTY (LEAVES KEY RLSE LIGHT ALONE IF NOT EMPTY).

 2589   REF   9  LAST  373     40,3454  11'042 1  RECALTST CCS    CADRSTOR
 2590   REF   1                40,3455  0 3457 1           TC     RECAL1
 2591   REF  42  LAST  376     40,3456  0 5217 0           TC     ENDOFJOB     NORMAL EXIT IF KEYBOARD INITIATED
 2592   REF  78  LAST  372     40,3457  3 5021 1  RECAL1   CAF    ZERO
 2593   REF  10  LAST  376     40,3460  57'042 0           XCH    CADRSTOR
 2594                          40,3461  0 0004 0           INHINT
 2595   REF   1                40,3462  0 5201 1           TC     JOBWAKE
 2596   REF   4  LAST  372     40,3463  11'014 1           CCS    LOADSTAT
 2597   REF   1                40,3464  0 3506 1           TC     DOPROC       + PROCEED WITHOUT DATA
 2598   REF  43  LAST  376     40,3465  0 5217 0           TC     ENDOFJOB     PATHALOGICAL CASE EXIT
 2599   REF   1                40,3466  0 3504 0           TC     DOTERM       -   TERMINATE
 2600   REF  23  LAST  363     40,3467  3 5016 0           CAF    TWO          -0 DATA IN OR RESEQUENCE
 2601   REF   1                40,3470  50 064 0  RECAL2   INDEX  LOCCTR
 2602   REF   2  LAST  204     40,3471  6 0164 1           AD     LOC          LOC IS + FOR BASIC JOBS
 2603   REF   2  LAST  376     40,3472  50 064 0           INDEX  LOCCTR
 2604   REF   3  LAST  376     40,3473  54 164 0           TS     LOC
 26041  REF  15  LAST  371     40,3474  3 1002 1           CA     NOUNREG      SAVE VERB IN MPAC, NOUN IN MPAC+1 AT
 26042  REF  42  LAST  373     40,3475  54 001 1           TS     L            TIME OF RESPONSE TO ENDIDLE FOR
 26043  REF  20  LAST  371     40,3476  3 1001 1           CA     VERBREG      POSSIBLE LATER TESTING BY JOB THAT HAS
 26044  REF   3  LAST  376     40,3477  50 064 0           INDEX  LOCCTR       BEEN WAKED UP.
 26045  REF 209  LAST  376     40,3500  52 155 1           DXCH   MPAC
 2605                          40,3501  0 0003 1           RELINT
```

```
 2606   REF   9  LAST  368   40,3502  0 4473 0  RECAL3   TC     RELDSP
 2607   REF  44  LAST  376   40,3503  0 5217 0           TC     ENDOFJOB

 2608   REF  79  LAST  376   40,3504  3 5021 1  DOTERM   CAF    ZERO
 2609   REF   1              40,3505  0 3470 1           TC     RECAL2

 2610   REF  48  LAST  376   40,3506  3 5017 1  DOPROC   CAF    ONE
 2611   REF   2  LAST  377   40,3507  0 3470 1           TC     RECAL2


26115   REF   3  LAST  284   30,2000                     SBANK= LOWSUPER
```

P2612 MISCELLANEOUS SERVICE ROUTINES IN FIXED/FIXED

```
 2613   REF   1                  4317                        SETLOC ENDBLFF

 26135  REF   5 LAST  372 TO  374:    63   111*             COUNT  02/PIN

R2614   SETNCADR        E CADR ARRIVES IN A. IT IS STORED IN NOUNCADR. EBANK BITS
R2615                   ARE SET. E ADRES IS DERIVED AND PUT INTO NOUNADD.

 2616   REF   8  LAST  353      4317  55'017 1  SETNCADR TS     NOUNCADR        STORE ECADR
 2617   REF  17  LAST  301      4320  54 003 0           TS     EBANK           SET EBANK BITS
 2618   REF   1                 4321  7 4373 0           MASK   LOW8
 2619   REF   2  LAST  199      4322  6 5051 0           AD     OCT1400
 2620   REF  29  LAST  353      4323  54 145 0           TS     NOUNADD         PUT E ADRES INTO NOUNADD
 2621   REF 118  LAST  375      4324  0 0002 0           TC     Q

R2622   SETNADD         GETS E CADR FROM NOUNCADR, SETS EBANK BITS, DERIVES
R2623                   E ADRES AND PUTS IT INTO NOUNADD.

 2624   REF   9  LAST  378      4325  3 1017 0  SETNADD  CA     NOUNCADR
 2625   REF   7  LAST  347      4326  1 4320 0           TCF    SETNCADR +1

R2626   SETEBANK        E CADR ARRIVES IN A. EBANK BITS ARE SET. E ADRES IS
R2627                   DERIVED AND LEFT IN A.

 2628   REF  18  LAST  378      4327  54 003 0  SETEBANK TS     EBANK           SET EBANK BITS
 2629   REF   2  LAST  378      4330  7 4373 0           MASK   LOW8
 2630   REF   3  LAST  378      4331  6 5051 0           AD     OCT1400         E ADRES LEFT IN A
 2631   REF 119  LAST  378      4332  0 0002 0           TC     Q

 2632                           4333   00016 0  R1D1     OCT    16              THESE 3 CONSTANTS FORM A PACKED TABLE.
 2633                           4334   00011 1  R2D1     OCT    11              DONT SEPARATE.
 2634                           4335   00004 0  R3D1     OCT    4

 2635   REF   7  LAST  362      4336  54 020 1  RIGHT5   TS     CYR
 2636   REF   8  LAST  378      4337  4 0020 1           CS     CYR
 2637   REF   9  LAST  378      4340  4 0020 1           CS     CYR
 2638   REF  10  LAST  378      4341  4 0020 1           CS     CYR
 2639   REF  11  LAST  378      4342  4 0020 1           CS     CYR
 2640   REF  12  LAST  378      4343  56 020 0           XCH    CYR
 2641   REF 120  LAST  378      4344  0 0002 0           TC     Q

 2642   REF  13  LAST  362      4345  54 022 0  LEFT5    TS     CYL
 2643   REF  14  LAST  378      4346  4 0022 0           CS     CYL
 2644   REF  15  LAST  378      4347  4 0022 0           CS     CYL
 2645   REF  16  LAST  378      4350  4 0022 0           CS     CYL
```

```
2646   REF  17  LAST  378     4351  4 0022 0          CS     CYL
2647   REF  18  LAST  379     4352  56 022 1          XCH    CYL
2648   REF 121  LAST  378     4353  0 0002 0          TC     Q

2649                           4354  6 0000 1  SLEFTS   DOUBLE
2650                           4355  6 0000 1           DOUBLE
2651                           4356  6 0000 1           DOUBLE
2652                           4357  6 0000 1           DOUBLE
2653                           4360  6 0000 1           DOUBLE
2654   REF 122  LAST  379     4361  0 0002 0          TC     Q

2655                           4362   00037 0  LOW5     OCT    37          THESE 3 CONSTANTS FORM A PACKED TABLE.
2656                           4363   01740 0  MID5     OCT    1740        DONT SEPARATE.
2657                           4364   76000 0  HI5      OCT    76000       MUST STAY HERE

2658   REF  13  LAST  375     4365  0 5134 1  TCNOVAC  TC     NOVAC
2659   REF  13  LAST  356     4366  0 5245 1  TCWAIT   TC     WAITLIST
2660   REF  14  LAST  356     4367  0 5324 1  TCTSKOVR TC     TASKOVER
2661   REF  12  LAST  267     4370  0 5147 0  TCFINDVC TC     FINDVAC

2662                           4371   30000 1  CHRPRIO  OCT    30000       EXEC PRIORITY OF CHARIN

2663                           4372   03777 0  LOW11    OCT    3777
2664   REF   6  LAST  347     4372            B12-1    EQUALS LOW11
2665                           4373   00377 1  LOW8     OCT    377

2667                           4374   00023 0  VD1      OCT    23          THESE 3 CONSTANTS FORM A PACKED TABLE.
2668                           4375   00021 1  ND1      OCT    21          DONT SEPARATE.
2669                           4376   00025 0  MD1      OCT    25

2670                           4377   00012 1  BINCON   DEC    10

2671   REF  21  LAST  322     4400  3 5011 1  FALTON   CA     BIT7        TURN ON OPERATOR ERROR LIGHT
2672                           4401  0 0006 1           EXTEND
2673   REF  11  LAST  368     4402  05 011 1           WOR    DSALMOUT    BIT 7 OF CHANNEL 11
2674   REF 123  LAST  379     4403  0 0002 0           TC     Q

2675   REF  22  LAST  379     4404  4 5011 0  FALTOF   CS     BIT7        TURN OFF OPERATOR ERROR LIGHT
2676                           4405  0 0006 1           EXTEND
2677   REF  12  LAST  379     4406  03 011 1           WAND   DSALMOUT    BIT 7 OF CHANNEL 11
2678   REF 124  LAST  379     4407  0 0002 0           TC     Q

2679   REF  14  LAST  365     4410  3 5013 0  RELDSPON CAF    BIT5        TURN ON KEY RELEASE LIGHT
2680                           4411  0 0006 1           EXTEND
2681   REF  13  LAST  379     4412  05 011 1           WOR    DSALMOUT    BIT 5 OF CHANNEL 11
2682   REF 125  LAST  379     4413  0 0002 0           TC     Q
```

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 2683                                4414  0 0006 1  LODSAMPT EXTEND
 2684   REF  10  LAST  272          4415  3 0025 0            DCA     TIME2
 2685   REF   5  LAST  281          4416  52 014 0            DXCH    SAMPTIME
 2686   REF 126  LAST  379          4417  0 0002 0            TC      Q


 2687                                4420  0 0006 1  TPSL1     EXTEND                  SHIFTS MPAC, +1, +2 LEFT 1
 2688   REF 210  LAST  376          4421  3 0156 0            DCA     MPAC    +1      LEAVES OVFIND SET TO +/- 1 FOR OF/UF
 2689   REF 211  LAST  380          4422  20 156 1            DAS     MPAC    +1
 2690   REF 212  LAST  380          4423  6 0154 1            AD      MPAC
 2691   REF 213  LAST  380          4424  26 154 0            ADS     MPAC
 2692                               4425  54 007 1            TS      7               TS A DOES NOT CHANGE A ON OF/UF.
 2693   REF 127  LAST  380          4426  0 0002 0            TC      Q               NO NET OF/UF
 2694   REF   7  LAST  352          4427  54 162 0            TS      MPAC+6          MPAC +6 SET TO +/-1 FOR OF/UF
 2695   REF 128  LAST  380          4430  0 0002 0            TC      Q


R2696   IF MPAC, +1 ARE EACH +NZ OR +0 AND C(A)=-0, SHORTMP WRONGLY GIVES +0.
R2697   IF MPAC, +1 ARE EACH -NZ OR -0 AND C(A)=+0, SHORTMP WRONGLY GIVES +0.
R2698   PRSHRTMP FIXES FIRST CASE ONLY, BY MERELY TESTING C(A) AND IF IT = -0,
R2699   SETTING RESULT TO -0.
R2700    (DO NOT USE PRSHRTMP UNLESS MPAC, +1 ARE EACH +NZ OR +0, AS THEY ARE
R2701    WHEN THEY CONTAIN TH E SF CONSTANTS.)

 2702   REF   2  LAST   70          4431  54 135 1  PRSHRTMP  TS      MPTEMP
 2703   REF 122  LAST  375          4432  10 000 0            CCS     A
 2704   REF   3  LAST  380          4433  3 0135 0            CA      MPTEMP          C(A) +, DO REGULAR SHORTMP
 2705   REF   8  LAST  359          4434  1 7257 1            TCF     SHORTMP +1      C(A) +0, DO REGULAR SHORTMP
 2706                               4435  1 4433 0            TCF     -2              C(A) -, DO REGULAR SHORTMP
 2707   REF  80  LAST  377          4436  4 5021 0            CS      ZERO            C(A) -0, FORCE RESULT TO -0 AND RETURN.
 2708   REF 214  LAST  380          4437  54 154 0            TS      MPAC
 2709   REF 215  LAST  380          4440  54 155 1            TS      MPAC    +1
 2710   REF 216  LAST  380          4441  54 156 1            TS      MPAC    +2
 2711   REF 129  LAST  380          4442  0 0002 0            TC      Q


 2712   REF  25  LAST  297          4443  3 5012 1  FLASHON   CAF     BIT6            TURN ON V/N FLASH
 2713                               4444  0 0006 1            EXTEND                  BIT 6 OF CHANNEL 11
 2714   REF  14  LAST  379          4445  05 011 1            WOR     DSALMOUT
 2715   REF 130  LAST  380          4446  0 0002 0            TC      Q


 2716   REF  26  LAST  380          4447  4 5012 0  FLASHOFF  CS      BIT6            TURN OFF V/N FLASH
 2717                               4450  0 0006 1            EXTEND
 2718   REF  15  LAST  380          4451  03 011 1            WAND    DSALMOUT        BIT 6 OF CHANNEL 11
 2719   REF 131  LAST  380          4452  0 0002 0            TC      Q
```

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P2720   INTERNAL USE OF KEYBOARD AND DISPLAY PROGRAM

R2721   USER MUST SCHEDULE CALLS TO NVSUB SO THAT THERE IS NO CONFLICT OF USE OR
R2722   CONFUSION TO OPERATOR. THE OLD GRABLOCK (INTERNAL/INTERNAL INTERLOCK)
R2723   HAS BEEN REMOVED AND THE INTERNAL USER NO LONGER HAS THE PROTECTION THIS
R2724   OFFERED.

R2725   THERE ARE TWO WAYS A JOB CAN BE PUT TO SLEEP BY THE KEYBOARD + DISPLAY
R2726   PROGRAM.    1) BY ENDIDLE
R2727               2) BY NVSUBUSY
R2728   THE BASIC CONVENTION IS THAT ONLY ONE JOB WILL BE PERMITTED ASLEEP VIA
R2729   THE KEYBOARD + DISPLAY PROGRAM AT A TIME. IF A JOB ATTEMPTS TO GO TO
R2730   SLEEP BY MEANS OF (1) OR (2) AND THERE IS ALREADY A JOB ASLEEP THAT WAS
R2731   PUT TO SLEEP BY (1) OR (2), THEN AN ABORT IS CAUSED.


R2732   THE CALLING SEQUENCE FOR NVSUB IS
R2733           CAF     V/N
R2734   L       TC      NVSUB
R2735   L+1     RETURN HERE IF OPERATOR HAS INTERVENED
R2736   L+2     RETURN HERE AFTER EXECUTION

R2737       A ROUTINE CALLED  NVSUBUSY IS PROVIDED (USE IS OPTIONAL)  TO PUT
R2738   YOUR JOB TO SLEEP UNTIL THE OPERATOR RELEASES THE KEYBOARD + DISPLAY
R2739   SYSTEM. NVSUBUSY ALSO TURNS ON THE KEY RELEASE LIGHT.
R2740   NVSUBUSY CANNOT BE CALLED FROM ERASABLE OR F/F MEMORY,
R2741   SINCE JOBSLEEP AND JOBWAKE CAN HANDLE ONLY FIXED BANKS.


R2742         THE CALLING SEQUENCE IS
R2743           CAF     WAKEFCADR
R2744           TC      NVSUBUSY


R2745   .


R2746   NVSUBUSY IS INTENDED FOR USE WHEN AN INTERNAL PROGRAM FINDS THE OPERATOR
R2747   IS USING THE KEYBOARD + DISPLAY PROGRAM (BY HIS OWN INITIATION). IT IS
R2748   NOT INTENDED FOR USE WHEN ONE INTERNAL PROGRAM FINDS ANOTHER INTERNAL
R2749   PROGRAM USING THE KEYBOARD + DISPLAY PROGRAM.


R2750   NVSUBUSY ABORTS (WITH CODE 01206) IF A SECOND JOB ATTEMPTS TO GO TO
R2751   SLEEP IN PINBALL. IN PARTICULAR, IF AN ATTEMPT IS MADE TO GO TO NVSUBUSY
R2752   WHEN
R2753   1) DSPLIST NOT= +0. THIS IS THE CASE WHERE THE CAPACITY OF THE DSPLIST
R2754      IS EXCEEDED.
R2755   2) CADRSTOR NOT= +0. THIS INDICATES THAT A JOB IS ALREADY USING
```

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R2756   ENDIDLE. (+-NZ INDICATE A JOB IS ALREADY ASLEEP DUE TO ENDIDLE.)

 2757   REF   1                    4453  4 4460 0  PRENVBSY CS     2K+3          SPECIAL ENTRANCE FOR ROUTINES IN FIXED
 2758   REF 132  LAST  380         4454  6 0002 0           AD     Q             BANKS ONLY DESIRING THE FCADR OF(LOC
 2759   REF   2  LAST  373         4455  6 0004 0           AD     FBANK         FROM WHICH THE TC PRENVBSY WAS DONE) -2
 2760   REF  33  LAST  374         4456  0 4701 0  NVSUBUSY TC     POSTJUMP      TO BE ENTERED.
 2761   REF   1                    4457   10577 0           CADR   NVSUBSY1
 2762                              4460   02003 0  2K+3     OCT    2003

R27625  NVSUBSY1 MUST BE IN BANK 27 OR LOWER, SO IT WILL PUT CALLER TO SLEEP
R27626  WITH HIS PROPER SUPERBITS.

 2763   REF   1                 04,2577                    SETLOC ENDSPMM +1
 27635  REF   2 LAST  375 TO  376:     9      9*          COUNT  07/PIN

 2764   REF  43  LAST  376       04,2577  54 001 1  NVSUBSY1 TS     L
 2769   REF   2  LAST  373       04,2600  0 4234 0           TC     ISCADR+0      ABORT IF CADRSTOR NOT= +0.
 2770   REF   2  LAST  373       04,2601  0 4240 0           TC     ISLIST+0      ABORT IF DSPLIST NOT= +0.
 2771   REF   3  LAST  358       04,2602  0 4410 0           TC     RELDSPON
 2772   REF  44  LAST  382       04,2603  3 0001 0           CA     L
 2773   REF   3  LAST  373       04,2604  55*043 0           TS     DSPLIST
 2774   REF   2  LAST  373       04,2605  0 5175 1  ENDNVBSY TC     JOBSLEEP

R2775   NVSBWAIT IS A SPECIAL ENTRANCE FOR ROUTINES IN FIXED BANKS ONLY. IF
R2776   SYSTEM IS NOT BUSY, IT EXECUTES V/N AND RETURNS TO L+1 (L= LOC FROM
R2777   WHICH THE TC NVSBWAIT WAS DONE). IF SYSTEM IS BUSY, IT PUTS CALLING JOB
R2778   TO SLEEP WITH L-1 GOING INTO LIST FOR EVENTUAL WAKING UP WHEN SYSTEM
R2779   IS NOT BUSY.

 2780   REF   1                    4461                    SETLOC NVSUBUSY +3
 27805  REF   6 LAST  378 TO  382:    98   209*           COUNT  02/PIN

 2781                              4461  22 007 0  NVSBWAIT LXCH   7             ZERO NVMONOPT OPTIONS
 2782   REF   9  LAST  375       4462  54 123 0           TS     NVTEMP
 2783   REF  35  LAST  374       4463  3 5002 0           CAF    BIT14
 27831  REF  10  LAST  374       4464  7 1021 1           MASK   MONSAVE1       EXTERNAL MONITOR BIT
 27832  REF   8  LAST  374       4465  6 1012 0           AD     DSPLOCK
 27833  REF 123  LAST  380       4466  10 000 0           CCS    A
 27834  REF   1                  4467  1 4471 0           TCF    NVSBWT1       BUSY
 2784   REF   1                  4470  1 4200 0           TCF    NVSBCOM       FREE. NVSUB WILL SAVE L+1 FOR RETURN
A2785                                                                          AFTER EXECUTION.
 2786   REF 133  LAST  382       4471  24 002 0  NVSBWT1  INCR   Q             L+2. PRENVBSY WILL PUT L-1 INTO LIST AND
 2787   REF   1                  4472  1 4453 0           TCF    PRENVBSY      GO TO SLEEP.

R2788   RELDSP IS USED BY VBPROC, VBTERM, VBROEXEC, VBROWAIT, VBRELDSP, EXTENDED
R2789   VERB DISPATCHER, VBRESEQ, RECALTST.
R2790   RELDSP1 IS USED BY MONITOR SET UP, VBRELDSP.
 2791   REF 134  LAST  382       4473  56 002 0  RELDSP   XCH    Q             SET DSPLOCK TO +0, TURN RELDSP LIGHT
```

```
 2792   REF   1                    4474  54 144 1          TS      RELRET          OFF.  SEARCH DSPLIST
 27921  REF  36  LAST  382         4475  4 5002 1          CS      BIT14
 27922                             4476  0 0004 0          INHINT
 27923  REF  11  LAST  382         4477  7 1021 1          MASK    MONSAVE1
 27924  REF  12  LAST  383         4500  55'021 1          TS      MONSAVE1        TURN OFF EXTERNAL MONITOR BIT
 2793   REF   4  LAST  382         4501  11'043 0          CCS     DSPLIST
 2794                              4502  0 4504 1          TC      +2
 2795   REF   1                    4503  0 4507 1          TC      RELDSP2         LIST EMPTY
 2796   REF  81  LAST  380         4504  3 5021 1          CAF     ZERO
 2797   REF   5  LAST  383         4505  57'043 1          XCH     DSPLIST
 2799   REF   2  LAST  376         4506  0 5201 1          TC      JOBWAKE
 2800                              4507  0 0003 1  RELDSP2 RELINT
 2801   REF  15  LAST  379         4510  4 5013 1          CS      BIT5            TURN OFF KEY RELEASE LIGHT
 2802                              4511  0 0006 1          EXTEND                  (BIT 5 OF CHANNEL 11)
 2803   REF  16  LAST  380         4512  03 011 1          WAND    DSALMOUT
 2804   REF  82  LAST  383         4513  3 5021 1          CAF     ZERO
 2805   REF   9  LAST  382         4514  55'012 1          TS      DSPLOCK
 2807   REF   2  LAST  383         4515  0 0144 0          TC      RELRET
 2808   REF 135  LAST  382         4516  56 002 0  RELDSP1 XCH     Q               SET DSPLOCK TO +0. NO DSPLIST SEARCH.
 2809   REF   3  LAST  383         4517  54 144 1          TS      RELRET          TURN KEY RLSE LIGHT OFF IF DSPLIST IS
A2810                                                                             EMPTY. LEAVE KEY RLSE LIGHT ALONE IF
A2811                                                                             DSPLIST IS NOT EMPTY.
 2812   REF   6  LAST  383         4520  11'043 0          CCS     DSPLIST
 2813                              4521  0 4523 1          TC      +2              +  NOT EMPTY. LEAVE KEY RLSE LIGHT ALONE
 2814   REF   2  LAST  383         4522  0 4507 1          TC      RELDSP2         +0 EMPTY. TURN OFF KEY RLSE LIGHT
 2815   REF  83  LAST  383         4523  3 5021 1          CAF     ZERO            -  NOT EMPTY. LEAVE KEY RLSE LIGHT ALONE
 2816   REF  10  LAST  383         4524  55'012 1          TS      DSPLOCK
 2817   REF   4  LAST  383         4525  0 0144 0          TC      RELRET

 2818                              4526          ENDPIN8F EQUALS
```

L   PINBALL GAME BUTTONS AND LIGHTS   USER'S PAGE NO. 78   EO S3

P28181 PINTEST IS NEEDED FOR AUTO CHECK OF PINBALL.

 28182 REF   2 LAST 236   43,2002   PINTEST EQUALS LST2FAN

P2819 VBTSTLTS TURNS ON ALL DISPLAY PANEL LIGHTS. AFTER 5 SEC, IT TURNS
R2820 OFF THE CAUTION AND STATUS LIGHTS.

```
 2821   REF   1                  41,3613                          SETLOC ENDNVSB1 +1

 28215  REF   8 LAST  370 TO  372:     61   907*                 COUNT  41/PIN

 2822   REF  52  LAST  365    41,3613  0 4662 1  VBTSTLTS TC     BANKCALL
 28224  REF   7  LAST  263    41,3614   66730 0             CADR   CHKPOOH

 28226                         41,3615  0 0004 0             INHINT
 2823   REF  28  LAST  375    41,3616  4 5017 0             CS     BIT1          SET BIT 1 OF IMODES33 SO IMUMON WONT
 2824   REF  20  LAST  187    41,3617  7 1321 1             MASK   IMODES33      TURN OUT ANY LAMPS.
 2825   REF  29  LAST  385    41,3620  6 5017 1             AD     BIT1
 2826   REF  21  LAST  385    41,3621  55'321 1             TS     IMODES33

 2827   REF   1               41,3622  3 3656 1             CAF    TSTCON1       TURN ON UPLINK ACTIVITY, TEMP, KEY RLSE,
 2828                         41,3623  0 0006 1             EXTEND               V/N FLASH, OPERATOR ERROR.
 2829   REF  17  LAST  383    41,3624  05 011 1             WOR    DSALMOUT
 2830   REF   1               41,3625  3 3657 0             CAF    TSTCON2       TURN ON NO ATT, GIMBAL LOCK, TRACKER,
 2831   REF  29  LAST  371    41,3626  55'036 1             TS     DSPTAB  +11D  PROG ALM.
 2832   REF  19  LAST  304    41,3627  3 5006 1             CAF    BIT10         TURN ON TEST ALARM OUTBIT
 2833                         41,3630  0 0006 1             EXTEND
 2834   REF   3  LAST  190    41,3631  05 013 0             WOR    CHAN13
 2835   REF   3  LAST  317    41,3632  3 4377 0             CAF    TEN
 2836   REF   1               41,3633  54 117 1  TSTLTS1    TS     ERCNT
 2837   REF   1               41,3634  4 3654 1             CS     FULLDSP
 2838   REF   2  LAST  385    41,3635  50 117 0             INDEX  ERCNT
 2839   REF  30  LAST  385    41,3636  55'023 0             TS     DSPTAB
 2840   REF   3  LAST  385    41,3637  10 117 1             CCS    ERCNT
 2841   REF   1               41,3640  0 3633 1             TC     TSTLTS1
 2842   REF   1               41,3641  4 3655 0             CS     FULLDSP1
 2843   REF  31  LAST  385    41,3642  55'024 1             TS     DSPTAB  +1    TURN ON 3 PLUS SIGNS
 2844   REF  32  LAST  385    41,3643  55'027 1             TS     DSPTAB  +4
 2845   REF  33  LAST  385    41,3644  55'031 0             TS     DSPTAB  +6
 2846   REF   4  LAST  204    41,3645  3 5024 1             CAF    ELEVEN
 2847   REF   9  LAST  371    41,3646  55'016 0             TS     NOUT
 2849   REF   1               41,3647  3 3661 0             CAF    SHOLTS
 2851   REF  14  LAST  379    41,3650  0 5245 1             TC     WAITLIST
 2852   REF  34  LAST  385       1023                      EBANK= DSPTAB
 2853   REF   1               41,3651   03662 0             2CADR  TSTLTS2
 2853   REF   1               41,3652   62102 0
 2854   REF  45  LAST  377    41,3653  0 5217 0             TC     ENDOFJOB      DSPLOCK IS LEFT BUSY (FROM KEYBOARD
A2855                                                                            ACTION) UNTIL TSTLTS3 TO INSURE THAT
A2856                                                                            LIGHTS TEST WILL BE SEEN.


 2857                         41,3654   05675 0  FULLDSP   OCT    05675         DISPLAY ALL 8:S
 2858                         41,3655   07675 1  FULLDSP1  OCT    07675         DISPLAY ALL 8:S AND +
 2859                         41,3656   00175 1  TSTCON1   OCT    00175
```

L PINBALL GAME BUTTONS AND LIGHTS USER'S PAGE NO. 80 EO S4

```
A2860                                                                   UPLINK ACTIVITY, TEMP, KEY RLSE,
A2861                                                                   V/N FLASH, OPERATOR ERROR.
 2862                        41,3657   40650 0  TSTCON2  OCT    40650    DSPTAB+11D  BITS 4,6,8,9.
A2863                                                                   NO ATT, GIMBAL LOCK, TRACKER, PROG ALM.
 2864                        41,3660   00115 1  TSTCON3  OCT    00115    CHAN 11  BITS 1, 3, 4, 7.
A2865                                                                   UPLINK ACTIVITY, TEMP, OPERATOR ERROR.
 2866                        41,3661   00764 1  SHOLTS   OCT    764      5 SEC

 2867  REF   4  LAST  375   41,3662   3 4371 0  TSTLTS2  CAF    CHRPRIO  CALLED BY WAITLIST
 2868  REF  14  LAST  379   41,3663   0 5134 1           TC     NOVAC
 2869  REF  35  LAST  385      1023                     EBANK= DSPTAB
 2870  REF   1              41,3664    03667 0          2CADR  TSTLTS3
 2870  REF   1              41,3665    62102 0
 2871  REF  15  LAST  379   41,3666   0 5324 1           TC     TASKOVER

 2872  REF   1              41,3667   4 3660 0  TSTLTS3  CS     TSTCON3  CALLED BY EXECUTIVE
 2873                       41,3670   0 0004 0           INHINT
 2874                       41,3671   0 0006 1           EXTEND           TURN OFF  UPLINK ACTIVITY, TEMP,
 2875  REF  18  LAST  385   41,3672   03 011 1           WAND   DSALMOUT  OPERATOR ERROR.
 2876  REF  20  LAST  385   41,3673   4 5006 0           CS     BIT10     TURN OFF TEST ALARM OUTBIT
 2877                       41,3674   0 0006 1           EXTEND
 2878  REF   4  LAST  385   41,3675   03 013 0           WAND   CHAN13
 28781 REF  20  LAST  302   41,3676   3 5014 1           CAF    BIT4      MAKE NO ATT FOLLOW BIT 4 OF CHANNEL 12
 28782                      41,3677   0 0006 1           EXTEND             (NO ATT LIGHT ON IF IN COARSE ALIGN)
 28783 REF  23  LAST  249   41,3700   02 012 0           RAND   CHAN12
 2879  REF  28  LAST  372   41,3701   6 5001 0           AD     BIT15     TURN OFF AUTO, HOLD, FREE, SPARE,
 2880  REF  36  LAST  386   41,3702   55'036 1           TS     DSPTAB +11D  GIMBAL LOCK, SPARE, TRACKER, PROG ALM
 2881  REF   1              41,3703   4 3725 0           CS     13-11,1   SET BITS TO INDICATE ALL LAMPS OUT. TEST
 2882  REF  22  LAST  385   41,3704   7 1321 1           MASK   IMODES33  LIGHTS COMPLETE.
 2883  REF   7  LAST  257   41,3705   6 5070 0           AD     PRIO16
 2884  REF  23  LAST  386   41,3706   55'321 1           TS     IMODES33

 2885  REF   1              41,3707   4 3726 0           CS     OCT55000
 2886  REF  38  LAST  197   41,3710   7 1320 0           MASK   IMODES30
 2887  REF   2  LAST  159   41,3711   6 5067 0           AD     PRIO15    15000.
 2888  REF  39  LAST  386   41,3712   55'320 0           TS     IMODES30

 2889  REF  33  LAST  224   41,3713   4 1331 0           CS     DPTMODES
 2890  REF  23  LAST  379   41,3714   7 5011 0           MASK   BIT7
 2891  REF  34  LAST  386   41,3715   27'331 0           ADS    DPTMODES
 2893                       41,3716   0 0003 1           RELINT

 2894  REF  53  LAST  385   41,3717   0 4662 1           TC     BANKCALL  REDISPLAY C(MODREG)
 2895  REF   1              41,3720    10566 0          CADR   DSPMM
 2896  REF   4  LAST  370   41,3721   0 4220 0           TC     KILMONON  TURN ON KILL MONITOR BIT.
 2897  REF   5  LAST  371   41,3722   0 4447 1           TC     FLASHOFF  TURN OFF V/N FLASH.
 2898  REF  34  LAST  382   41,3723   0 4701 0           TC     POSTJUMP  DOES RELDSP AND GOES TO PINBRNCH IF
 2899  REF   1              41,3724    61376 1          CADR   TSTLTS4    ENDIDLE IS AWAITING OPERATOR RESPONSE.
```

```
2901                    41,3725   16001 1  13-11.1  OCT    16001
2903                    41,3726   55000 1  OCT55000 OCT    55000
2904                    41,3727            ENDPINS2 EQUALS
```

```
P2905   ERROR LIGHT RESET (RSET) TURNS OFF,
R2906   UPLINK ACTIVITY, AUTO, HOLD, FREE, OPERATOR ERROR,
R2907   PROG ALM, TRACKER FAIL.
R2908   LEAVES GIMBAL LOCK AND NO ATT ALONE.
R2909   IT ALSO ZERDES THE :TEST ALARM: OUT BIT, WHICH TURNS OFF STBY,RESTART.
R2910   IT ALSO SETS :CAUTION RESET: TO 1.
R2911   IT ALSO FORCES BIT 12 OF ALL DSPTAB ENTRIES TO 1.

 2912   REF   2 LAST  376   40,3510                       SETLOC DOPROC  +2
 29125  REF  10 LAST  376 TO  378:    39   840*           COUNT  40/PIN

 2913   REF   3 LAST  368   40,3510  56 115 1  ERROR     XCH    21/22REG       RESTORE ORIGINAL C(DSPLOCK). THUS ERROR
 2914   REF  11 LAST  383   40,3511  55'012 1            TS     DSPLOCK        LIGHT RESET LEAVES DSPLOCK UNCHANGED.
 2915                       40,3512  0 0004 0            INHINT
 2916   REF  21 LAST  386   40,3513  3 5006 1            CAF    BIT10          TURN ON :CAUTION RESET: OUTBIT
 2917                       40,3514  0 0006 1            EXTEND
 2918   REF  19 LAST  386   40,3515  05 011 1            WOR    DSALMOUT       BIT10 CHAN 11
 2919   REF   1             40,3516  3 3576 0            CAF    GL+NOATT       LEAVE GIMBAL LOCK AND NO ATT INTACT,
 2920   REF  37 LAST  386   40,3517  7 1036 1            MASK   DSPTAB +11D    TURNING OFF AUTO, HOLD, FREE,
 2921   REF  29 LAST  386   40,3520  6 5001 0            AD     BIT15          PROG ALARM, AND TRACKER.
 2922   REF  38 LAST  388   40,3521  55'036 1            TS     DSPTAB +11D
 2923   REF   8 LAST  386   40,3522  4 5070 1            CS     PRIO16         RESET FAIL BITS WHICH GENERATE PROG
 2924   REF  24 LAST  386   40,3523  7 1321 1            MASK   IMODES33       ALARM SO THAT IF THE FAILURE STILL
 2925   REF   9 LAST  388   40,3524  6 5070 0            AD     PRIO16         EXISTS, THE ALARM WILL COME BACK.
 2926   REF  25 LAST  388   40,3525  55'321 1            TS     IMODES33
 2927   REF  22 LAST  388   40,3526  4 5006 0            CS     BIT10
 2928   REF  40 LAST  386   40,3527  7 1320 0            MASK   IMODES30
 2929   REF  23 LAST  388   40,3530  6 5006 1            AD     BIT10
 2930   REF  41 LAST  388   40,3531  55'320 0            TS     IMODES30

 2931   REF  35 LAST  386   40,3532  4 1331 0            CS     OPTMODES
 2932   REF  24 LAST  386   40,3533  7 5011 0            MASK   BIT7
 2933   REF  36 LAST  388   40,3534  27'331 0            ADS    OPTMODES
 2935   REF  24 LAST  388   40,3535  4 5006 0            CS     BIT10          TURN OFF :TEST ALARM: OUTBIT.
 2936                       40,3536  0 0006 1            EXTEND
 2937   REF   5 LAST  386   40,3537  03 013 0            WAND   CHAN13
 2938   REF   1             40,3540  4 3574 0            CS     ERCON          TURN OFF UPLINK ACTIVITY,
 2939                       40,3541  0 0006 1            EXTEND                OPERATOR ERROR.
 2940   REF  20 LAST  388   40,3542  03 011 1            WAND   DSALMOUT
 2941   REF   2 LAST  359   40,3543  3 4377 0  TSTAB     CAF    BINCON         (DEC 10)
 2942   REF   4 LAST  385   40,3544  54 117 1            TS     ERCNT          ERCNT = COUNT
 2943                       40,3545  0 0004 0            INHINT
 2944   REF   5 LAST  388   40,3546  50 117 0            INDEX  ERCNT
 2945   REF  39 LAST  388   40,3547  11'023 0            CCS    DSPTAB
 2946   REF  49 LAST  377   40,3550  6 5017 1            AD     ONE
 2947   REF   1             40,3551  0 3556 1            TC     ERPLUS
 2948   REF  50 LAST  388   40,3552  6 5017 1            AD     ONE
 2949   REF 124 LAST  382   40,3553  4 0000 0  ERMINUS    CS     A
 2950   REF   1             40,3554  7 3577 0            MASK   NOTBIT12
 2951   REF   1             40,3555  0 3561 0            TC     ERCOM
```

```
 2952   REF 125  LAST  388   40,3556  4 0000 0  ERPLUS   CS      A
 2953   REF   2  LAST  388   40,3557  7 3577 0           MASK    NOTBIT12
 2954   REF 126  LAST  389   40,3560  4 0000 0           CS      A              MIGHT WANT TO RESET CLPASS, DECBRNCH,
 2955   REF   6  LAST  388   40,3561  50 117 0  ERCOM    INDEX   ERCNT          ETC.
 2956   REF  40  LAST  388   40,3562  55'023 0           TS      DSPTAB
 2957                        40,3563  0 0003 1           RELINT
 2958   REF   7  LAST  389   40,3564  10 117 1           CCS     ERCNT
 2959   REF   1              40,3565  0 3544 1           TC      TSTAB   +1
 2960   REF  84  LAST  383   40,3566  3 5021 1           CAF     ZERO
 2961   REF   5  LAST  271   40,3567  54 375 1           TS      FAILREG
 29611  REF   6  LAST  389   40,3570  54 376 1           TS      FAILREG +1
 29612  REF   7  LAST  389   40,3571  54 377 0           TS      FAILREG +2
 2962   REF   2  LAST   82   40,3572  55'357 0           TS      SFAIL
 2963   REF  46  LAST  385   40,3573  0 5217 0           TC      ENDOFJOB

 2964                        40,3574   00104 1  ERCON    OCT     104            CHAN 11 BITS 3,7.
A2965                                                                          UPLINK ACTIVITY, AND OPERATOR ERROR.
 2966                        40,3575   00240 1  BITS6,8  OCT     240
 29665                       40,3576   00050 1  GL+NOATT OCT     00050          NO ATT AND GIMBAL LOCK LAMPS
 2967                        40,3577   73777 1  NOTBIT12 OCT     73777
 2968                        40,3600            ENDPINS1 EQUALS

 3000   REF   4  LAST  377   30,2000            SBANK= LOWSUPER
```

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```
 1500                          34,2002                        BANK   34
 1501   REF   1                27,2000                        SETLOC MANUVER
 1502                          27,2000                        BANK

 1503   REF   1                  1146                         EBANK= TEMPR60

 1504   REF   1                                               COUNT  27/R60
R15041

R150411 R60CSM
R150413 REV 13   CONFORMS TO GSOP CHAPTER FOUR REVISION LOGIC  09  JAN 18,1968
R150415


 1505   REF   1                27,2000  0 4711 1  R60CSM    TC     MAKECADR
 1506   REF   2  LAST  390     27,2001  55'146 1            TS     TEMPR60

R1507          INSERT PRIODSP CHECK WITH R22 (V06N49)  WITH JENNINGS BRODEUR

 1510   REF  27  LAST  380     27,2002  3 5012 1  REDOMANN  CAF    BIT6
 1511   REF   4  LAST  250     27,2003  7 0101 0            MASK   FLAGWRD5       IS 3-AXIS FLAG SET
 1512   REF 127  LAST  389     27,2004  10 000 0            CCS    A
 1513   REF   1                27,2005  1 2013 0            TCF    TOBALL         YES
 1514   REF   9  LAST  291     27,2006  0 6006 1            TC     INTPRET
 1515                          27,2007   77624 1            CALL
 1516   REF   1                27,2010   56126 1                   VECPOINT       TO COMPUTE FINAL ANGLES
 1517   REF   2  LAST  252     27,2011   01155 1            STORE  CPHI           STORE FINAL ANGLES - CPHI,CTHETA,CPSI
 1518                          27,2012   77776 1            EXIT

 1519   REF   1                27,2013  3 2125 0  TOBALL    CAF    V06N18
 1520   REF  54  LAST  386     27,2014  0 4662 1            TC     BANKCALL
 1521   REF   1                27,2015   21132 1            CADR   GOPERF2R       DISPLAY PLEASE PERFORM AUTO MANEUVER
 1522   REF   1                27,2016  0 2114 1            TC     R61TEST
 1523   REF   1                27,2017  0 2023 1            TC     REDOMANC       PROCEED
 1524   REF   1                27,2020  1 2052 0            TCF    ENDMANU1       ENTER I.E. FINISHED WITH R60

 1525   REF   1                27,2021  0 2056 0            TC     CHKLINUS       TO CHECK FOR PRIORITY DISPLAYS
 1526   REF  47  LAST  389     27,2022  0 5217 0            TC     ENDOFJOB

 1529   REF  28  LAST  390     27,2023  3 5012 1  REDOMANC  CAF    BIT6
 1530   REF   5  LAST  390     27,2024  7 0101 0            MASK   FLAGWRD5       IS 3-AXIS FLAG SET
 1531   REF 128  LAST  390     27,2025  10 000 0            CCS    A
 1532   REF   1                27,2026  1 2034 0            TCF    TOBALLC        YES
 1533   REF  10  LAST  390     27,2027  0 6006 1            TC     INTPRET
 1534                          27,2030   77624 1            CALL
 1535   REF   2  LAST  390     27,2031   56126 1                   VECPOINT       TO COMPUTE FINAL ANGLES
 1536   REF   3  LAST  390     27,2032   01156 1            STORE  CPHI           STORE ANGLES
 1537                          27,2033   77776 1            EXIT

 1538   REF   7  LAST  254     27,2034  3 4371 0  TOBALLC   CAF    PRIO30         IS MODE AUTO AND CTL GNC
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```
1539                                27,2035  0 0006 1           EXTEND
1540   REF   1                     27,2036  06 031 0           RXOR    CHAN31
1541   REF   2  LAST  166          27,2037  7 7707 1           MASK    13,14,15
1542                                27,2040  0 0006 1           EXTEND
1543                                27,2041  1 2043 0           BZF     +2              AUTO, NON-FLASH N18
154301 REF   2  LAST  390          27,2042  1 2013 0           TCF     TOBALL          NOT AUTO

1548   REF   2  LAST  390          27,2043  3 2125 0           CAF     V06N18          SET UP NON-FLASHING V06 N18
1549   REF  55  LAST  390          27,2044  0 4662 1           TC      BANKCALL
1550   REF   1                     27,2045   20676 1           CADR    GODSPR
1551   REF   2  LAST  390          27,2046  0 2056 0           TC      CHKLINUS

1552   REF  56  LAST  391          27,2047  0 4662 1  STARTMNV TC      BANKCALL
1553   REF   1                     27,2050   17627 1           CADR    GOMANUR
1555   REF   3  LAST  391          27,2051  1 2013 0  ENDMANUV TCF     TOBALL          FINISHED MANEUVER

1566   REF  20  LAST  267          27,2052  0 5560 1  ENDMANU1 TC      DOWNFLAG        RESET 3-AXIS FLAG
1567   REF   1                     27,2053   00124 0           ADRES   3AXISFLG        BIT 6 FLAG 5
1568   REF   3  LAST  390          27,2054  31'146 0           CAE     TEMPR60                                          -
1569   REF   5  LAST  363          27,2055  0 4704 0           TC      BANKJUMP                                         -

1570   REF   3  LAST  237          27,2056  4 0100 1  CHKLINUS CS      FLAGWRD4
1571   REF  21  LAST  371          27,2057  7 5004 1           MASK    BIT12           IS PRIORITY DISPLAY FLAG SET     -
1572   REF 129  LAST  390          27,2060  10 000 0           CCS     A                                                -
157201 REF 136  LAST  383          27,2061  0 0002 0           TC      Q               NO - EXIT
157202 REF 137  LAST  391          27,2062  3 0002 0           CA      Q
157204 REF 217  LAST  380          27,2063  54 155 1           TS      MPAC +2         SAVE RETURN
15721  REF  14  LAST  360          27,2064  4 6214 1           CS      THREE           OBTAIN LOCATION FOR RESTART.
157212 REF   2  LAST   71          27,2065  6 0133 0           AD      BUF2            HOLDS Q OF LAST DISPALY
1573   REF   2  LAST  221          27,2066  55'053 1           TS      TBASE1

1580   REF   5  LAST  266          27,2067  0 5412 0           TC      PHASCHNG
1581                                27,2070   00071 1           OCT     71              1.7SPOT FOR RELINUS

1586   REF  25  LAST  388          27,2071  3 5011 1           CAF     BIT7
1587   REF   1                     27,2072  0 5526 0           TC      LINUS           GO SET BITS FOR PRIORITY DISPLAY -
1588   REF 218  LAST  391          27,2073  0 0156 0           TC      MPAC +2

158811 REF  16  LAST  383          27,2074  3 5013 0  RELINUS  CAF     BIT5            IS TRACK FLAG ON
158812 REF  13  LAST  259          27,2075  7 0075 1           MASK    FLAGWRD1
158813                             27,2076  0 0006 1           EXTEND
158814 REF   1                     27,2077  1 2111 0           BZF     GOREDO20        NO

158815 REF  14  LAST  267          27,2100  0 5546 0           TC      UPFLAG
158816 REF   1                     27,2101   00077 1           ADRES   PDSPFLAG        R60 PRIODSP FLAG

15882  REF  15  LAST  391          27,2102  0 5546 0           TC      UPFLAG
158821 REF   1                     27,2103   00024 1           ADRES   TARGIFLG        FOR R52

158822 REF  85  LAST  389          27,2104  3 5021 1           CAF     ZERO            RESET TO ZERO, SINCE
```

L R60,R62 USER'S PAGE NO. 3 E2 S3

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158823 REF  21 LAST 259  27,2105  55'303 1          TS     OPTIND          OPTIND WAS SET TO -1 BY V379

15883  REF   1          27,2106  3 5066 1          CAF    PRIO14          RESTORE ORIGINAL PRIORITY
15884  REF   3 LAST 255 27,2107  0 5210 1          TC     PRIOCHNG

15885  REF   3 LAST 391 27,2110  0 1053 0          TC     TBASE1

15886  REF   6 LAST 391 27,2111  0 5412 0 GOREDO20 TC     PHASCHNG
15887                    27,2112   00111 0          OCT    111             1.11 FOR PIKUP20

15888  REF  48 LAST 390 27,2113  0 5217 0          TC     ENDOFJOB

1589   REF   7 LAST 376 27,2114  3 1011 0 R61TEST  CA     MODREG          ARE WE IN P00.  IF YES THIS MUST BE
15891                    27,2115  0 0006 1          EXTEND                      VERB49 OR VERB89 SO DO ENDEXT.
15892  REF   2 LAST 390 27,2116  1 2052 0          BZF    ENDMANU1        RESET 3-AXIS & RUTURN.  USER DOES ENDEXT
15893  REF   4 LAST 391 27,2117  3 0100 0          CA     FLAGWRD4        ARE WE IN R61 (P20)
1590   REF  22 LAST 391 27,2120  7 5004 1          MASK   BIT12
1591                    27,2121  0 0006 1          EXTEND
1592   REF   2 LAST 189 27,2122  1 4106 0          BZF    GOTOPOOH        NO
1593   REF   1          27,2123  0 4622 0          TC     GOTOV56         YES

1594                    27,2124   20100 1 BIT14+7  OCT    20100
1595                    27,2125   01422 1 V06N18   VN     0618
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P1597 PROGRAM DESCRIPTION - VECPOINT

R1598 THIS INTERPRETIVE SUBROUTINE MAY BE USED TO POINT A SPACECRAFT AXIS IN A DESIRED DIRECTION. THE AXIS
R1600 TO BE POINTED MUST APPEAR AS A HALF UNIT DOUBLE PRECISION VECTOR IN SUCCESSIVE LOCATIONS OF ERASABLE MEMORY
R1602 BEGINNING WITH THE LOCATION CALLED SCAXIS. THE COMPONENTS OF THIS VECTOR ARE GIVEN IN SPACECRAFT COORDINATES.
R1604 THE DIRECTION IN WHICH THIS AXIS IS TO BE POINTED MUST APPEAR AS A HALF UNIT DOUBLE PRECISION VECTOR IN
R1606 SUCCESSIVE LOCATIONS OF ERASABLE MEMORY BEGINNING WITH THE ADDRESS CALLED POINTVSM. THE COMPONENTS OF THIS
R1608 VECTOR ARE GIVEN IN STABLE MEMBER COORDINATES. WITH THIS INFORMATION VECPOINT COMPUTES A SET OF THREE GIMBAL
R1610 ANGLES (2S COMPLEMENT) CORRESPONDING TO THE CROSS-PRODUCT ROTATION BETWEEN SCAXIS AND POINTVSM AND STORES THEM
R1612 IN T(MPAC) BEFORE RETURNING TO THE CALLER.
R1613 THIS ROTATION, HOWEVER, MAY BRING THE S/C INTO GIMBAL LOCK. WHEN POINTING A VECTOR IN THE Y-Z PLANE,
R1615 THE TRANSPONDER AXIS, OR THE AOT FOR THE LEM, THE PROGRAM WILL CORRECT THIS PROBLEM BY ROTATING THE CROSS-
R1617 PRODUCT ATTITUDE ABOUT POINTVSM BY A FIXED AMOUNT SUFFICIENT TO ROTATE THE DESIRED S/C ATTITUDE OUT OF GIMBAL
R1619 LOCK. IF THE AXIS TO BE POINTED IS MORE THAN 40.6 DEGREES BUT LESS THAN 60.5 DEG FROM THE +X (OR-X) AXIS,
R1621 THE ADDITIONAL ROTATION TO AVOID GIMAL LOCK IS 35 DEGREES. IF THE AXIS IS MORE THAN 60.5 DEGEES FROM +X (OR -X)
R1623 THE ADDITIONAL ROTATION IS 35 DEGREES. THE GIMBAL ANGLES CORRESPONDING TO THIS ATTITUDE ARE THEN COMPUTED AND
R1625 STORED AS 2S COMPLIMENT ANGLES IN T(MPAC) BEFORE RETURNING TO THE CALLER.
R1627 WHEN POINTING THE X-AXIS, OR THE THRUST VECTOR, OR ANY VECTOR WITHIN 40.6 DEG OF THE X-AXIS, VECPOINT
R1629 CANNOT CORRECT FOR A CROSS-PRODUCT ROTATION INTO GIMBAL LOCK. IN THIS CASE A PLATFORM REALIGNMENT WOULD BE
R1631 REQUIRED TO POINT THE VECTOR IN THE DESIRED DIRECTION. AT PRESENT NO INDICATION IS GIVEN FOR THIS SITUATION
R1633 EXCEPT THAT THE FINAL MIDDLE GIMBAL ANGLE IN MPAC +2 IS GREATER THAN 59 DEGREES.

R1635 CALLING SEQUENCE -
R1636 1) LOAD SCAXIS, POINTVSM
R1637 2) CALL
R1638 VECPOINT

R1639 RETURNS WITH

R1640 1) DESIRED OUTER GIMBAL ANGLE IN MPAC
R1641 2) DESIRED INNER GIMBAL ANGLE IN MPAC +1
R1642 3) DESIRED MIDDLE GIMBAL ANGLE IN MPAC +2

R1643 ERASABLES USED -

R1644	1) SCAXIS	6
R1645	2) POINTVSM	6
R1646	3) MIS	18
R1647	4) DEL	18
R1648	5) COF	6
R1649	6) VECQTEMP	1
R1650	7) ALL OF VAC AREA	43
R1651	TOTAL	99

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 1652  REF   1              27,2000                    SETLOC VECPT
 1653                       27,2126                    BANK
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 1654   REF   4  LAST  114   E6,1661                          EBANK= BCDU

 1655   REF   1                                               COUNT  27/VECPT

 1656                        27,2126   40020 1  VECPOINT STQ    BOV             SAVE RETURN ADDRESS
 1657   REF   1              27,2127   03310 0                  VECQTEMP
 1658   REF   1              27,2130   56131 1                  VECLEAR         AND CLEAR OVFIND
 1659                        27,2131   47164 1  VECLEAR  AXC,2  RTB
 1660   REF   2  LAST  114   27,2132   03320 0                  MIS             READ THE PRESENT CDU ANGLES AND
 1661   REF   1              27,2133   44376 0                  READCDUK        STORE THEM IN PD25, 26, 27
 1662                        27,2134   34032 1           STCALL 25D
 1663   REF   1              27,2135   44405 0                  CDUTODCM        S/C AXES TO STABLE MEMBER AXES (MIS)
 1664                        27,2136   61375 1           VLOAD  VXM
 1665   REF   2  LAST  114   27,2137   03357 0                  POINTVSM        RESOLVE THE POINTING DIRECTION VF INTO
 1666   REF   3  LAST  394   27,2140   03321 1                  MIS             INITIAL S/C AXES ( VF = POINTVSM)
 1667                        27,2141   77656 1           UNIT
 1668                        27,2142   00035 1           STORE  28D
A1669                                                             PD 28 29 30 31 32 33
 1670                        27,2143   53435 0           VXV    UNIT            TAKE THE CROSS PRODUCT VF X VI
 1671   REF   2  LAST  114   27,2144   03351 0                  SCAXIS          WHERE VI = SCAXIS
 1672                        27,2145   57400 1           BOV    VCOMP
 1673   REF   1              27,2146   56256 0                  PICKAXIS
 1674   REF   2  LAST  114   27,2147   17343 0           STODL  COF             CHECK MAGNITUDE
 1675                        27,2150   00045 0                  36D             OF CROSS PRODUCT
 1676                        27,2151   50025 0           DSU    BMN             VECTOR, IF LESS
 1677   REF   1              27,2152   16327 0                  OPB-14          THAN B-14 ASSUME
 1678   REF   2  LAST  394   27,2153   56256 0                  PICKAXIS        UNIT OPERATION
 1679                        27,2154   50375 0           VLOAD  DOT                     INVALID.
 1680   REF   3  LAST  394   27,2155   03351 0                  SCAXIS
 1691                        27,2156   00035 1                  28D
 1682                        27,2157   65552 0           SL1    ARCCOS
 1683                        27,2160   77624 1  COMPMATX CALL                   NOW COMPUTE THE TRANSFORMATION FROM
 1684   REF   1              27,2161   44530 1                  DELCOMP         FINAL S/C AXES TO INITIAL S/C AXES  MFI
 1685                        27,2162   75160 1           AXC,1  AXC,2
 1686   REF   4  LAST  394   27,2163   03320 0                  MIS             COMPUTE THE TRANSFORMATION FROM FINAL
 1687   REF   1              27,2164   03425 1                  DEL             S/C AXES TO STABLE MEMBER AXES
 1688                        27,2165   77624 1           CALL                   MFS = MIS MFI
 1689   REF   1              27,2166   44304 0                  MXM3            (IN PD LIST)

 1690                        27,2167   51545 1           DLOAD  ABS
 1691                        27,2170   00007 0                  6               MFS6 = SIN(CPSI)                    $2
 1692                        27,2171   50025 0           DSU    BMN
 1693   REF   1              27,2172   16314 0                  SINGIMLC        = SIN(59 DEGS)                      $2
 1694   REF   1              27,2173   56246 1                  FINDGIMB        /CPSI/ LESS THAN 59 DEGS
A1695                                                             I.E. DESIRED ATTITUDE NOT IN GIMBAL LOCK

 1696                        27,2174   51545 1           DLOAD  ABS             CHECK TO SEE IF WE ARE POINTING
 1697   REF   4  LAST  394   27,2175   03351 0                  SCAXIS          THE THRUST AXIS
 1698                        27,2176   51025 1           DSU    BPL
 1699   REF   1              27,2177   16316 1                  SINVEC1         SIN 49.4 DEGS                       $2
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 1700   REF   2  LAST  394   27,2200   56246 1                    FINDGIMB      IF SO, WE ARE TRYING TO POINT IT INTO
 1701                        27,2201   77775 1           VLOAD                  GIMBAL LOCK, ABORT COULD GO HERE
 1702                        27,2202   77626 0           STADR
 1703   REF   5  LAST  394   27,2203   50442 0           STOVL   MIS +12D
 1704                        27,2204   77626 0           STADR                  STORE MFS (IN PD LIST) IN MIS
 1705   REF   6  LAST  395   27,2205   50450 0           STOVL   MIS +6
 1706                        27,2206   77626 0           STADR
 1707   REF   7  LAST  395   27,2207   50456 0           STOVL   MIS
 1708   REF   8  LAST  395   27,2210   03327 1                    MIS +6        INNER GIMBAL AXIS IN FINAL S/C AXES
 1709                        27,2211   57444 1           BPL     VCOMP          LOCATE THE IG AXIS DIRECTION CLOSEST TO
 1710   REF   1              27,2212   56213 1                    IGSAMEX       FINAL X S/C AXIS

 1711                        27,2213   50035 1 IGSAMEX   VXV     BMN            FIND THE SHORTEST WAY OF ROTATING THE
 1712   REF   5  LAST  394   27,2214   03351 0                    SCAXIS        S/C OUT OF GIMBAL LOCK BY A ROTATION
 1713   REF   1              27,2215   56222 0                    U=SCAXIS      ABOUT +- SCAXIS, I.E. IF (IG (SGN MFS3)
A1714                                                                           X SCAXIS . XF) LESS THAN 0, U = SCAXIS
A1715                                                                          OTHERWISE U = -SCAXIS

 1716                        27,2216   57575 1           VLOAD   VCOMP
 1717   REF   6  LAST  395   27,2217   03351 0                    SCAXIS
 1718   REF   3  LAST  394   27,2220   37343 1           STCALL  COF            ROTATE ABOUT -SCAXIS
 1719   REF   1              27,2221   56225 1                    CHEKAXIS
 1720                        27,2222   77775 1 U=SCAXIS  VLOAD
 1721   REF   7  LAST  395   27,2223   03351 0                    SCAXIS
 1722   REF   4  LAST  395   27,2224   03343 0           STORE   COF            ROTATE ABOUT + SCAXIS
 1723                        27,2225   51545 1 CHEKAXIS  DLOAD   ABS
 1724   REF   8  LAST  395   27,2226   03351 0                    SCAXIS        SEE IF WE ARE POINTING THE AOT
 1725                        27,2227   51025 1           DSU     BPL
 1726   REF   1              27,2230   16320 1                    SINVEC2       SIN 29.5 DEGS                          $2
 1727   REF   1              27,2231   56235 0                    PICKANG1      IF SO, ROTATE 50 DEGS ABOUT +- SCAXIS
 1728                        27,2232   52145 0           DLOAD   GOTO           IF NOT, MUST BE POINTING THE TRANSPONDER
 1729   REF   1              27,2233   16324 0                    VECANG2       OR SOME VECTOR IN THE Y, OR Z PLANE
 1730   REF   1              27,2234   56237 1                    COMPMFSN      IN THIS CASE ROTATE 35 DEGS TO GET OUT
A1731                                                                          OF GIMBAL LOCK (VECANG2  $360)
 1732                        27,2235   77745 1 PICKANG1  DLOAD
 1733   REF   1              27,2236   16322 0                    VECANG1       = 50 DEGS                          $ 360
 1734                        27,2237   77624 1 COMPMFSN  CALL
 1735   REF   2  LAST  394   27,2240   44530 1                    DELCOMP       COMPUTE THE ROTATION ABOUT SCAXIS TO
 1736                        27,2241   75160 1           AXC,1   AXC,2          BRING MFS OUT OF GIMBAL LOCK
 1737   REF   9  LAST  395   27,2242   03320 0                    MIS
 1738   REF   2  LAST  394   27,2243   03425 1                    DEL
 1739                        27,2244   77624 1           CALL
 1740   REF   2  LAST  394   27,2245   44304 0                    MXM3          COMPUTE THE NEW TRANSFORMATION FROM
A1741                                                                          DESIRED S/C AXES TO STABLE MEMBER AXES
A1742                                                                          WHICH WILL ALIGN VI WITH VF AND AVOID
                                                                               GIMBAL LOCK
 1743                        27,2246   45160 1 FINDGIMB  AXC,1   CALL
 1744                        27,2247   00000 1                    0             EXTRACT THE COMMANDED CDU ANGLES FROM
 1745   REF   1              27,2250   44655 1                    DCMTOCDU      THIS MATRIX
 1746                        27,2251   40234 0           RTB     SETPD
 1747   REF   1              27,2252   45552 1                    V1STO2S       CONVERT TO 2:S COMPLEMENT
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1748                        27,2253  00001 0                 0
1749                        27,2254  77650 1          GOTO
1750  REF  2 LAST 394       27,2255  03310 0                 VECQTEMP       RETURN TO CALLER

1751                        27,2256  50375 0  PICKAXIS VLOAD  DOT            IF VF X VI = 0,  FIND VF . VI
1752                        27,2257  00035 1                  28D
1753  REF  9 LAST 395       27,2260  03351 0                  SCAXIS
1754                        27,2261  72240 1          BMN     TLOAD
1755  REF  1                27,2262  56266 0                  ROT180
1756                        27,2263  00032 0                  25D
1757                        27,2264  77650 1          GOTO                   IF VF = VI, CDU DESIRED = PRESENT CDU
1758  REF  3 LAST 396       27,2265  03310 0                  VECQTEMP       PRESENT CDU ANGLES

1759                        27,2266  47375 0  ROT180   VLOAD  VXV            IF VF, VI ANTIPARALLEL, 180 DEG ROTATION
1760  REF 10 LAST 395       27,2267  03327 1                  MIS +6         IS REQUIRED. Y STABLE MEMBER AXIS IN
1761  REF  2 LAST 286       27,2270  15333 0                  HIUNITX        INITIAL S/C AXIS.
1762                        27,2271  47256 0          UNIT    VXV            FIND Y(SM) X X(I)
1763  REF 10 LAST 396       27,2272  03351 0                  SCAXIS         FIND UNIT(VI X UNIT(Y(SM) X X(I)))
1764                        27,2273  40056 0          UNIT    BOV            I.E. PICK A VECTOR IN THE PLANE OF X(I),
1765  REF  1                27,2274  56310 0                  PICKX          Y(SM) PERPENDICULAR TO VI
1766  REF  5 LAST 395       27,2275  17343 0          STODL   COF
1767                        27,2276  00045 0                  36D            CHECK MAGNITUDE
1768                        27,2277  50025 0          DSU     BMN            OF THIS VECTOR.
1769  REF  2 LAST 394       27,2300  16327 0                  DPB-14         IF LESS THAN B-14,
1770  REF  2 LAST 396       27,2301  56310 0                  PICKX          PICK X-AXIS.
1771                        27,2302  77775 1          VLOAD
1772  REF  6 LAST 396       27,2303  03343 0                  COF
1773  REF  7 LAST 396       27,2304  17343 0  XROT    STODL   COF
1774  REF  2 LAST 294       27,2305  15333 0                  HIOPHALF
1775                        27,2306  77650 1          GOTO
1776  REF  1                27,2307  56160 0                  COMPMATX
1777                        27,2310  52175 0  PICKX   VLOAD  GOTO           PICK THE XAXIS IN THIS CASE
1778  REF  3 LAST 396       27,2311  15333 0                  HIUNITX
1779  REF  1                27,2312  56304 0                  XROT
1780                        35,2000          BANK    35
1781  REF  1                27,2000          SETLOC  MANUVER1
1782                        27,2313          BANK

1783                        27,2313  15555 0  SINGIMLC 2DEC   .4285836003    =SIN(59)                  $2
1783                        27,2314  35172 0
1784                        27,2315  14113 1  SINVEC1  2DEC   .3796356537    =SIN(49.4)                $2
1784                        27,2316  36326 0
1785                        27,2317  07701 0  SINVEC2  2DEC   .2462117800    =SIN(29.5)                $2
1785                        27,2320  35703 0
1786                        27,2321  04343 1  VECANG1  2DEC   .1388888889    = 50 DEGREES                        $360
1786                        27,2322  21616 0
1787                        27,2323  03070 0  VECANG2  2DEC   .09722222222   = 35 DEGREES                        $360
1787                        27,2324  34344 0
1788                        27,2325  00000 1  1BITDP   OCT     0              KEEP THIS BEFORE DPB(-14)     *********
1789                        27,2326  00001 0  DPB-14   OCT     00001
```

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```
1790                        27,2327   00000 1          OCT    00000
1791                        34,2002                    BANK   34
1792  REF   2  LAST  390    27,2000                    SETLOC MANUVER
1793                        27,2330                    BANK
```

P1794 ROUTINE FOR INITIATING AUTOMATIC MANEUVER VIA KEYBOARD (V49)

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 1795   REF   4  LAST  390      1155                          EBANK= CPHI

 1796   REF   1                                               COUNT  27/R62

 1797   REF   1                27,2330  3 5052 0  R62DISP    CAF    V06N22        DISPLAY COMMAND ICDUS CPHI, CTHETA, CPHI
 1798   REF  57  LAST  391     27,2331  0 4662 1             TC     BANKCALL
 1799   REF   2  LAST  194     27,2332   20720 0             CADR   GOFLASH
 1800   REF  16  LAST  263     27,2333  1 5534 1             TCF    ENDEXT
 1801   REF   1                27,2334  1 2336 1             TCF    GOMOVE        PROCEED
 1802   REF   2  LAST  252     27,2335  1 2330 1             TCF    R62DISP       ENTER

A1803                                                                             ASTRONAUT MAY LOAD NEW ICDUS AT THIS
A1804                                                                             POINT
 1805   REF  16  LAST  391     27,2336  0 5546 0  GOMOVE     TC     UPFLAG        SET 3-AXIS FLAG
 1806   REF   2  LAST  391     27,2337   00124 0             ADRES  3AXISFLG      BIT 6  FLAG 5
 1807   REF  58  LAST  398     27,2340  0 4662 1             TC     BANKCALL
 1808   REF   1                27,2341   56000 1             CADR   R60CSM

 1809   REF  17  LAST  398     27,2342  1 5534 1             TCF    ENDEXT
```

```
0500                          15,2000                    BANK   15
050001 REF   1                22,2000                    SETLOC KALCMON1
050002                        22,2000                    BANK

0501   REF   5  LAST  394     E6,1661                    EBANK= BCDU

05015  REF   1                                          COUNT  22/KALC

0502   REF  11  LAST  390     22,2000  0 6006 1 KALCMAN3 TC     INTPRET
0503                          22,2001   77634 0          RTB
0504   REF   2  LAST  394     22,2002   44376 0                READCDUK       PICK UP CURRENT COU ANGLES
0505   REF   6  LAST  399     22,2003   03262 1          STORE BCDU           STORE THE INITIAL S/C ANGLES
0516                          22,2004   72364 0          AXC,2 TLOAD          COMPUTE THE TRANSFORMATION FROM
0517   REF  11  LAST  396     22,2005   03320 0                MIS            INITIAL S/C AXES TO STABLE MEMBER AXES
0518   REF   7  LAST  399     22,2006   03262 1                BCDU           (MIS)
0519                          22,2007   77624 1          CALL
0520   REF   2  LAST  394     22,2010   44405 0                CDUTODCM
0521                          22,2011   72364 0          AXC,2 TLOAD          COMPUTE THE TRANSFORMATION FROM
0522   REF   4  LAST  121     22,2012   03425 1                MFS            FINAL S/C AXES TO STABLE MEMBER AXES
0523   REF   5  LAST  398     22,2013   01156 1                CPHI           (MFS)
0524                          22,2014   77624 1          CALL
0525   REF   3  LAST  399     22,2015   44405 0                CDUTODCM
0526                          22,2016   45160 1 SECAD    AXC,1 CALL           MIS AND MFS ARRAYS CALCULATED        $2
0527   REF  12  LAST  399     22,2017   03320 0                MIS
0528   REF   1                22,2020   44334 0                TRANSPOS
0529                          22,2021   77775 1          VLOAD
0530                          22,2022   77626 0          STADR
0531   REF  12  LAST  114     22,2023   50474 0          STOVL  TMIS +12D
0532                          22,2024   77626 0          STADR
0533   REF  13  LAST  399     22,2025   50502 0          STOVL  TMIS +6
0534                          22,2026   77626 0          STADR
0535   REF  14  LAST  399     22,2027   74510 0          STORE  TMIS          TMIS = TRANSPOSE(MIS) SCALED BY 2
0536                          22,2030   75160 1          AXC,1  AXC,2
0537   REF  15  LAST  399     22,2031   03266 0                TMIS
0538   REF   5  LAST  399     22,2032   03425 1                MFS
0539                          22,2033   77624 1          CALL
0540   REF   3  LAST  395     22,2034   44304 0                MXM3
0541                          22,2035   45575 1          VLOAD  STADR
0542   REF   1                22,2036   50335 1          STOVL  MFI +12D
0543                          22,2037   77626 0          STADR
0544   REF   2  LAST  399     22,2040   50343 0          STOVL  MFI +6
0545                          22,2041   77626 0          STADR
0546   REF   3  LAST  399     22,2042   74351 0          STORE  MFI           MFI = TMIS MFS (SCALED BY 4)
0547                          22,2043   45001 1          SETPD  CALL          TRANSPOSE MFI IN PD LIST
0548                          22,2044   00023 0                 18D
0549   REF   1                22,2045   44343 0                 TRNSPSPD
0550                          22,2046   45575 1          VLOAD  STADR
0551   REF   1                22,2047   50474 0          STOVL  TMFI +12D
0552                          22,2050   77626 0          STADR
0553   REF   2  LAST  399     22,2051   50502 0          STOVL  TMFI +6
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 0554                              22,2052   77626 0          STADR
 0555   REF   3  LAST  399        22,2053   74510 0          STORE  TMFI          TMFI = TRANSPOSE (MFI)  SCALED BY 4
R0556
R0557   CALCULATE COFSKEW AND MFISYM
R0558
 0559                              22,2054   45345 1          DLOAD  DSU
 0560   REF   4  LAST  400        22,2055   03271 0                 TMFI +2
 0561   REF   4  LAST  399        22,2056   03430 0                 MFI +2
 0562                              22,2057   45325 1          PDDL   DSU           CALCULATE COF SCALED BY 2/SIN(AM)
 0563   REF   5  LAST  400        22,2060   03432 1                 MFI +4
 0564   REF   5  LAST  400        22,2061   03273 1                 TMFI +4
 0565                              22,2062   45325 1          PDDL   DSU
 0566   REF   6  LAST  400        22,2063   03301 0                 TMFI +10D
 0567   REF   6  LAST  400        22,2064   03440 1                 MFI +10D
 0568                              22,2065   77666 1          VDEF
 0569   REF   4  LAST  114        22,2066   03311 1          STORE  COFSKEW       EQUALS MFISKEW
R0570
R0571   CALCULATE AM AND PROCEED ACCORDING TO ITS MAGNITUDE
R0572
 0573                              22,2067   43345 1          DLOAD  DAD
 0574   REF   7  LAST  400        22,2070   03426 1                 MFI
 0575   REF   8  LAST  400        22,2071   03446 1                 MFI +16D
 0576                              22,2072   43225 0          DSU    DAD
 0577   REF   2  LAST   34        22,2073   15325 1                 DP1/4TH
 0578   REF   9  LAST  400        22,2074   03436 0                 MFI +8D
 0579   REF   3  LAST  114        22,2075   03317 1          STORE  CAM           CAM = (MFI0+MFI4+MFI8-1)/2 HALF SCALE
 0580                              22,2076   77726 1          ARCCOS
 0581   REF   2  LAST  114        22,2077   03365 1          STORE  AM            AM=ARCCOS(CAM)  (AM SCALED BY 2)
 0582                              22,2100   51025 1          DSU    BPL
 0583   REF   1                   22,2101   04367 1                 MINANG
 0584   REF   1                   22,2102   44111 0                 CHECKMAX
 0585                              22,2103   77776 1          EXIT                MANEUVER LESS THAN 0.25 DEG
 0586                              22,2104   0 0004 0         INHINT              GO DIRECTLY INTO ATTITUDE HOLD
 0587   REF  51  LAST  388        22,2105   4 5017 0         CS     ONE          ABOUT COMMANDED ANGLES
 0588   REF   1                   22,2106   55'332 0         TS     HOLDFLAG     NOGO WILL STOP ANY RATE AND SET UP FOR A
 0589   REF   1                   22,2107   0 3142 0         TC     LOADCDUD     GOOD RETURN
 0590   REF   1                   22,2110   1 2730 0         TCF    NOGO

 0597                              22,2111   45345 1 CHECKMAX DLOAD  DSU
 0598   REF   3  LAST  400        22,2112   03365 1                 AM
 0599   REF   1                   22,2113   04370 1                 MAXANG
 0600                              22,2114   77244 0          BPL    VLOAD
 0601   REF   1                   22,2115   44123 1                 ALTCALC      UNIT
 0602   REF   5  LAST  400        22,2116   03311 1                 COFSKEW      COFSKEW
 0603                              22,2117   77655 1          UNIT
 0604   REF   8  LAST  396        22,2120   03343 0          STORE  COF           COF IS THE MANEUVER AXIS
 0605                              22,2121   77650 1          GOTO                SEE IF MANEUVER GOES THRU GIMBAL LOCK
 0606   REF   1                   22,2122   44737 1                 LOCSKIRT
 0607                              22,2123   53375 0 ALTCALC  VLOAD  VAD          IF AM GREATER THAN 170 DEGREES
 0608   REF  10  LAST  400        22,2124   03426 1                 MFI
```

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 0609   REF   7  LAST  400   22,2125   03267 1                TMFI
 0610                       22,2126   77762 1          VSR1
 0611   REF   1             22,2127   27267 1          STOVL  MFISYM
 0612   REF  11  LAST  400   22,2130   03434 1                MFI +6
 0613                       22,2131   74455 0          VAD    VSR1
 0614   REF   8  LAST  401   22,2132   03275 1                TMFI +6
 0615   REF   2  LAST  401   22,2133   27275 1          STOVL  MFISYM +6
 0616   REF  12  LAST  401   22,2134   03442 0                MFI +12D
 0617                       22,2135   74455 0          VAD    VSR1
 0618   REF   9  LAST  401   22,2136   03303 1                TMFI +12D
 0619   REF   3  LAST  401   22,2137   03303 1          STORE  MFISYM +12D     MFISYM=(MFI+TMFI)/2  SCALED BY 4
R0620
R0621
R0622   CALCULATE COF
R0623
 0624                       22,2140   70545 1          DLOAD  SR1
 0625   REF   4  LAST  400   22,2141   03317 1                CAM
 0626                       22,2142   45325 1          PDDL   DSU             PDD CAM                          $4
 0627   REF   1             22,2143   15333 0                 DPHALF
 0628   REF   5  LAST  401   22,2144   03317 1                CAM
 0629                       22,2145   65204 1          BOVB   PDDL            PD2 1 - CAM                      $2
 0630   REF   1             22,2146   45712 1                 SIGNMPAC
 0631   REF   4  LAST  401   22,2147   03307 0                MFISYM +16D
 0632                       22,2150   56225 1          DSU    DDV
 0633                       22,2151   00001 0                 0
 0634                       22,2152   00003 1                 2
 0635                       22,2153   65366 1          SQRT   PDDL            COFZ = SQRT(MFISYM8-CAM)/1-CAM)
 0636   REF   5  LAST  401   22,2154   03277 0                MFISYM +8D                                $ ROOT 2
 0637                       22,2155   56225 1          DSU    DDV
 0638                       22,2156   00001 0                 0
 0639                       22,2157   00003 1                 2
 0640                       22,2160   65366 1          SQRT   PDDL            COFY = SQRT(MFISYM4-CAM)/(1-CAM)  $ROOT2
 0641   REF   6  LAST  401   22,2161   03267 1                MFISYM
 0642                       22,2162   56225 1          DSU    DDV
 0643                       22,2163   00001 0                 0
 0644                       22,2164   00003 1                 2
 0645                       22,2165   55566 1          SQRT   VDEF            COFX = SQRT(MFISYM-CAM)/(1-CAM)  $ROOT 2
 0646                       22,2166   77656 1          UNIT
 0647   REF   9  LAST  400   22,2167   03343 0          STORE  COF
R0648
R0649   DETERMINE  LARGEST COF AND ADJUST ACCORDINGLY
R0650
 0651                       22,2170   45345 1  COFMAXGO DLOAD  DSU
 0652   REF  10  LAST  401   22,2171   03343 0                COF
 0653   REF  11  LAST  401   22,2172   03345 0                COF +2
 0654                       22,2173   71240 1          BMN    DLOAD           COFY G COFX
 0655   REF   1             22,2174   44203 0                 COMP12
 0656   REF  12  LAST  401   22,2175   03343 0                COF
 0657                       22,2176   50025 0          DSU    BMN
 0658   REF  13  LAST  401   22,2177   03347 1                COF +4
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0659  REF   1                 22,2200   44260 0                 METHOD3         COFZ G COFX OR COFY
0660                          22,2201   77650 1          GOTO
0661  REF   1                 22,2202   44234 1                 METHOD1         COFX G COFY OR COFZ
0662                          22,2203   45345 1  COMP12  DLOAD  DSU
0663  REF  14  LAST  401      22,2204   03345 0                 COF +2
0664  REF  15  LAST  402      22,2205   03347 1                 COF +4
0665                          22,2206   77640 0          BMN
0666  REF   2  LAST  402      22,2207   44260 0                 METHOD3         COFZ G COFY OR COFX

0667                          22,2210   51145 0  METHOD2 DLOAD  BPL             COFY MAX
0668  REF   6  LAST  400      22,2211   03313 0                 COFSKEW +2      UY
0669  REF   1                 22,2212   44216 1                 U2POS
0670                          22,2213   57575 1          VLOAD  VCOMP
0671  REF  16  LAST  402      22,2214   03343 0                 COF
0672  REF  17  LAST  402      22,2215   03343 0          STORE  COF
0673                          22,2216   51145 0  U2POS   DLOAD  BPL
0674  REF   7  LAST  401      22,2217   03271 0                 MFISYM +2       UX UY
0675  REF   1                 22,2220   44224 0                 OKU21
0676                          22,2221   57545 1          DLOAD  DCOMP           SIGN OF UX OPPOSITE TO UY
0677  REF  18  LAST  402      22,2222   03343 0                 COF
0678  REF  19  LAST  402      22,2223   03343 0          STORE  COF
0679                          22,2224   51145 0  OKU21   DLOAD  BPL
0680  REF   8  LAST  402      22,2225   03301 0                 MFISYM +10D     UY UZ
0681  REF   2  LAST  400      22,2226   44737 1                 LOCSKIRT
0682                          22,2227   57545 1          DLOAD  DCOMP           SIGN OF UZ OPPOSITE TO UY
0683  REF  20  LAST  402      22,2230   03347 1                 COF +4
0684  REF  21  LAST  402      22,2231   03347 1          STORE  COF +4
0685                          22,2232   77650 1          GOTO
0686  REF   3  LAST  402      22,2233   44737 1                 LOCSKIRT
0687                          22,2234   51145 0  METHOD1 DLOAD  BPL             COFX MAX
0688  REF   7  LAST  402      22,2235   03311 1                 COFSKEW         UX
0689  REF   1                 22,2236   44242 0                 U1POS
0690                          22,2237   57575 1          VLOAD  VCOMP
0691  REF  22  LAST  402      22,2240   03343 0                 COF
0692  REF  23  LAST  402      22,2241   03343 0          STORE  COF
0693                          22,2242   51145 0  U1POS   DLOAD  BPL
0694  REF   9  LAST  402      22,2243   03271 0                 MFISYM +2       UX UY
0695  REF   1                 22,2244   44250 0                 OKU12
0696                          22,2245   57545 1          DLOAD  DCOMP
0697  REF  24  LAST  402      22,2246   03345 0                 COF +2          SIGN OF UY OPPOSITE TO UX
0698  REF  25  LAST  402      22,2247   03345 0          STORE  COF +2
0699                          22,2250   51145 0  OKU12   DLOAD  BPL
0700  REF  10  LAST  402      22,2251   03273 1                 MFISYM +4       UX UZ
0701  REF   4  LAST  402      22,2252   44737 1                 LOCSKIRT
0702                          22,2253   57545 1          DLOAD  DCOMP           SIGN OF UZ OPPOSITE TO UY
0703  REF  26  LAST  402      22,2254   03347 1                 COF +4
0704  REF  27  LAST  402      22,2255   03347 1          STORE  COF +4
0705                          22,2256   77650 1          GOTO
0706  REF   5  LAST  402      22,2257   44737 1                 LOCSKIRT
0707                          22,2260   51145 0  METHOD3 DLOAD  BPL             COFZ MAX
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0708   REF   8  LAST  402   22,2261   03315 0                 COFSKEW +4      UZ
0709   REF   1               22,2262   44266 0                 U3POS
0710                         22,2263   57575 1          VLOAD  VCOMP
0711   REF  28  LAST  402    22,2264   03343 0                 COF
0712   REF  29  LAST  403    22,2265   03343 0          STORE  COF
0713                         22,2266   51145 0  U3POS   DLOAD  BPL
0714   REF  11  LAST  402    22,2267   03273 1                 MFISYM +4       UX UZ
0715   REF   1               22,2270   44274 0                 OKU31
0716                         22,2271   57545 1          DLOAD  DCOMP
0717   REF  30  LAST  403    22,2272   03343 0                 COF             SIGN OF UX OPPOSITE TO UZ
0718   REF  31  LAST  403    22,2273   03343 0          STORE  COF
0719                         22,2274   51145 0  OKU31   DLOAD  BPL
0720   REF  12  LAST  403    22,2275   03301 0                 MFISYM +10D     UY UZ
0721   REF   6  LAST  402    22,2276   44737 1                 LOCSKIRT
0722                         22,2277   57545 1          DLOAD  DCOMP
0723   REF  32  LAST  403    22,2300   03345 0                 COF +2          SIGN OF UY OPPOSITE TO UZ
0724   REF  33  LAST  403    22,2301   03345 0          STORE  COF +2
0725                         22,2302   77650 1          GOTO
0726   REF   7  LAST  403    22,2303   44737 1                 LOCSKIRT
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R0727
R0728   MATRIX OPERATIONS
R0729
 0730                    22,2304   77601 0  MXM3     SETPD                MXM3 MULTIPLIES 2 3X3 MATRICES
 0731                    22,2305   00001 0                 0               AND LEAVES RESULT IN PD LIST
 0732                    22,2306   64743 0           DLOAD* PDDL*          ADDRESS OF 1ST MATRIX IN XR1
 0733                    22,2307   77762 1                  12D,2          ADDRESS OF 2ND MATRIX IN XR2
 0734                    22,2310   77770 1                  6,2
 0735                    22,2311   55523 0           PDDL*  VDEF           DEFINE VECTOR M2(COL 1)
 0736                    22,2312   77776 1                  0,2
 0737                    22,2313   64717 1           MXV*   PDDL*          M1XM2(COL 1) IN PD
 0738                    22,2314   00001 0                  0,1
 0739                    22,2315   77760 0                  14D,2
 0740                    22,2316   64723 0           PDDL*  PDDL*
 0741                    22,2317   77765 0                  8D,2
 0742                    22,2320   77774 0                  2,2
 0743                    22,2321   63666 1           VDEF   MXV*           DEFINE VECTOR M2(COL 2)
 0744                    22,2322   00001 0                  0,1
 0745                    22,2323   64723 0           PDDL*  PDDL*          M1XM2(COL 2) IN PD
 0746                    22,2324   77756 0                  16D,2
 0747                    22,2325   77764 1                  10D,2
 0748                    22,2326   55523 0           PDDL*  VDEF           DEFINE VECTOR M2(COL 3)
 0749                    22,2327   77772 0                  4,2
 0750                    22,2330   41517 1           MXV*   PUSH           M1XM2(COL 3) IN PD
 0751                    22,2331   00001 0                  0,1
 0752                    22,2332   77650 1           GOTO
 0753  REF  2 LAST 399   22,2333   44343 0                  TRNSPSPD         REVERSE ROWS AND COLS IN PD AND
R0754                                 RETURN WITH M1XM2 IN PD LIST
R0755
 0756                    22,2334   76601 1  TRANSPOS SETPD  VLOAD*           TRANSPOS TRANSPOSES A 3X3 MATRIX
 0757                    22,2335   00001 0                  0                AND LEAVES RESULT IN PD LIST
 0758                    22,2336   00001 0                  0,1              MATRIX ADDRESS IN XR1
 0759                    22,2337   62713 0           PDVL*  PDVL*
 0760                    22,2340   00007 0                  6,1
 0761                    22,2341   00015 0                  12D,1
 0762                    22,2342   77606 1           PUSH                    MATRIX IN PD
 0763                    22,2343   65345 0  TRNSPSPD DLOAD  PDDL             ENTER WITH MATRIX IN PD LIST
 0764                    22,2344   00003 1                  2
 0765                    22,2345   00007 0                  6
 0766                    22,2346   14003 1           STODL  2
 0767                    22,2347   77626 0           STADR
 0768                    22,2350   63770 1           STODL  6
 0769                    22,2351   00005 1                  4
 0770                    22,2352   77725 1           PDDL
 0771                    22,2353   00015 0                  12D
 0772                    22,2354   14005 1           STODL  4
 0773                    22,2355   77626 0           STADR
 0774                    22,2356   63762 1           STODL  12D
 0775                    22,2357   00013 0                  10D
 0776                    22,2360   77725 1           PDDL
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 0777                          22,2361   00017 1                 14D
 0778                          22,2362   14013 0           STODL 10D
 0779                          22,2363   77626 0           STADR
 0780                          22,2364   77760 0           STORE 14D
 0781                          22,2365   77616 0           RVQ                 RETURN WITH TRANSPOSED MATRIX IN PD LIST
 0782                          22,2366   00013 0 MINANG    DEC   .00069375
 0783                          22,2367   17071 1 MAXANG    DEC   .472222
R0784          GIMBAL LOCK CONSTANTS

R0785          D = MGA CORRESPONDING TO GIMBAL LOCK = 60 DEGREES
R0786          NGL = BUFFER ANGLE (TO AVOID DIVISIONS BY ZERO) = 2 DEGREES

 0787                          22,2370   15667 1 SD        DEC   .433015       = SIN(D)                                  $2
 0788                          22,2371   33555 1 K3S1      DEC   .86603        = SIN(D)                                  $1
 0789                          22,2372   67777 1 K4        DEC   -.25          = - COS(D)                                $2
 0790                          22,2373   04000 0 K4SQ      DEC   .125          = COS(D)COS(D)                            $2
 0791                          22,2374   00217 0 SNGLCD    DEC   .008725       = SIN(NGL)COS(D)                          $2
 0792                          22,2375   17773 1 CNGL      DEC   .499695       = COS(NGL)                                $2
 0794                          22,2376   0 0004 0 READCDUK INHINT               LOAD T(MPAC) WITH THE CURRENT CDU ANGLES
 0795   REF   5 LAST  244      22,2377   3 0034 0          CA    CDUZ
 0796   REF 219 LAST  391      22,2400   54 156 1          TS    MPAC +2
 0797                          22,2401   0 0006 1          EXTEND
 0798   REF   6 LAST  271      22,2402   3 0033 1          DCA   CDUX
 0799                          22,2403   0 0003 1          RELINT
 0800   REF   1                22,2404   1 6445 0          TCF   TLOAD +6
 0801                          16,2000                     BANK  16
 080101 REF   1                22,2000                     SETLOC KALCMON2
 080102                        22,2405                     BANK

 080105 REF   2 LAST  399 TO  405:   261   261*           COUNT* $$/KALC

 0802                          22,2405   66370 0 CDUTODCM AXT,1 SSP             SUBROUTINE TO COMPUTE  DIRECTION COSINE
 0803                          22,2406   00003 1          OCT   3               MATRIX RELATING S/C AXES TO STABLE
 0804   REF   1                22,2407   00051 0                S1              MEMBER AXES FROM 3 CDU ANGLES IN T(MPAC)
 0805                          22,2410   00001 0          OCT   1               SET XR1, S1 AND PD FOR LOOP
 0806                          22,2411   00010 0          STORE 7
 0807                          22,2412   77601 0          SETPD
 0808                          22,2413   00001 0                0
 0809                          22,2414   47133 0 LOOPSIN  SLOAD* RTB
 0810                          22,2415   00013 0                10D,1
 0811   REF   3 LAST  285      22,2416   45513 1                CDULOGIC
 0812                          22,2417   00013 0          STORE 10D             LOAD PD WITH 0 SIN(PHI)
 0813                          22,2420   65356 1          SIN   PODL                          2 COS(PHI)
 0814                          22,2421   00013 0                10D                         4 SIN(THETA)
 0815                          22,2422   41546 0          COS   PUSH                          6 COS(THETA)
 0816                          22,2423   71300 1          TIX,1 DLOAD                         8 SIN(PSI)
 0817   REF   1                22,2424   44414 0                LOOPSIN                    10 COS(PSI)
 0818                          22,2425   00007 0                6
 0819                          22,2426   72405 0          DMP   SL1
 0820                          22,2427   00013 0                10D
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0821                22,2430   10001 1          STORE  0,2
0822                22,2431   77745 1          DLOAD
0823                22,2432   00005 1                 4
0824                22,2433   65205 0          DMP    PDDL
0825                22,2434   00001 0                 0          (PD6 SIN(THETA)SIN(PHI))
0826                22,2435   00007 0                 6
0827                22,2436   41205 0          DMP    DMP
0828                22,2437   00011 1                 8D
0829                22,2440   00003 1                 2
0830                22,2441   44352 0          SL1    BDSU
0831                22,2442   00015 0                 12D
0832                22,2443   77752 1          SL1
0833                22,2444   10003 0          STORE  2,2
0834                22,2445   77745 1          DLOAD
0835                22,2446   00003 1                 2
0836                22,2447   65205 0          DMP    PDDL       (PD7 COS(PHI)SIN(THETA)) SCALED 4
0837                22,2450   00005 1                 4
0838                22,2451   00007 0                 6
0839                22,2452   41205 0          DMP    DMP
0840                22,2453   00011 1                 8D
0841                22,2454   00001 0                 0
0842                22,2455   77752 1          SL1
0843                22,2456   72415 1          DAD    SL1
0844                22,2457   00017 1                 14D
0845                22,2460   10005 0          STORE  4,2
0846                22,2461   77745 1          DLOAD
0847                22,2462   00011 1                 8D
0848                22,2463   10007 1          STORE  6,2
0849                22,2464   77745 1          DLOAD
0850                22,2465   00013 0                 10D
0851                22,2466   72405 0          DMP    SL1
0852                22,2467   00003 1                 2
0853                22,2470   10011 0          STORE  8D,2
0854                22,2471   77745 1          DLOAD
0855                22,2472   00013 0                 10D
0856                22,2473   57405 1          DMP    DCOMP
0857                22,2474   00001 0                 0
0858                22,2475   77752 1          SL1
0859                22,2476   10013 1          STORE  10D,2
0860                22,2477   77745 1          DLOAD
0861                22,2500   00005 1                 4
0862                22,2501   57405 1          DMP    DCOMP
0863                22,2502   00013 0                 10D
0864                22,2503   77752 1          SL1
0865                22,2504   10015 1          STORE  12D,2
0866                22,2505   77745 1          DLOAD
0867                22,2506   72405 0          DMP    SL1        (PUSH UP 7)
0868                22,2507   00011 1                 8D
0869                22,2510   41325 0          PDDL   DMP        (PD7 COS(PHI)SIN(THETA)SIN(PSI)) SCALE4
0870                22,2511   00007 0                 6
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 0871                          22,2512   00001 0                 0
 0872                          22,2513   72415 1          DAD    SL1          (PUSH UP 7)
 0873                          22,2514   77626 0          STADR               C7=COS(PHI)SIN(THETA)SIN(PSI)
 0874                          22,2515   67760 1          STORE  14D,2
 0875                          22,2516   77745 1          DLOAD
 0875                          22,2517   72405 0          DMP    SL1          (PUSH UP 6)
 0877                          22,2520   00011 1                 8D
 0878                          22,2521   41325 0          PDDL   DMP          (PD6 SIN(THETA)SIN(PHI)SIN(PSI)) SCALE4
 0879                          22,2522   00007 0                 5
 0880                          22,2523   00003 1                 2
 0881                          22,2524   72425 1          DSU    SL1          (PUSH UP 6)
 0882                          22,2525   77626 0          STADR
 0883                          22,2526   67756 1          STORE  16D,2        C8=-SIN(THETA)SIN(PHI)SIN(PSI)
 0884                          22,2527   77616 0          RVQ                  +COS(THETA)COS(PHI)
 0885                          22,2530             ENDOCM   EQUALS

 0886                          15,2000             BANK   15
 088601 REF   2 LAST  399      22,2000             SETLOC KALCMON1
 088602                        22,2530             BANK

R0887  CALCULATION OF THE MATRIX DEL.....
R0888          *      *                --T          *
R0889          DEL = (IDMATRIX)COS(A)+UU (1-COS(A))+UX SIN(A)          SCALED 1
R0890          -
R0891          WHERE U IS A UNIT VECTOR (DP SCALED 2) ALONG THE AXIS OF ROTATION.
R0893          A IS THE ANGLE OF ROTATION (DP SCALED 2)
R0894                                                 -
R0895          UPON ENTRY THE STARTING ADDRESS OF U IS COF, AND A IS IN MPAC

 08955 REF   3 LAST  405 TO  407:    83   344*          COUNT  22/KALC

 0896                          22,2530   41401 1 DELCOMP SETPD  PUSH         MPAC CONTAINS THE ANGLE A
 0897                          22,2531   00001 0                 0
 0898                          22,2532   65356 1          SIN    PDDL         PD0 = SIN(A)
 0899                          22,2533   41546 0          COS    PUSH         PD2 = COS(A)
 08995                         22,2534   65302 0          SR2    PDDL         PD2 = COS(A)                              $8
 0900                          22,2535   41021 1          BDSU   BOVB         PD4 = 1-COS(A)                            $2
 0901   REF   2  LAST  401     22,2536   15333 0                 DPHALF
 09014  REF   2  LAST  401     22,2537   45712 1                 SIGNMPAC

R0902  COMPUTE THE DIAGONAL COMPONENTS OF DEL

 09024                         22,2540   77725 1          PDDL
 0903   REF  34  LAST  403     22,2541   03343 0                 COF
 0904                          22,2542   41316 0          DSQ    DMP
 0905                          22,2543   00005 1                 4
 0906                          22,2544   52415 0          DAD    SL3
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0907                                22,2545   00003 1              2
0908                                22,2546   77604 0        BOVB
0909  REF   3  LAST  407            22,2547   45712 1              SIGNMPAC
0910  REF   3  LAST  395            22,2550   17426 1        STODL DEL             UX UX(U-COS(A)) +COS(A)              $1
0911  REF  35  LAST  407            22,2551   03345 0              COF +2
0912                                22,2552   41316 0        DSQ   DMP
0913                                22,2553   00005 1              4
0914                                22,2554   52415 0        DAD   SL3
0915                                22,2555   00003 1              2
0916                                22,2556   77604 0        BOVB
0917  REF   4  LAST  408            22,2557   45712 1              SIGNMPAC
0918  REF   4  LAST  408            22,2560   17436 0        STODL DEL +8D         UY UY(1-COS(A)) +COS(A)              $1
0919  REF  36  LAST  408            22,2561   03347 1              COF +4
0920                                22,2562   41316 0        DSQ   DMP
0921                                22,2563   00005 1              4
0922                                22,2564   52415 0        DAD   SL3
0923                                22,2565   00003 1              2
0924                                22,2566   77604 0        BOVB
0925  REF   5  LAST  408            22,2567   45712 1              SIGNMPAC
0926  REF   5  LAST  408            22,2570   03446 1        STORE DEL +16D        UZ UZ(1-COS(A)) +COS(A)              $1

R0927  COMPUTE THE OFF DIAGONAL TERMS OF DEL

0928                                22,2571   41345 0        DLOAD DMP
0929  REF  37  LAST  408            22,2572   03343 0              COF
0930  REF  38  LAST  408            22,2573   03345 0              COF +2
0931                                22,2574   72405 0        DMP   SL1
0932                                22,2575   00005 1              4
0933                                22,2576   41325 0        PDDL  DMP             D6  UX UY (1-COS A)                  $ 4
0934  REF  39  LAST  408            22,2577   03347 1              COF +4
0935                                22,2600   00001 0              0
0936                                22,2601   43206 1        PUSH  DAD             D8  UZ SIN A                         $ 4
0937                                22,2602   00007 0              6
0938                                22,2603   41112 0        SL2   BOVB
0939  REF   6  LAST  408            22,2604   45712 1              SIGNMPAC
0940  REF   6  LAST  408            22,2605   17434 1        STODL DEL +6
0941                                22,2606   62421 1        BDSU  SL2
0942                                22,2607   77604 0        BOVB
0943  REF   7  LAST  408            22,2610   45712 1              SIGNMPAC
0944  REF   7  LAST  408            22,2611   17430 0        STODL DEL +2
0945  REF  40  LAST  408            22,2612   03343 0              COF
0946                                22,2613   41205 0        DMP   DMP
0947  REF  41  LAST  408            22,2614   03347 1              COF +4
0948                                22,2615   00005 1              4
0949                                22,2616   65352 0        SL1   PDDL            D6  UX UZ (1-COS A )                 $ 4
0950  REF  42  LAST  408            22,2617   03345 0              COF +2
0951                                22,2620   41405 0        DMP   PUSH            D8  UY SIN(A)
0952                                22,2621   00001 0              0
0953                                22,2622   62415 0        DAD   SL2
0954                                22,2623   00007 0              6
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0955                                22,2624   77604 0          BOVB
0956   REF   8  LAST  408           22,2625   45712 1                   SIGNMPAC
0957   REF   8  LAST  408           22,2626   17432 1          STODL    DEL +4          UX UZ (1-COS(A))+UY SIN(A)
0958                                22,2627   62421 1          BDSU     SL2
0959                                22,2630   77604 0          BOVB
0960   REF   9  LAST  409           22,2631   45712 1                   SIGNMPAC
0961   REF   9  LAST  409           22,2632   17442 0          STODL    DEL +120        UX UZ (U-COS(A))-UY SIN(A)
0962   REF  43  LAST  408           22,2633   03345 0                   COF +2
0963                                22,2634   41205 0          DMP      DMP
0964   REF  44  LAST  409           22,2635   03347 1                   COF +4
0965                                22,2636   00005 1                   4
0966                                22,2637   65352 0          SL1      PDDL            D6  UY UZ (1-COS(A))                $ 4
0967   REF  45  LAST  409           22,2640   03343 0                   COF
0968                                22,2641   41405 0          DMP      PUSH            D8  UX SIN(A)
0969                                22,2642   00001 0                   0
0970                                22,2643   62415 0          DAD      SL2
0971                                22,2644   00007 0                   6
0972                                22,2645   77604 0          BOVB
0973   REF  10  LAST  409           22,2646   45712 1                   SIGNMPAC
0974   REF  10  LAST  409           22,2647   17444 0          STODL    DEL +140        UY UZ(1-COS(A)) +UX SIN(A)
0975                                22,2650   62421 1          BDSU     SL2
0976                                22,2651   77604 0          BOVB
0977   REF  11  LAST  409           22,2652   45712 1                   SIGNMPAC
0978   REF  11  LAST  409           22,2653   03440 1          STORE    DEL +100        UY UZ (1-COS(A)) -UX SIN(A)
0979                                22,2654   77616 0          RVQ


R0980   DIRECTION COSINE MATRIX TO CDU ANGLE ROUTINE
R0981   X1 CONTAINS THE COMPLEMENT OF THE STARTING ADDRESS FOR MATRIX (SCALED 2)
R0982   LEAVES CDU ANGLES SCALED 2PI IN V(MPAC)
R0983   COS(MGA) WILL BE LEFT IN S1 (SCALED 1)

R0984   THE DIRECTION COSINE MATRIX RELATING S/C AXES TO STABLE MEMBER AXES CAN BE WRITTEN AS***

R0986           C =COS(THETA)COS(PSI)
R0987            0
R0988           C =-COS(THETA)SIN(PSI)COS(PHI)+SI (THETA)SIN(PHI)
R0989            1
R0990           C =COS(THETA)SIN(PSI)SIN(PHI) + S N(THETA)COS(PHI)
R0991            2
R0992           C =SIN(PSI)
R0993            3
R0994           C =COS(PSI)COS(PHI)
R0995            4
R0996           C =-COS(PSI)SIN(PHI)
R0997            5
R0998           C =-SIN(THETA)COS(PSI)
R0999            6
R1000           C =SIN(THETA)SIN(PSI)COS(PHI)+COS THETA)SIN(PHI)
R1001            7
```

```
R1002            C =-SIN(THETA)SIN(PSI)SIN(PHI)+CO (THETA)COS(PHI)
R1003             8

R1004            WHERE PHI = OGA
R1005                  THETA = IGA
R1006                  PSI = MGA

 1007                        22,2655   67543 1  DCMTOCDU DLOAD*  ARCSIN
 1008                        22,2656   00007 0                   6,1
 1009                        22,2657   71406 0           PUSH    COS             PD +0   PSI
 1010                        22,2660   41152 1           SL1     BOVB
 1011  REF  12  LAST  409    22,2661   45712 1                   SIGNMPAC
 1012  REF   2  LAST  405    22,2662   00051 0           STORE   S1
 1013                        22,2663   57543 1           DLOAD*  DCOMP
 1014                        22,2664   00015 0                   12D,1
 1015                        22,2665   67471 1           DDV     ARCSIN
 1016  REF   3  LAST  410    22,2666   00051 0                   S1
 1017                        22,2667   51123 0           PDDL*   BPL             PD +2  THETA
 1018                        22,2670   00001 0                   0,1             MUST CHECK THE SIGN OF COS(THETA)
 1019  REF   1               22,2671   44703 0                   OKTHETA         TO DETERMINE THE PROPER QUADRANT
 1020                        22,2672   57545 1           DLOAD   DCOMP
 1021                        22,2673   43244 1           BPL     DAD
 1022  REF   1               22,2674   44700 0                   SUHALFA
 1023  REF   3  LAST  407    22,2675   15333 0                   DPHALF
 1024                        22,2676   77650 1           GOTO
 1025  REF   1               22,2677   44702 1                   CALCPHI
 1026                        22,2700   77625 0  SUHALFA  DSU
 1027  REF   4  LAST  410    22,2701   15333 0                   DPHALF
 1028                        22,2702   77606 1  CALCPHI  PUSH
 1029                        22,2703   57543 1  OKTHETA  DLOAD*  DCOMP
 1030                        22,2704   00013 0                   10D,1
 1031                        22,2705   67471 1           DDV     ARCSIN
 1032  REF   4  LAST  410    22,2706   00051 0                   S1
 1033                        22,2707   51123 0           PDDL*   BPL             PUSH DOWN PHI
 1034                        22,2710   00011 1                   8D,1
 1035  REF   1               22,2711   44723 1                   OKPHI
 1036                        22,2712   57545 1           DLOAD   DCOMP           PUSH UP PHI
 1037                        22,2713   43244 1           BPL     DAD
 1038  REF   1               22,2714   44720 1                   SUHALFAP
 1039  REF   5  LAST  410    22,2715   15333 0                   DPHALF
 1040                        22,2716   77650 1           GOTO
 1041  REF   1               22,2717   44724 0                   VECOFANG
 1042                        22,2720   52025 1  SUHALFAP DSU     GOTO
 1043  REF   6  LAST  410    22,2721   15333 0                   DPHALF
 1044  REF   2  LAST  410    22,2722   44724 0                   VECOFANG
 1045                        22,2723   77745 1  OKPHI    DLOAD                  PUSH UP PHI
 1046                        22,2724   43466 1  VECOFANG VDEF    RVQ
```

L   ANGLFIND   USER'S PAGE NO. 13   E6 S3

P1047   ROUTINE FOR TERMINATING AUTOMATIC MANEUVERS

```
 10512                                22,2725   0 0004 0  NOGOM2   INHINT                 THIS LOCATION ACCESSED BY A BZMF NOGO -2
 10513  REF  59  LAST  398            22,2726   0 4662 1           TC       BANKCALL
 10513 1 REF   1                      22,2727    40155 1           CADR     ZEROEROR

 10514                                22,2730   0 0004 0  NOGO     INHINT
 10515  REF   4  LAST  259            22,2731   0 4526 1           TC       STOPRATE

A1052                                                                        TERMINATE MANEUVER
 1053   REF  24  LAST  376            22,2732   3 5016 0           CAF      TWO          NOTE - ALL RETURNS ARE NOW MADE VIA
 1054   REF  15  LAST  385            22,2733   0 5245 1           TC       WAITLIST     GOODEND
 1055   REF   8  LAST  399            E6,1661                      EBANK=   BCDU
 1056   REF   1                      22,2734    02006 0           2CADR    ENDMANU
 1056   REF   1                      22,2735    42066 1
 1058   REF  49  LAST  392            22,2736   1 5217 1           TCF      ENDOFJOB
```

L GIMBAL LOCK AVOIDANCE USER'S PAGE NO. 1 EO S3

```
 0001                          15,2000                    BANK   15
 0002   REF   3  LAST  407     22,2000                    SETLOC KALCMON1
 0003                          22,2737                    BANK

 0004   REF   9  LAST  411     E6,1661                    EBANK= BCDU
R0005   DETECTING GIMBAL LOCK
 0005   REF   1                22,2737          LOCSKIRT EQUALS WCALC
 0009                          22,2737   70740 0 WCALC    LXC,1  DLOAD*
 0010   REF   2  LAST  184     22,2740   01130 1                RATEINDX
 0011   REF   1                22,2741   04771 1                ARATE,1
 0012                          22,2742   45002 1          SR4   CALL          COMPUTE THE INCREMENTAL ROTATION MATRIX
 0013   REF   3  LAST  395     22,2743   44530 1                DELCOMP      DEL CORRESPONDING TO A 1 SEC ROTATION
A0014                                                                       ABOUT COF
 0015                          22,2744   74343 0          DLOAD* VXSC
 0016   REF   2  LAST  412     22,2745   04771 1                ARATE,1
 0017   REF  46  LAST  409     22,2746   03343 0                COF
 0018                          22,2747   77721 0          MXV
 0019   REF   1                22,2750   05003 1                QUADROT
 0020   REF   1                22,2751   17311 1          STODL BRATE
 0021   REF   4  LAST  400     22,2752   03365 1                AM
 0022                          22,2753   55605 1          DMP   DDV*
 0023   REF   1                22,2754   05001 0                ANGLTIME
 0024   REF   3  LAST  412     22,2755   04771 1                ARATE,1
 0025                          22,2756   77661 0          SR
 0026                          22,2757   20606 0                5
 0027   REF   1                22,2760   27317 1          STOVL TM
 0028   REF   2  LAST  412     22,2761   03311 1                BRATE
 0029                          22,2762   77761 1          VXSC
 0030   REF   1                22,2763   05025 0                BIASCALE
 0031   REF   1                22,2764   03275 1          STORE BIASTEMP      ATTITUDE ERROR BIAS TO PREVENT OVERSHOOT
A0032                                                                       IN SYSTEM
 0033                          22,2765   77614 1          SETGO              STATE SWITCH CALCMAN2 (43D)
 0034   REF   1                22,2766   01035 0                CALCMAN2    0(OFF) = BYPASS STARTING PROCEDURE
 0035   REF   1                22,2767   45032 1                NEWANGL +1  1(ON) = START MANEUVER

 0036                          22,2770   00044 1 ARATE    2DEC  .0022222222 = .05 DEG/SEC
 0036                          22,2771   15053 0
 0037                          22,2772   00221 0          2DEC  .0088888889 = .2 DEG/SEC
 0037                          22,2773   24255 0
 0038                          22,2774   00554 0          2DEC  .0222222222 = .5 DEG/SEC
 0038                          22,2775   02660 0
 0039                          22,2776   02660 0          2DEC  .0888888889 = 2 DEG/SEC              $22.5 DEG/SEC
 0039                          22,2777   13301 1
 0040                          22,3000   00003 1 ANGLTIME 2DEC  .000190735  = 1008 - 19
 0040                          22,3001   04000 0
A0041                                                                       MANEUVER ANGLE TO MANEUVER TIME

 0042                          22,3002   03146 1 QUADROT  2DEC  .1          ROTATION MATRIX FROM S/C AXES TO CONTROL
 0042                          22,3003   14632 0
```

```
0043                    22,3004   00000 1           2DEC   0              AXES  (X ROT = -7.25 DEG)
0043                    22,3005   00000 1
0044                    22,3006   00000 1           2DEC   0
0044                    22,3007   00000 1
0045                    22,3010   00000 1           2DEC   0
0045                    22,3011   00000 1
0046                    22,3012   03131 1           2DEC   .099200        =(.1)COS7.25
0046                    22,3013   11275 1
0047                    22,3014   77461 1           2DEC   -.012620       =-(.1)SIN7.25
0047                    22,3015   47370 0
0048                    22,3016   00000 1           2DEC   0
0049                    22,3017   00000 1
0049                    22,3020   00316 0           2DEC   .012620        (.1)SIN7.25
0049                    22,3021   30407 1
0050                    22,3022   03131 1           2DEC   .099200        (.1)COS7.25
0050                    22,3023   11275 1
0051                    22,3024   00004 0 BIASCALE  2DEC   .0002543132    = (450/180)(1/0.6)(1/16384)
0051                    22,3025   05253 0
```

L KALCMANU STEERING USER'S PAGE NO. 1 E0 S3

R0001 GENERATION OF STEERING COMMANDS FOR DIGITAL AUTOPILOT FREE FALL MANEUVERS

R0003 NEW COMMANDS WILL BE GENERATED EVERY ONE SECOND DURING THE MANEUVER

```
0004                              15,2000                          BANK    15

0005   REF   4  LAST  412         22,2000                          SETLOC KALCMON1
0006                              22,3026                          BANK

0007   REF  10  LAST  412         E6,1651                          EBANK= BCDU

0008   REF   4 LAST  407 TO  414:   190   534*                     COUNT   22/KALC

0009   REF   2  LAST  400         22,3026  4 1332 0  NEWDELHI      CS      HOLDFLAG        SEE IF MANEUVER HAS BEEN INTERRUPTED
0010                              22,3027  0 0006 1                 EXTEND                  BY ASTRONAUT
0011   REF   2  LAST  400         22,3030  6 2726 0                 BZMF    NOGO -2         IF SO, TERMINATE KALCMANU
0012   REF  12  LAST  399         22,3031  0 6006 1  NEWANGL        TC      INTPRET
0013                              22,3032   75160 1                 AXC,1   AXC,2
0014   REF  13  LAST  399         22,3033   03320 0                 MIS                     COMPUTE THE NEW MATRIX FROM S/C TO
0015   REF  12  LAST  409         22,3034   03425 1                 DEL                     STABLE MEMBER AXES
0016                              22,3035   77624 1                 CALL
0017   REF   4  LAST  399         22,3036   44304 0                 MXM3
0018                              22,3037   45575 1                 VLOAD   STADR
0019   REF  14  LAST  414         22,3040   50442 0                 STOVL   MIS +12D        CALCULATE NEW DESIRED CDU ANGLES
0020                              22,3041   77626 0                 STADR
0021   REF  15  LAST  414         22,3042   50450 0                 STOVL   MIS +6D
0022                              22,3043   77526 0                 STADR
0023   REF  16  LAST  414         22,3044   74456 0                 STORE   MIS
0024                              22,3045   45160 1                 AXC,1   CALL
0025   REF  17  LAST  414         22,3046   03320 0                 MIS
0026   REF   2  LAST  395         22,3047   44655 1                 DCMTOCDU        PICK UP THE NEW CDU ANGLES FROM MATRIX
0027                              22,3050   77634 0                 RTB
0028   REF   2  LAST  395         22,3051   45552 1                 VISTO2S
0029   REF   1                   22,3052   03267 1                 STORE   NCDU           NEW CDU ANGLES
0030                              22,3053   77414 0                 BONCLR  EXIT
0031   REF   2  LAST  412         22,3054   01215 0                 CALCMAN2
0032   REF   1                   22,3055   40065 0                 MANUSTAT        TO START MANEUVER
0033   REF  25  LAST  411         22,3056  3 5016 0                 CAF     TWO                     +0 OTHERWISE
0034   REF   2  LAST  114         22,3057  55'664 0  INCRDCDU       TS      KSPNDX
0035                              22,3060  6 0000 1                 DOUBLE
0036   REF   2  LAST  114         22,3061  55'665 1                 TS      KDPNDX
0037   REF   3  LAST  414         22,3062  51'664 1                 INDEX   KSPNDX
0038   REF   2  LAST  414         22,3063  3 1666 0                 CA      NCDU           NEW DESIRED CDU ANGLES
0039                              22,3064  0 0006 1                 EXTEND
0040   REF   4  LAST  414         22,3065  5 1664 1                 INDEX   KSPNDX
0041   REF  11  LAST  414         22,3066  21'661 0                 MSU     BCDU           INITIAL S/C ANGLE OR PREVIOUS DESIRED
0042                              22,3067  0 0006 1                 EXTEND                  CDU ANGLES
0043   REF   2  LAST  412         22,3070  7 3002 1                 MP      QUADROT
0044   REF   3  LAST  414         22,3071  51'665 0                 INDEX   KDPNDX
0045   REF   2  LAST  109         22,3072  53'576 0                 DXCH    DELCDUX        ANGLE INCREMENTS TO BE ADDED TO
```

```
 0046   REF   5  LAST  414   22,3073  51'664 1            INDEX  KSPNDX        DCDU EVERY TENTH SEC
 0047   REF   3  LAST  414   22,3074  3 1666 0            CA     NCDU          BY LEM DAP
 0048   REF   6  LAST  415   22,3075  51'664 1            INDEX  KSPNDX
 0049   REF  12  LAST  414   22,3076  57'661 1            XCH    BCDU
 0050   REF   4  LAST  414   22,3077  51'665 0            INDEX  KDPNDX
 0051   REF   2  LAST  110   22,3100  55'646 0            TS     CDUXD
 0052   REF   7  LAST  415   22,3101  11'664 0            CCS    KSPNDX
 0053   REF   1              22,3102  1 3057 1            TCF    INCRDCDU      LOOP FOR THREE AXES

 0054                        22,3103  0 0003 1            RELINT
R0055   COMPARE PRESENT TIME WITH TIME TO TERMINATE MANEUVER

 0056   REF   1              22,3104  0 3115 1  TMANUCHK  TC     TIMECHK
 00565  REF  35  LAST  386   22,3105  0 4701 0            TC     POSTJUMP
 0057   REF   1              22,3106   40131 0            CADR   CONTMANU

 0058   REF  52  LAST  400   22,3107  3 5017 1            CAF    ONE
 0060   REF  16  LAST  411   22,3110  0 5245 1  MANUSTAL  TC     WAITLIST
 0061   REF  13  LAST  415   E6,1661                      EBANK= BCDU
 0062   REF   1              22,3111   02000 0            2CADR  MANUSTOP
 0062   REF   1              22,3112   42065 1
 0063                        22,3113  0 0003 1            RELINT
 0064   REF  50  LAST  411   22,3114  1 5217 1            TCF    ENDOFJOB

 0065                        22,3115  0 0006 1  TIMECHK   EXTEND
 0066   REF  11  LAST  380   22,3116  4 0025 1            DCS    TIME2
 0067   REF   1              22,3117  53'673 0            DXCH   TTEMP
 0068                        22,3120  0 0006 1            EXTEND
 0069   REF   2  LAST  412   22,3121  3 1717 1            DCA    TM
 0070   REF   2  LAST  415   22,3122  21'673 0            DAS    TTEMP
 0071   REF   3  LAST  415   22,3123  11'672 1            CCS    TTEMP
 0072   REF 138  LAST  391   22,3124  0 0002 0            TC     Q
 0073                        22,3125  1 3127 1            TCF    +2
 0074   REF   1              22,3126  1 3137 0            TCF    2NDRETRN
 0075   REF   4  LAST  415   22,3127  11'673 0            CCS    TTEMP +1
 0076   REF 139  LAST  415   22,3130  0 0002 0            TC     Q
 0077   REF   1              22,3131  1 3133 1            TCF    MANUOFF
 0078                        22,3132  4 0000 0            COM
 0079   REF   1              22,3133  6 5041 1  MANUOFF   AD     1SEC
 0080                        22,3134  0 0006 1            EXTEND
 0081   REF   2  LAST  415   22,3135  6 3137 1            BZMF   2NDRETRN
 0082   REF 140  LAST  415   22,3136  24 002 0            INCR   Q
 0083   REF 141  LAST  415   22,3137  24 002 0  2NDRETRN  INCR   Q
 0084   REF 142  LAST  415   22,3140  24 002 0            INCR   Q
 0085   REF 143  LAST  415   22,3141  0 0002 0            TC     Q

 00855  REF   1              20,2000                      SETLOC MANUSTUF
 00856                       20,2065                      BANK
```

```
0086                          20,2065   77776 1  MANUSTAT EXIT                  INITIALIZATION ROUTINE
0087                          20,2066   0 0006 1           EXTEND                FOR AUTOMATIC MANEUVERS
0088   REF  12  LAST  415     20,2067   3 0025 0           DCA    TIME2
0089   REF   3  LAST  415     20,2070   21'717 0           DAS    TM             TM+TO    MANEUVER COMPLETION TIME
0090   REF   2  LAST  415     20,2071   4 5041 0           CS     ISEC
0091   REF  45  LAST  382     20,2072   54 001 1           TS     L
00911  REF  86  LAST  391     20,2073   4 5021 0           CS     ZERO
0092   REF   4  LAST  416     20,2074   21'717 0           DAS    TM             (TM+TO)-1
0093                          20,2075   0 0004 0           INHINT
0094   REF  53  LAST  415     20,2076   4 5017 0           CS     ONE            ENABLE AUTOPILOT TO PERFORM
0095   REF   3  LAST  414     20,2077   55'332 0           TS     HOLDFLAG       AUTOMATIC MANEUVERS
0096   REF   3  LAST  412     20,2100   4 1130 0           CS     RATEINDX       SEE IF MANEUVERING AT HIGH RATE
0097   REF  15  LAST  351     20,2101   6 6211 0           AD     SIX
0098                          20,2102   0 0006 1           EXTEND
0099   REF   1                20,2103   6 2105 1           BZMF   HIGHGAIN
0100                          20,2104   1 2110 1           TCF    +4
0101   REF   1                20,2105   4 1501 0  HIGHGAIN CS     RCSFLAGS       IF SO, SET HIGH RATE FLAG (BIT 15 OF
0102   REF  30  LAST  388     20,2106   7 5001 1           MASK   BIT15          RCSFLAGS)
0103   REF   2  LAST  416     20,2107   27'501 0           ADS    RCSFLAGS
0104   REF   3  LAST  412     20,2110   53'711 0           DXCH   BRATE          X-AXIS MANEUVER RATE
0105   REF   6  LAST  177     20,2111   53'526 0           DXCH   WBODY
0106   REF   4  LAST  416     20,2112   53'713 1           DXCH   BRATE +2       Y-AXIS MANEUVER RATE
0107   REF   1                20,2113   53'530 1           DXCH   WBODY1
0108   REF   5  LAST  416     20,2114   53'715 1           DXCH   BRATE +4       Z-AXIS MANEUVER RATE
0109   REF   2  LAST  108     20,2115   53'532 0           DXCH   WBODY2
0110   REF   2  LAST  412     20,2116   3 1675 1           CA     BIASTEMP +1    INSERT ATTITUDE ERROR BIASES
0111   REF   2  LAST  109     20,2117   55'564 0           TS     BIAS           INTO AUTOPILOT
0112   REF   3  LAST  416     20,2120   3 1677 0           CA     BIASTEMP +3
0113   REF   2  LAST  109     20,2121   55'565 1           TS     BIAS1
0114   REF   4  LAST  416     20,2122   3 1701 0           CA     BIASTEMP +5
0115   REF   2  LAST  109     20,2123   55'566 1           TS     BIAS2
0116   REF   5  LAST  304     20,2124   3 0025 0           CA     TIME1
0117   REF   3  LAST  416     20,2125   6 5041 1           AD     1SEC
0118   REF   1                20,2126   57'671 0           XCH    NEXTIME
0119   REF  36  LAST  415     20,2127   0 4701 0           TC     POSTJUMP
0120   REF   2  LAST  415     20,2130    45056 0           CADR   INCRDCDU -1

0122                          20,2131   0 0004 0  CONTMANU INHINT                 CONTINUE WITH UPDATE PROCESS
0123   REF   6  LAST  416     20,2132   4 0025 1           CS     TIME1
0124   REF   2  LAST  416     20,2133   6 1671 0           AD     NEXTIME
0125   REF 130  LAST  391     20,2134   10 000 0           CCS    A
0126   REF  54  LAST  416     20,2135   6 5017 1           AD     ONE
0127   REF   1                20,2136   1 2141 0           TCF    MANUCALL
0128   REF   1                20,2137   6 5001 0           AD     NEGMAX
0129                          20,2140   4 0000 0           COM
0130   REF  17  LAST  415     20,2141   0 5245 1  MANUCALL TC     WAITLIST
0131   REF  14  LAST  415     E6,1661                      EBANK= BCDU
0132   REF   1                20,2142    02150 1           2CADR  UPDTCALL
0132   REF   1                20,2143    40066 0
0133                          20,2144   0 0003 1           RELINT
```

L KALCMANU STEERING USER'S PAGE NO. 4 E6 S3

```
0134  REF   4  LAST  416   20,2145  3 5041 1          CAF     1SEC          INCREMENT TIME FOR NEXT UPDATE
0135  REF   3  LAST  416   20,2146  27'671 1          ADS     NEXTIME
0136  REF  51  LAST  415   20,2147  1 5217 1          TCF     ENDOFJOB


0137  REF   1             20,2150  3 7663 0  UPDTCALL CAF     PRIO26        CALL FOR UPDATE
0138  REF  13  LAST  379   20,2151  0 5147 0          TC      FINDVAC       OF STEERING COMMANDS
0139  REF  15  LAST  416   E6,1661                    EBANK=  BCDU
0140  REF   1             20,2152   03026 0          2CADR   NEWDELHI
0140  REF   1             20,2153   44066 1
0141  REF  16  LAST  386   20,2154  0 5324 1          TC      TASKOVER
```

L KALCMANU STEERING USER'S PAGE NO. 5 E6 S3

P0142 ROUTINE FOR TERMINATING AUTOMATIC MANEUVERS

```
01425  REF   1                 21,2000                          SETLOC KALCMON3
01426                          21,2000                          BANK

0143   REF   1                 21,2000   0 4537 1  MANUSTOP TC     STOPYZ
0144   REF  18  LAST  254      21,2001   0 4740 0           TC     IBNKCALL
01445  REF   1                 21,2002    45144 1           CADR   LOADYZ

0145   REF   6  LAST  399      21,2003   3 1155 1  ENDROLL  CA     CPHI
0146   REF   3  LAST  415      21,2004   55'646 0           TS     CDUXD          SET CDUXD TO THE COMMANDED OUTER GIMBAL
0149   REF   5  LAST  411      21,2005   0 4526 1           TC     STOPRATE
0150   REF   1                 21,2006   3 1327 0  ENDMANU  CA     ATTPRIO        RESTORE USERS PRIORITY
0151   REF   3  LAST  205      21,2007   54 063 0           TS     NEWPRIO

0152   REF  87  LAST  416      21,2010   3 5021 1           CA     ZERO           ZERO ATTCADR
0153   REF   3  LAST  192      21,2011   53'326 0           DXCH   ATTCADR

0154   REF   2  LAST  202      21,2012   0 5160 0           TC     SPVAC          RETURN TO USER OF GOMANUR

0155   REF  17  LAST  417      21,2013   0 5324 1           TC     TASKOVER

01555  REF   1                    4000                          SETLOC STOPRAT
01556                             4526                          BANK
0156   REF  88  LAST  418         4526   3 5021 1  STOPRATE CAF    ZERO
0157   REF   3  LAST  414         4527   55'575 0           TS     DELCDUX
0158   REF   4  LAST  418         4530   55'576 0           TS     DELCDUX +1     ZERO ROLL INCREMENTAL ANGLES
0159   REF   7  LAST  416         4531   55'525 0           TS     WBODY          RATE
0160   REF   8  LAST  418         4532   55'526 0           TS     WBODY +1
0161   REF   3  LAST  416         4533   55'564 0           TS     BIAS           BIAS

01611  REF  31  LAST  416         4534   4 5001 1           CS     BIT15          MAKE SURE HIGH RATE FLAG (BIT 15 OF
01612  REF   3  LAST  416         4535   7 1501 0           MASK   RCSFLAGS       RCSFLAGS) IS RESET.
01613  REF   4  LAST  418         4536   55'501 0           TS     RCSFLAGS

0162   REF  89  LAST  418         4537   3 5021 1  STOPYZ   CAF    ZERO
0163   REF   2  LAST  109         4540   55'577 1           TS     DELCDUY        ZERO PITCH, YAW
0164   REF   3  LAST  418         4541   55'600 1           TS     DELCDUY +1     INCREMENTAL ANGLES
0165   REF   2  LAST  109         4542   55'601 0           TS     DELCDUZ
0166   REF   3  LAST  418         4543   55'602 0           TS     DELCDUZ +1
0167   REF   2  LAST  416         4544   55'527 1           TS     WBODY1         RATES
0168   REF   3  LAST  418         4545   55'530 1           TS     WBODY1 +1
0169   REF   3  LAST  416         4546   55'531 0           TS     WBODY2
0170   REF   4  LAST  418         4547   55'532 0           TS     WBODY2 +1
0171   REF   3  LAST  416         4550   55'565 1           TS     BIAS1          BIASES
0172   REF   3  LAST  416         4551   55'566 1           TS     BIAS2
0173   REF 144  LAST  415         4552   0 0002 0           TC     0

01735  REF   2  LAST  415      20,2000                          SETLOC MANUSTUF
01736                          20,2155                          BANK
```

```
0174  REF   7  LAST  405   20,2155  3 0032 0  ZERDEROR CA    CDUX          PICK UP CDU ANGLES AND STORE IN
0175  REF   4  LAST  418   20,2156  55'646 0            TS    CDUXD         CDU DESIRED
0176  REF   2  LAST  225   20,2157  3 0033 1            CA    CDUY
0177  REF   2  LAST  110   20,2160  55'650 1            TS    CDUYD
0178  REF   6  LAST  405   20,2161  3 0034 0            CA    CDUZ
0179  REF   2  LAST  110   20,2162  55'652 0            TS    CDUZD
0180  REF 145  LAST  418   20,2163  0 0002 0            TC    Q

01805 REF   5  LAST  414   22,2000                     SETLOC KALCMON1
01806                      22,3142                     BANK

0181  REF   7  LAST  418   22,3142  3 1155 1  LOADCDUD CA    CPHI          STORE TERMINAL ANGLES INTO
0182  REF   5  LAST  419   22,3143  55'646 0            TS    CDUXD         COMMAND ANGLES
0183  REF   1              22,3144  3 1156 1  LOADYZ   CA    CTHETA
0184  REF   3  LAST  419   22,3145  55'650 1            TS    CDUYD
0185  REF   1              22,3146  3 1157 0            CA    CPSI
0186  REF   3  LAST  419   22,3147  55'652 0            TS    CDUZD
0187  REF 146  LAST  419   22,3150  0 0002 0            TC    Q
```

L SYSTEM TEST STANDARD LEAD INS USER'S PAGE NO. 1 E0 S3

```
 0001   REF  15  LAST  248   E5,1671                          EBANK= XSM

 0002                        33,2000                          BANK   33
 0003   REF   1              13,2000                          SETLOC E/PROGI
 0004                        13,2036                          BANK

 0005   REF   1                                               COUNT* $$/P07

R0006            SPECIAL PROGRAMS TO EASE THE PANGS OF ERASABLE MEMORY PROGRAMS.

R0007   E/BKCALL   FOR DOING BANKCALLS FROM AND RETURNING TO ERASABLE.

R0008            THIS ROUTINE IS CALLABLE FROM ERASABLE OR FIXED.  LIKE BANKCALL, HOWEVER, SWITCHING BETWEEN S3 AND S4
R0010   IS NOT POSSIBLE.

R0011            THE CALLING SEQUENCE IS:

A0012                                                        TC     BANKCALL
A0013                                                        CADR   E/BKCALL
A0014                                                        CADR   ROUTINE          WHERE YOU WANT TO GO IN FIXED.
A0015                                                        RETURN HERE FROM DISPLAY TERMINATE, BAD STALL OR TC 0.
A0016                                                        RETURN HERE FROM DISPLAY PROCEED OR GOOD RETURN FROM STALL.
A0017                                                        RETURN HERE FROM DISPLAY ENTER OR RECYCLE.

R0018            THIS ROUTINE REQUIRES TWO ERASABLES (EBUF2, +1) IN UNSWITCHED WHICH ARE UNSHARED BY INTERRUPTS AND
R0020   OTHER EMEMORY PROGRAMS.

R0021            A + L ARE PRESERVED THROUGH BANKCALL AND E/BKCALL.

 0022   REF   3  LAST  391   13,2036  52 134 0  E/BKCALL DXCH   BUF2           SAVE A,L AND GET DP RETURN.
 0023   REF   1              13,2037  52 365 0            DXCH   EBUF2          SAVE DP RETURN.
 0024   REF   2  LAST  420   13,2040  24 364 0            INCR   EBUF2          RETURN +1 BECAUSE DOUBLE CADR.
 0025   REF  12  LAST  374   13,2041  3 0006 1            CA     BBANK
 0026   REF   5  LAST  373   13,2042  7 5054 1            MASK   LOW10          GET CURRENT EBANK.  (SBANK SOMEDAY)
 0027   REF   3  LAST  420   13,2043  26 365 0            ADS    EBUF2 +1       FORM BBCON.  (WAS FBANK)
 0028   REF   4  LAST  420   13,2044  50 364 0            NDX    EBUF2
 0029                        13,2045  2'7777 0            CA     0 -1           GET CADR OF ROUTINE.
 0030   REF   2  LAST  189   13,2046  0 4666 0            TC     SWCALL         GO TO ROUTINE, SETTING Q TO SWRETURN
A0031                                                                          AND RESTORING A + L.
 0032                        13,2047  0 2053 0            TC     +4             TX 0, V34, OR BAD STALL RETURN.
 0033                        13,2050  0 2052 1            TC     +2             PROCEED OR GOOD STALL RETURN.
 0034   REF   5  LAST  420   13,2051  24 364 0            INCR   EBUF2          ENTER OR RECYCLE RETURN.
 0035   REF   6  LAST  420   13,2052  24 364 0            INCR   EBUF2
 0036   REF   7  LAST  420   13,2053  52 365 0  E/SWITCH DXCH   EBUF2
 0037                        13,2054  32 006 0            DTCB
```

L SYSTEM TEST STANDARD LEAD INS USER'S PAGE NO. 2 E5 S3

P0038 E/CALL FOR CALLING A FIXED MEMORY INTERPRETIVE SUBROUTINE FROM ERASABLE AND RETURNING TO ERASABLE.

R0040 THE CALLING SEQUENCE IS...

```
A0041                                                   RTB
A0042                                                           E/CALL
A0043                                                   CADR    ROUTINE         THE INTERPRETIVE SUBROUTINE YOU WANT.
A0044                                                                           RETURNS HERE IN INTERPRETIVE.

 0045  REF   4  LAST  376   13,2055  22 164 1  E/CALL   LXCH    LOC             ADRES -1 OF CADR.
 0046  REF  46  LAST  416   13,2056  50 001 0           INDEX   L
 0047  REF  47  LAST  421   13,2057  3 0001 0           CA      L               CADR IN A.
 0048  REF  48  LAST  421   13,2060  24 001 0           INCR    L
 0049  REF  49  LAST  421   13,2061  24 001 0           INCR    L               RETURN ADRES IN L.
 0050  REF   8  LAST  420   13,2062  52 365 0           DXCH    EBUF2           STORE CADR AND RETURN.
 0051  REF  13  LAST  414   13,2063  0 6006 1           TC      INTPRET
 0052                       13,2064   77624 1          CALL
 0053  REF   9  LAST  421   13,2065   00364 0                   EBUF2           INDIRECTLY EXECUTE ROUTINE.  IT MUST
 0054                       13,2066   77776 1          EXIT                    LEAVE VIA RVQ OR EQUIVALENT.
 0055  REF  10  LAST  421   13,2067  22 365 1          LXCH    EBUF2 +1        PICK UP RETURN.
 0056  REF  14  LAST  421   13,2070  1 6010 1           TCF     INTPRET +2      SET LOC AND RETURB TO CALLER
```

L SYSTEM TEST STANDARD LEAD INS USER'S PAGE NO. 3 E5 S3

```
P0057   E/JOBWAK        FOR WAKING UP ERASABLE MEMORY JOBS.

R0058           THIS ROUTINE MUST BE CALLED IN INTERRUPT OR WITH INTERRUPTS INHIBITED.

R0060           THE CALLING SEQUENCE IS:

A0061                                                   INHINT
A0062                                                     .
A0063                                                     .
A0064                                                   CA      WAKEADR         ADDRESS OF SLEEPING JOB
A0065                                                   TC      IBNKCALL
A0066                                                   CADR    E/JOBWAK
A0067                                                     .                     RETURNS HERE
A0068                                                     .
A0069                                                     .
A0070                                                   RELINT                  IF YOU DID AN INHINT.

 0071                           33,2000                 BANK    33
 0072   REF   1                 04,2000                 SETLOC  E/PROG
 0073                           04,2606                 BANK

 0074   REF   1                                         COUNT*  $$/P07

 0075   REF   3  LAST  383      04,2606  0 5201 1  E/JOBWAK TC    JOBWAKE         ARRIVE IWTH ADRES IN A.
 0076   REF  16  LAST  349      04,2607  4 5005 0           CS    BIT11
 0077   REF   4  LAST  376      04,2610  50 064 0           NDX   LOCCTR
 0078   REF   5  LAST  421      04,2611  26 164 0           ADS   LOC             KNOCK FIXED MEMORY BIT OUT OF ADRES.
 0079   REF   1                 04,2612  0 0072 1           TC    RUPTREG3        RETURN

R0080   THESE PROGRAMS ARE PROVIDED TO ALLOW OVERLAY OF BANKS 30 THRU 33 OF THE 205 VERSIONS OF SYSTEM TESTS AND
R0082   PRELAUNCH ALIGN.  THE INTENT IS TO ALLOW THE STG AND HYBRID LABS TO RUN ALL THE TESTS WITH COLOSSUS.

 0084                           33,2000                 BANK    33
 0085   REF   1                 33,2000                 SETLOC  TESTLEAD
 0086                           33,2000                 BANK

 0087   REF   1                                         COUNT   33/COMST

 0088   REF   5  LAST  247      E5,1425                 EBANK=  QPLACE

 0089   REF   1                 33,2000  0 3436 0  COMPVER  TC    GCOMPVER        MUST BE 33,2000.

 0090   REF   1                 33,2001  0 3131 1  GTSCPSS1 TC    GTSCPSS         MUST BE AT 33,2001

 0091   REF   1                 33,2002  0 5354 0  REDO     TC    NEWMODEX        DISPLAY MM 07.
 0092                           33,2003   00007 0           MM    07              FALL INTO IMUTEST
```

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R0010   NAME- IMU PERFORMANCE TESTS 2

R0011   DATE- MARCH 20,1967

R0012   BY- SYSTEM TEST GROUP 864-6900 EXT. 1274

R0013   MODNO.- ZERO

R0014   FUNCTIONAL DESCRIPTION

R0015   POSITIONING ROUTINES FOR THE IMU PERFORMANCE TESTS AS WELL AS SOME OF
R0016   THE TESTS THEMSELVES. FOR A DESCRIPTION OF THESE SUBROUTINES AND THE
R0017   OPERATING PROCEDURES (TYPICALLY) SEE STG MEMO 685.THEORETICAL REF.E-1973

 0018                          33,2004                          BANK   33
 0019   REF   1                33,2000                          SETLOC IMUCAL
 0020                          33,2004                          BANK

 0021   REF   1                E5,1423                          EBANK= POSITON
 0022   REF  90  LAST  418     33,2004  3 5021 1  IMUTEST      CA     ZERO
 0023   REF   1                33,2005  55'452 1               TS     DRIFTT
 0024   REF   1                33,2006  55'643 0               TS     GEOCOMP1
 00241  REF   1                33,2007  3 2443 0               CAF    TESTTIME
 00242  REF   1                33,2010  55'412 0               TS     LENGTHOT
 00243  REF   1                33,2011  0 2302 1               TC     CDAALIGN        TAKE CARE OF DRIFT FLAG
 0025   REF   1                33,2012  3 5041 1               CAF    1SECX
 0026   REF   1                33,2013  55'644 1               TS     1SECXT1

 00261  REF   1                33,2014  3 2441 1               CA     OC14400
 00262  REF   7  LAST  306     33,2015  55'074 1               TS     1/PIPADT
 0027   REF  15  LAST  421     33,2016  0 6006 1  GUESS        TC     INTPRET         CALCULATE -COS LATITUDE AND SIN LATITUDE
 002701                        33,2017   77624 1               CALL
 0028   REF   1                33,2020   10613 1                      LATAZCHK
 0029                          33,2021   57546 1               COS    DCOMP
 0030                          33,2022   77752 1               SL1
 0031   REF   1                33,2023   16447 1               STODL  WANGI
 0032   REF   1                33,2024   02403 1                      LATITUDE
 0033                          33,2025   72556 1               SIN    SL1
 0034   REF   1                33,2026   02445 0               STORE  WANGO
 0035                          33,2027   77776 1               EXIT
 0036   REF  60  LAST  411     33,2030  0 4662 1  GEOIMUTT     TC     BANKCALL        GYROCOMPASS COMES IN HERE
 0037   REF   2  LAST  239     33,2031   16577 0               CADR   IMUZERO
 0038   REF   1                33,2032  0 2316 1               TC     IMUSTLLG
 0039   REF  91  LAST  423     33,2033  3 5021 1  IMUBACK      CA     ZERO
 0040   REF   1                33,2034  55'421 0               TS     NDXCTR
 0041   REF   1                33,2035  55'450 0               TS     TORONDX
 0042   REF   2  LAST  423     33,2036  55'451 1               TS     TORONDX +1
 0043   REF   1                33,2037  3 4375 1  NBPOSPL      CA     DEC17
 0044   REF   1                33,2040  55'655 1               TS     ZERONDX1
 0045   REF   1                33,2041  3 2445 0               CA     XNBADR
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0046   REF   1                  33,2042  0 2356 0          TC     ZERDING
0047   REF   1                  33,2043  3 5002 0          CA     HALF
0048   REF   2  LAST  287       33,2044  55'713 1          TS     XNB
0049   REF  16  LAST  423       33,2045  0 6006 1          TC     INTPRET
0050                             33,2046   73545 1          DLOAD  SIN
0051   REF   1                  33,2047   02401 0                 AZIMUTH
0052   REF   2  LAST  287       33,2050   02724 1          STORE  YNB +2
0053   REF   2  LAST  287       33,2051   16734 0          STODL  ZNB +4
0054   REF   2  LAST  424       33,2052   02401 0                 AZIMUTH
0055                             33,2053   77746 1          COS
0056   REF   3  LAST  424       33,2054   02726 0          STORE  YNB +4
0057                             33,2055   77676 0          DCOMP
0058   REF   3  LAST  424       33,2056   02732 0          STORE  ZNB +2
00581                            33,2057   77776 1          EXIT
00582  REF   8  LAST  266       33,2060  0 5364 0          TC     CHECKMM
00583                            33,2061   00003 1          MM     03                SEE IF IN OPTICAL VERIFICATION
00584                            33,2062  1 2064 0          TCF    +2                NO
00585  REF   1                  33,2063  1 3443 0          TCF    SETNBPOS +1         YES
00586  REF  17  LAST  424       33,2064  0 6006 1          TC     INTPRET
00587                            33,2065   77624 1          CALL
0059   REF   1                  33,2066   47311 1                 CALCGA
0060                             33,2067   77776 1          EXIT
0061   REF  61  LAST  423       33,2070  0 4662 1          TC     BANKCALL
0062   REF   2  LAST  241       33,2071   16663 0          CADR   IMUCOARS
0063   REF   1                  33,2072  3 5002 0          CAF    GLOKFBIT          IF GLOKFAIL SET, GIMBAL LOCK
0064   REF   3  LAST  185       33,2073  7 0077 0          MASK   FLAGWRD3
0065                             33,2074  0 0006 1          EXTEND
0066                             33,2075  1 2077 1          BZF    +2
0067   REF   2  LAST  423       33,2076  25'421 1          INCR   NDXCTR            +1 IF IN GIMBAL LOCK,OTHERWISE 0
0068   REF  21  LAST  391       33,2077  0 5560 1          TC     DOWNFLAG          RESET GIMBAL LOCK FLAG
0069   REF   1                  33,2100   00056 1          ADRES  GLOKFAIL          BIT 14 FLAG 3
0070   REF   2  LAST  423       33,2101  0 2316 1          TC     IMUSTLLG
0071   REF   3  LAST  424       33,2102  11'421 0          CCS    NDXCTR            IF ONE GO AND DO A PIPA TEST ONLY
0072   REF   1                  33,2103  0 2131 0          TC     PIPACHK           ALIGN AND MEASURE VERTICAL PIPA RATE
0074   REF  62  LAST  424       33,2104  0 4662 1          TC     BANKCALL
0075   REF   2  LAST  243       33,2105   17073 0          CADR   IMUFINE
0076   REF   3  LAST  424       33,2106  0 2316 1          TC     IMUSTLLG
0077                             33,2107  0 0006 1          EXTEND
00771  REF   1                  33,2110  3 1657 1          DCA    PERFDLAY
00772  REF   1                  33,2111  0 5342 1          TC     LONGCALL
00773  REF   2  LAST  423       E5,1423                    EBANK= POSITON
00774  REF   1                  33,2112   02116 0          2CADR  GOESTIMS
00774  REF   1                  33,2113   66065 1
00775  REF   1                  33,2114  3 2121 1          CA     ESTICADR
00776  REF   3  LAST  382       33,2115  0 5175 1          TC     JOBSLEEP
00777  REF   2  LAST  424       33,2116  3 2121 1 GOESTIMS CA     ESTICADR
00778  REF   4  LAST  422       33,2117  0 5201 1          TC     JOBWAKE
00779  REF  18  LAST  418       33,2120  0 5324 1          TC     TASKOVER
007791 REF   1                  33,2121   66453 0 ESTICADR CADR   ESTIMS
```

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0078   REF  92  LAST  423   33,2122  3 5021 1  TORQUE   CA      ZERO
0079   REF   7  LAST  283   33,2123  55'050 1           TS      DSPTEM2
0080   REF   1              33,2124  3 1514 0           CA      DRIFTI
0081   REF   8  LAST  425   33,2125  55'051 0           TS      DSPTEM2 +1
0082   REF   3  LAST  424   33,2126  51'423 0           INDEX   POSITON
0083   REF   2  LAST   98   33,2127  55'430 0           TS      SOUTHDR -1
0084   REF   1              33,2130  0 2427 1           TC      SHOW

0085   REF   4  LAST  424   33,2131  51'421 1  PIPACHK  INDEX   NDXCTR          PIPA TEST
0086                        33,2132  0 2133 1           TC      +1
0087   REF   1              33,2133  0 2417 1           TC      EARTHR*
0090   REF   1              33,2134  3 4374 0           CA      DEC57
0091   REF   2  LAST  423   33,2135  55'412 0           TS      LENGTHOT
0092   REF  55  LAST  416   33,2136  3 5017 1           CA      ONE
0093   REF   1              33,2137  55'547 1           TS      RESULTCT
0094   REF  93  LAST  425   33,2140  3 5021 1           CA      ZERO
0095   REF   1              33,2141  51'422 1           INDEX   PIPINDEX
0096   REF   2  LAST  271   33,2142  54 037 1           TS      PIPAX
0097   REF   1              33,2143  55'502 0           TS      DATAPL
00971  REF   2  LAST  425   33,2144  55'506 1           TS      DATAPL +4
0098   REF   1              33,2145  0 2321 0           TC      CHECKG          PIP PULSE CATCHING ROUTINE
0099                        33,2146  0 0004 0           INHINT
0100   REF  26  LAST  414   33,2147  3 5016 0           CAF     TWO
0101   REF   1              33,2150  0 5235 0           TC      TWIDDLE
0102   REF  16  LAST  420   E5,1671                     EBANK=  XSM
0103   REF   1              33,2151   02153 1          ADRES   PIPATASK
0105   REF  52  LAST  417   33,2152  0 5217 0           TC      ENDOFJOB
0106                        33,2153  0 0006 1  PIPATASK EXTEND
0107   REF   3  LAST  425   33,2154  27'412 0           DIM     LENGTHOT
01071  REF   4  LAST  425   33,2155  3 1412 1           CA      LENGTHOT
0108                        33,2156  0 0006 1           EXTEND
0109   REF   1              33,2157  6 2163 1           BZMF    STARTPIP
0110   REF  25  LAST  388   33,2160  3 5006 1           CAF     BIT10
0111   REF   2  LAST  425   33,2161  0 5235 0           TC      TWIDDLE
0112   REF  17  LAST  425   E5,1671                     EBANK=  XSM
0113   REF   2  LAST  425   33,2162   02153 1          ADRES   PIPATASK
0114   REF   2  LAST  247   33,2163  3 5002 0  STARTPIP CAF     PRIO20
0115   REF  14  LAST  417   33,2164  0 5147 0           TC      FINDVAC
0116   REF  18  LAST  425   E5,1671                     EBANK=  XSM
0117   REF   1              33,2165   02170 0          2CADR   PIPJOBB
0117   REF   1              33,2166   66065 1
0118   REF  19  LAST  424   33,2167  0 5324 1           TC      TASKOVER
0119   REF   5  LAST  425   33,2170  51'421 1  PIPJOBB  INDEX   NDXCTR
0120                        33,2171  0 2172 1           TC      +1
0121   REF   2  LAST  425   33,2172  0 2417 1           TC      EARTHR*
0122   REF   5  LAST  425   33,2173  3 1412 1           CA      LENGTHOT
0123                        33,2174  0 0006 1           EXTEND
0124                        33,2175  6 2177 1           BZMF    +2
0125   REF  53  LAST  425   33,2176  0 5217 0           TC      ENDOFJOB
0126   REF   8  LAST  344   33,2177  3 5022 1           CA      FIVE
```

```
0127   REF   2  LAST  425   33,2200  55'547 1           TS      RESULTCT
0128   REF   2  LAST  425   33,2201  0 2321 0           TC      CHECKG
0134                        33,2202  0 0006 1           EXTEND
0135   REF   3  LAST  425   33,2203  4 1503 1           DCS     DATAPL
0136   REF   4  LAST  426   33,2204  21'507 0           DAS     DATAPL +4

0137   REF  18  LAST  424   33,2205  0 6006 1           TC      INTPRET
0138                        33,2206   45345 1           DLOAD   DSU
0139   REF   5  LAST  426   33,2207   02511 0                    DATAPL +6
0140   REF   6  LAST  426   33,2210   02505 0                    DATAPL +2
0141                        33,2211   45044 0           BPL     CALL
0142   REF   1              33,2212   66214 0                    AINGOTN
0143   REF   1              33,2213   66276 1                    OVERFIX
0144                        33,2214   56325 0  AINGOTN  PDDL    DDV
0145   REF   7  LAST  426   33,2215   02507 1                    DATAPL +4
0146                        33,2216   57212 1           SL4     DMPR
0147   REF   1              33,2217   27110 1                    DEC585          DEC585 HAS BEEN REDEFINED FOR LEM
0148                        33,2220   77634 0           RTB
0149   REF   1              33,2221   45544 0                    SGNAGREE
0150   REF   9  LAST  425   33,2222   01051 1           STORE   DSPTEM2
0151                        33,2223   77776 1           EXIT
0152   REF   6  LAST  425   33,2224  11'421 0           CCS     NDXCTR
0153   REF   2  LAST  423   33,2225  0 2302 1           TC      COAALIGN        TAKE PLATFORM OUT OF GIMBAL LOCK
0154   REF   2  LAST  425   33,2226  0 2427 1           TC      SHOW
0155   REF   1              33,2227  3 2447 1  VERTDRFT CA      3990DEC         ABOUT 1 HOUR VERTICAL DRIFT TEST
0156   REF   6  LAST  425   33,2230  55'412 0           TS      LENGTHOT
0157   REF   4  LAST  425   33,2231  51'423 0           INDEX   POSITON
0158   REF   3  LAST  425   33,2232  4 1427 0           CS      SOUTHDR -2
0159   REF   2  LAST  423   33,2233  55'452 1           TS      DRIFTT
0160   REF  19  LAST  425   33,2234  3 1675 1           CA      XSM +4          0 IF POSN 4
0161                        33,2235  0 0006 1           EXTEND
0162   REF   1              33,2236  1 2244 0           BZF     PON2
0163   REF  17  LAST  391   33,2237  4 5013 1  PON4     CS      BIT5                    OFFSET PLATFORM
0164   REF   1              33,2240  27'651 0           ADS     ERCOMP1 +2
0165   REF  18  LAST  426   33,2241  3 5013 0           CA      BIT5
0166   REF   2  LAST  426   33,2242  27'647 1           ADS     ERCOMP1
0167   REF   1              33,2243  1 2250 0           TCF     PONG
0168   REF  19  LAST  426   33,2244  4 5013 1  PON2     CS      BIT5
0169   REF   3  LAST  425   33,2245  27'651 0           ADS     ERCOMP1 +2
0170   REF  20  LAST  426   33,2246  3 5013 0           CA      BIT5
0171   REF   4  LAST  426   33,2247  27'653 1           ADS     ERCOMP1 +4
0172   REF   3  LAST  425   33,2250  0 2417 1  PONG     TC      EARTHR*
0173   REF  94  LAST  425   33,2251  3 5021 1           CA      ZERO            ALLOW ONLY SOUTH GYRO EARTH RATE COMPENS
0174   REF   1              33,2252  55'404 1           TS      ERVECTOR
0175   REF   2  LAST  426   33,2253  55'405 0           TS      ERVECTOR +1
0176   REF  10  LAST  350   33,2254  3 4777 1  GUESS1   CAF     POSMAX
0177   REF   3  LAST  423   33,2255  55'450 0           TS      TORONDX
0178   REF   4  LAST  426   33,2256  55'451 1           TS      TORONDX +1
0179   REF   8  LAST  419   33,2257  3 0032 0           CA      CDUX
0180   REF   2  LAST   98   33,2260  55'413 1           TS      LOSVEC
```

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0181   REF   2  LAST  424   33,2261  0 2453 1          TC     ESTIMS
0184   REF   1              33,2262  3 1512 0  VALMIS  CA     DRIFTO
0185   REF  10  LAST  426   33,2263  55'051 0          TS     DSPTEM2 +1
0186   REF  95  LAST  426   33,2264  3 5021 1          CA     ZERO
0187   REF  11  LAST  427   33,2265  55'050 1          TS     DSPTEM2
0188   REF   3  LAST  426   33,2266  0 2427 1          TC     SHOW

01894  REF  22  LAST  424   33,2267  0 5560 1  ENDTEST1 TC     DOWNFLAG       IMU NOT IN USE
0190   REF   3  LAST  259   33,2270   00007 0           ADRES  IMUSE          BIT 8 FLAG 0
0191   REF  96  LAST  427   33,2271  4 5021 0          CS     ZERO
0192   REF   2  LAST  422   33,2272  0 5357 0          TC     NEWMODEX +3
0193   REF  63  LAST  424   33,2273  0 4662 1          TC     BANKCALL
0194   REF   1              33,2274   16063 0          CADR   MKRELEAS
0195   REF  18  LAST  398   33,2275  0 5534 0          TC     ENDEXT
```

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0196                          33,2276   43215 0  OVERFFIX DAD     DAD
0197   REF   1                33,2277   15343 1                   DPPOSMAX
0198   REF   1                33,2300   27116 1                   ONEDPP
0199                          33,2301   77616 0           RVQ

0200                          33,2302  0 0006 1  COAALIGN EXTEND                  COARSE ALIGN SUBROUTINE
0201   REF   6  LAST  422     33,2303  23'425 0           QXCH    OPLACE
0202   REF  97  LAST  427     33,2304   3 5021 1           CA      ZERO
0203   REF  10  LAST  271     33,2305  55'155 0           TS      THETAD
0204   REF  11  LAST  428     33,2306  55'156 0           TS      THETAD +1
0205   REF  12  LAST  428     33,2307  55'157 1           TS      THETAD +2
0206   REF  64  LAST  427     33,2310  0 4662 1           TC      BANKCALL
0207   REF   3  LAST  424     33,2311   16663 0           CADR    IMUCOARS
0208   REF  65  LAST  428     33,2312  0 4662 1           TC      BANKCALL
0209   REF   6  LAST  303     33,2313   17577 1           CADR    IMUSTALL
0210   REF   1                33,2314  0 3102 1           TC      SOMERR2
0211   REF   7  LAST  428     33,2315  0 1425 0           TC      OPLACE

0212                          33,2316  0 0006 1  IMUSTLLG EXTEND
0213   REF   8  LAST  428     33,2317  23'425 0           QXCH    OPLACE
0214   REF   3  LAST  426     33,2320  0 2312 0           TC      COAALIGN +10

0215                          33,2321  0 0006 1  CHECKG   EXTEND                  PIP PULSE CATCHING ROUTINE
0216   REF   9  LAST  428     33,2322  23'425 0           QXCH    OPLACE
0217                          33,2323  0 2331 1           TC      +6
0218                          33,2324  0 0003 1  CHECKG1  RELINT
0219   REF   3  LAST  205     33,2325  3 0067 0           CA      NEWJOB
0220                          33,2326  0 0006 1           EXTEND
02201                         33,2327  6 2335 0           BZMF    +6
02202  REF   1                33,2330  0 5164 1           TC      CHANG1
02203                         33,2331  0 0004 0           INHINT
02204  REF   2  LAST  425     33,2332  51'422 1           INDEX   PIPINDEX
02205  REF   3  LAST  425     33,2333  4 0037 1           CS      PIPAX
02206  REF   2  LAST  100     33,2334  55'655 1           TS      ZERONDX
0224                          33,2335  0 0004 0           INHINT
0225   REF   3  LAST  428     33,2336  51'422 1           INDEX   PIPINDEX
0226   REF   4  LAST  428     33,2337  3 0037 0           CA      PIPAX
0227   REF   3  LAST  428     33,2340  6 1655 0           AD      ZERONDX
0228                          33,2341  0 0006 1           EXTEND
0229   REF   1                33,2342  1 2324 1           BZF     CHECKG1
0230   REF   4  LAST  428     33,2343  51'422 1           INDEX   PIPINDEX
0231   REF   5  LAST  428     33,2344  3 0037 0           CA      PIPAX
0232   REF   3  LAST  426     33,2345  51'547 0           INDEX   RESULTCT
0233   REF   8  LAST  426     33,2346  55'502 0           TS      DATAPL
0234   REF   1                33,2347  0 4553 0           TC      FINETIME
0235   REF   4  LAST  428     33,2350  51'547 0           INDEX   RESULTCT
0236   REF   9  LAST  428     33,2351  55'503 1           TS      DATAPL +1
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0237   REF   5  LAST  428   33,2352  51'547 0           INDEX  RESULTCT
0238   REF  10  LAST  428   33,2353  23'504 1           LXCH   DATAPL +2
0239                        33,2354  0 0003 1           RELINT
0240   REF  10  LAST  428   33,2355  0 1425 0  ENDCHKG  TC     QPLACE


0241   REF  50  LAST  421   33,2356  54 001 1  ZEROING  TS     L
0242                        33,2357  1 2361 0           TCF    +2
0243   REF   2  LAST  423   33,2360  55'655 1  ZEROING1 TS     ZERONDX1
0244   REF  98  LAST  428   33,2361  3 5021 1           CAF    ZERO
0245   REF  51  LAST  429   33,2362  50 001 0           INDEX  L
0246                        33,2363  54 000 0           TS     0
0247   REF  52  LAST  429   33,2364  24 001 0           INCR   L
0248   REF   3  LAST  429   33,2365  11'655 1           CCS    ZERONDX1
0249   REF   1              33,2366  1 2360 1           TCF    ZEROING1
0250   REF 147  LAST  419   33,2367  0 0002 0           TC     Q
```

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0251   REF   1                32,2000                          SETLOC  IMUCAL3
0252                          32,2000                          BANK
0254                          32,2000   65345 0  ERTHRVSE      DLOAD   PDDL
0255   REF   1                32,2001   27111 0                SCHZEROS        PD24 = (SIN          -COS    0)(OMEG/MS)
0256   REF   2  LAST  423     32,2002   02403 1                LATITUDE
0257                          32,2003   57545 1          COS   DCOMP
0258                          32,2004   73525 1          PDDL  SIN
0259   REF   3  LAST  430     32,2005   02403 1                LATITUDE
0260                          32,2006   74266 0          VDEF  VXSC
0261   REF   1                32,2007   26450 1                OMEG/MS
0262   REF   3  LAST  426     32,2010   02405 1          STORE ERVECTOR
0263                          32,2011   77634 0          RTB
0264   REF   1                32,2012   45510 1                LOADTIME
0265   REF   1                32,2013   26443 0          STOVL TMARK
0266   REF   2  LAST  430     32,2014   27111 0                SCHZEROS
0267   REF   5  LAST  426     32,2015   02650 0          STORE ERCOMP1
0268                          32,2016   77616 0          RVQ
0269   REF   2  LAST  423     33,2000                    SETLOC  IMUCAL
0270                          33,2370                    BANK
0272                          33,2370   47020 0  EARTHR  ITA     RTB             CALCULATES AND COMPENSATES EARTH RATE
0273   REF   1                33,2371   00051 0                 S2
0274   REF   2  LAST  430     33,2372   45510 1                 LOADTIME
0275   REF   1                33,2373   02441 1          STORE  TEMPTIME
0276                          33,2374   51025 1          DSU    BPL
0277   REF   2  LAST  430     33,2375   02443 0                 TMARK
0278   REF   1                33,2376   66401 1                 ERTHR
0279                          33,2377   77624 1          CALL
0280   REF   2  LAST  426     33,2400   66276 1                 OVERFFIX
0281                          33,2401   74261 1  ERTHR   SL     VXSC
0282                          33,2402   20212 1                 9D
0283   REF   4  LAST  430     33,2403   02405 1                 ERVECTOR
0284                          33,2404   53321 1          MXV    VAD
0285   REF  20  LAST  426     33,2405   02672 0                 XSM
0286   REF   6  LAST  430     33,2406   02650 0                 ERCOMP1
0287   REF   7  LAST  430     33,2407   16650 0          STODL  ERCOMP1
0288   REF   2  LAST  430     33,2410   02441 1                 TEMPTIME
0289   REF   3  LAST  430     33,2411   02443 0          STORE  TMARK
0290                          33,2412   47170 1          AXT,1  RTB
0291   REF   8  LAST  430     33,2413   02647 0          ECADR  ERCOMP1
0292   REF   1                33,2414   45653 0                 PULSEIMU
0293                          33,2415   77650 1          GOTO
0294   REF   2  LAST  430     33,2416   00051 0                 S2
0295                          33,2417   0 0006 1  EARTHR* EXTEND
02951  REF   3  LAST   35     33,2420   23'426 0         QXCH   QPLACES
02952  REF  19  LAST  426     33,2421   0 6006 1         TC     INTPRET
02953                          33,2422   77624 1          CALL
02954  REF   1                33,2423   66370 0                 EARTHR
02955                          33,2424   77776 1  PROUT   EXIT
02956  REF   4  LAST  424     33,2425   0 2316 1         TC     IMUSTLLG
02957  REF   4  LAST  430     33,2426   0 1426 0         TC     QPLACES
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0296                                33,2427  0 0006 1  SHOW      EXTEND
0297   REF  11  LAST  429           33,2430  23'425 0            QXCH    QPLACE
0298   REF   5  LAST  426           33,2431  3 1423 0  SHOW1     CA      POSITON
0299   REF  12  LAST  427           33,2432  55'052 0            TS      DSPTEM2 +2
0300   REF   1                      33,2433  3 2442 1            CA      VB06N98
0301   REF  66  LAST  428           33,2434  0 4662 1            TC      BANKCALL
0302   REF   3  LAST  398           33,2435   20720 0            CADR    GOFLASH
0304   REF   1                      33,2436  0 2267 0            TC      ENDTEST1        V 34
0305   REF  12  LAST  431           33,2437  0 1425 0            TC      QPLACE           V33
0306   REF   1                      33,2440  1 2431 1            TCF     SHOW1

03061                               33,2441   14400 0  OCT14400  OCT     14400
0307   REF   2  LAST  430           33,2447            3990DEC   =       OMEG/MS
0308                                33,2442   01542 0  VB06N98   VN      0698
0309                                33,2443   01602 1  TESTTIME  OCT     01602
0310   REF   5  LAST  365              4375            DEC17     =       ND1
0311   REF   9  LAST  282           33,2444   02757 0  OGCPL     ECADR   OGC
0312   REF   5  LAST  417              5041            1SECX     =       1SEC
0313   REF  15  LAST  374              4374            DEC57     =       VD1
0314   REF   3  LAST  424           33,2445   01713 0  XNBADR    GENADR  XNB
0315   REF  21  LAST  430           33,2446   01671 0  XSMADR    GENADR  XSM
0316                                33,2447   07623 1  OMEG/MS   2DEC    .24339048
                                    33,2450   26552 1

03161  REF  67  LAST  431           33,2451  0 4662 1  P11OUT    TC      BANKCALL
03162  REF   2  LAST  213           33,2452   70117 1            CADR    MATRXJOB        RETURN TO P11

03165  REF   1                                                   COUNT   02/COMST

0317                                   4553                     BLOCK   2
0318                                   4553  0 0004 0  FINETIME  INHINT                  RETURNS WITH INTERRUPT INHIBITED
0319                                   4554  0 0006 1            EXTEND
0320   REF   1                        4555  00 004 0            READ    LOSCALAR
0321   REF  53  LAST  429             4556  54 001 1            TS      L
0322                                   4557  0 0006 1            EXTEND
0323   REF   2  LAST  431             4560  06 004 0            RXOR    LOSCALAR
0324                                   4561  0 0006 1            EXTEND
0325                                   4562  1 4566 1            BZF     +4
0326                                   4563  0 0006 1            EXTEND
0327   REF   3  LAST  431             4564  00 004 0            READ    LOSCALAR
0328   REF  54  LAST  431             4565  54 001 1            TS      L
0329   REF  11  LAST  426             4566  4 4777 0  +4        CS      POSMAX
0330   REF  55  LAST  431             4567  6 0001 0            AD      L
0331                                   4570  0 0006 1            EXTEND
0332   REF   2  LAST  428             4571  1 4554 0            BZF     FINETIME +1
0333                                   4572  0 0006 1            EXTEND
0334   REF   1                        4573  00 003 1            READ    HISCALAR
0335   REF 148  LAST  429             4574  0 0002 0            TC      Q
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R0336   PROGRAM NAME-OPTIMUM PRELAUNCH ALIGNMENT CALIBRATION
R0337   DATE- NOVEMBER 2  1966
R0338   BY- GEORGE SCHMIDT IL 7-146 EXT. 126
R0339   MOD NO 3
R0340   FUNCTIONAL DESCRIPTION

R0341   THIS     SECTION CONSISTS OF PRELAUNCH ALIGNMENT AND GYRO DRIFT TESTS
R0342   INTEGRATED TOGETHER TO SAVE WORDS. COMPASS IS COMPLETELY RESTART
R0343   PROOFED EXCEPT FOR THE FIRST 30 SECONDS OR SO.  PERFORMANCE TESTS OF
R0344   THE IRIGS IS RESTART PROOFED ENOUGH TO GIVE 75 PERCENT CONFIDENCE THAT
R0345   IF A RESTART OCCURS THE DATA WILL STILL BE GOOD. GOOD PRACTICE TO RECYCL
R0346   WHEN A RESTART OCCURS UNLESS IT HAPPENS NEAR THE END OF A TEST-THEN WAIT
R0347   FOR THE DATA TO FLASH.
R03471  A RESTART IN GYROCOMPASS DURING GYRO TORQUING CAUSES PULSES TO BE LOST
R0348   THE PRELAUNCH ALIGNMENT TECHNIQUE IS BASICALLY THE SAME AS IN BLOCK 1
R0349   EXCEPT THAT IT HAS BEEN SIMPLIFIED IN THE SENSE THAT SMALL ANGLE APPROX.
R0350   HAVE BEEN USED. THE DRIFT TESTS USE A UNIQUE IMPLEMENTATION OF THE
R0351   OPTIMUM STATISTICAL FILTER. FOR A DESCRIPTION SEE E-1973.BOTH OF THESE
R0352   ROUTINES USE STANDARD SYSTEM TEST LEADIN PROCEDURES. THE INITIALIZATION
R0353   PROCEDURE FOR THE DRIFT TESTS IS IN THE JOC S. THE INITIALIZATION METHOD
R0354   FOR GYROCOMPASS IS AN ERAS LOAD THEN A MISSION PHASE CALL.
R0355   THE COMPASS ALIGNS TO Z DOWN,X DOWNRANGE, HAS THE CAPABILITY
R0356   CHANGE AZIMUTH WHILE RUNNING , IS COMPENSATED FOR
R0357   COMPONENT ERRORS.IS CAPABLE OF OPTICAL VERIFICATION( CSM ONLY).

R0358   COMPASS ERASABLE LOAD REQUIRED

R0359    1-LAUNCHAZ -DP AZIMUTH IN REV FROM NORTH OF XSM DESIRED      (NOM=.2)
R0360   2- LATITUDE -DP-OF LAUNCH PAD
R0361   3- AZIMUTH-DP-OF ZNB OF VEHICLE
R03611  4- IMU COMPENSATION PARAMETERS
R0362   5-AZ AND ELEVATION OF TARGETS 1,2     ****OPTIONAL****

R0363   TO PERFORM AS PART OF COMPASS

R0364   1-OPTICAL VERIFICATION= V 65 E
R0365   2-AZIMUTH CHANGE-V 78 E

R0366   SUBROUTINES CALLED

R0367   DURING OPTICAL VERIFICATION (CSM ONLY) ESSENTIALLY ALL OF INFLIGHT ALIGN
R0368   IS CALLED IN ONE WAY OR ANOTHER. SEE THE LISTING.

R0369   NORMAL EXIT

R0370   DRIFT TESTS- LENGTHOT GOES TO ZERO-RETURN TO IMU PERF TEST2 CONTROL
R0371   GYROCOMPASS-MANY,SEE THE LISTING
R0372   ALARMS

R0373   1500     OVERFLOW IN DRIFT TEST
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R0374 1601 BAD IMU TORQUE ABORT
R0375 1602 BAD OPTICS DURING VERIFICATION-RETURN TO COMPASS CSM ONLY

R0376 OUTPUT

R0377 DRIFT TESTS- FLASHING DISPLAYS OF RESULTS-CONTROLLED IN IMU PERF TESTS 2
R0378 COMPASS-PROGRAM MODE LIGHTS TELL YOU WHAT PHASE OF PROGRAM YOU ARE IN
R0379 01 INITIALIZING THE PLATFORM POSITION AND ERASABLE
R0380 02 GYROCOMPASSING
R0381 03 DOING OPTICAL VERIFICATION (CSM)
R0382
R0383
R0384 DEBRIS

R0385 ALL CENTRALS,ALL OF EBANK XSM

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R0386    MOST OF THE ROUTINES COMMON TO ALIGNMENT AND CALIBRATION APPEAR
R0387    ON THE NEXT FEW PAGES.

 03875  REF   1                                          COUNT  33/P02

 0388   REF  22  LAST  431   E5,1671                     EBANK= XSM
 0389                        33,2453                     BANK   33
 0390   REF   3  LAST  430   33,2000                     SETLOC IMUCAL
 0391                        33,2453                     BANK

 0392   REF   2  LAST  259   33,2453  0 5372 1  ESTIMS   TC     2PHSCHNG        COMES HERE FROM IMU2
 0393                        33,2454   00075 0           OCT    00075
 03931                       33,2455   00004 0           OCT    00004           TURN OFF GROUP 4 IF ON
 0394                        33,2456  0 0004 0  RSTGTS1  INHINT                 COMES HERE PHASE1 RESTART
 0395   REF   7  LAST  416   33,2457  3 0025 0           CA     TIME1
 0396   REF   1              33,2460  55'645 0           TS     GTSWTLT1
 0397   REF  99  LAST  429   33,2461  3 5021 1           CAF    ZERO            ZERO THE PIPAS
 0398   REF   6  LAST  428   33,2462  54 037 1           TS     PIPAX
 0399   REF   1              33,2463  54 040 1           TS     PIPAY
 0400   REF   1              33,2464  54 041 0           TS     PIPAZ
 0402                        33,2465  0 0003 1           RELINT
 0403   REF   1              33,2466  3 3127 0           CA     77DECML         ZERO ALL NECESSARY LOCATIONS
 0404   REF   4  LAST  429   33,2467  55'655 1           TS     ZERONDX1
 0405   REF   1              33,2470  3 3130 0           CA     ALXXXZ
 0406   REF   2  LAST  424   33,2471  0 2356 0           TC     ZEROING
 0407   REF  20  LAST  430   33,2472  0 6006 1           TC     INTPRET
 04084                       33,2473   77735 0           SLOAD
 04085  REF   3  LAST  430   33,2474   27111 0                  SCHZEROS
 04086  REF   9  LAST  306   33,2475   25477 1           STOVL  GCOMPSW -1
 0409   REF   1              33,2476   27122 0                  INTVAL +2       LOAD SOME INITIAL DRIFT GAINS
 0410   REF   1              33,2477   26455 1           STOVL  ALXIS
 0411   REF   4  LAST  434   33,2500   27111 0                  SCHZEROS
 0412   REF  17  LAST  306   33,2501   01472 1           STORE  GCOMP
 0413   REF   6  LAST  299   33,2502   01163 1           STORE  DELVX            GCOMPZER SUBROUTINE NO LONGER NEEDED
 0414                        33,2503   77776 1           EXIT

 0415   REF   2  LAST  423   33,2504  11'643 0           CCS    GEOCOMP1        NON ZERO IF COMPASS.
 0416                        33,2505  0 2507 1           TC     +2
 0417   REF   1              33,2506  0 2523 1           TC     SLEEPIE +1
 0422   REF  21  LAST  434   33,2507  0 6006 1           TC     INTPRET
 04221                       33,2510   77624 1           CALL
 04222  REF   1              33,2511   64000 0                  ERTHRVSE
 04223                       33,2512   77776 1           EXIT
 0423   REF   7  LAST  426   33,2513  3 1412 1           CA     LENGTHOT         TIMES FIVE IS THE NUM OF SEC ERECTING
 0424   REF   1              33,2514  55'646 0           TS     ERECTIME

 0425   REF   3  LAST  427   33,2515  0 5354 0           TC     NEWMODEX
 0426                        33,2516   00002 0           MM     02
 0427   REF  68  LAST  431   33,2517  0 4662 1           TC     BANKCALL        SET UP PIPA FAIL TO CAUSE ISS ALARM
```

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0429   REF   2  LAST  306   33,2520   17156 0          CADR   PIPUSE          COMPASS NEVER TURNS THIS OFF
0429   REF   1               33,2521   0 3403 0         TC     ANNNNNN         END OF FIRST TIME THROUGH
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R0430    COMES HERE AT THE END OF EVERY ITERATION THROUGH DRIFT TEST OR COMPASS

R0431   SET UP WAITLIST SECTION
 0432   REF   8  LAST  434   33,2522  55'412 0  SLEEPIE  TS      LENGTHOT        TEST NOT OVER-DECREMENT LENGTHOT
 0433   REF   7  LAST  392   33,2523  0 5412 0           TC      PHASCHNG         CHANGE PHASE
 0434                        33,2524   00135 0           OCT     00135
 0435   REF   5  LAST  426   33,2525  11'450 0           CCS     TORQNDX         ARE WE DOING VERTDRIFT
 0436   REF   4  LAST  426   33,2526  0 2417 1           TC      EARTHR*         TRUE TORQUE SOUTH GYRO
 0437   REF   1              33,2527  0 3406 0  WTLISTNT TC      CHKCOMED                SEE IF COMPASS OVER
 04371  REF   1              33,2530  0 2532 1           TC      SETGWLST
 04372  REF  54  LAST  425   33,2531  0 5217 0           TC      ENDOFJOB

 04373                       33,2532  0 0006 1  SETGWLST EXTEND
 04374  REF 220  LAST  405   33,2533  22 154 1           QXCH    MPAC             CALLED EVERY WAITLIST OR AZIMUTH CHANGE
 0438                        33,2534  0 0004 0           INHINT
 0439   REF   8  LAST  434   33,2535  4 0025 1           CS      TIME1
 0440   REF   2  LAST  434   33,2536  6 1645 1           AD      GTSWTLT1
 0441                        33,2537  0 0006 1           EXTEND
 0442                        33,2540  6 2542 0           BZMF    +2
 0443   REF   2  LAST  416   33,2541  6 5001 0           AD      NEGMAX           10 MS ERROR OK
 0444   REF   2  LAST  423   33,2542  6 1644 0           AD      1SECXT1         1 SEC FOR CALIBRATION, .5 SEC IN COMPASS
 0445                        33,2543  0 0006 1           EXTEND
 0446   REF   1              33,2544  6 2550 0           BZMF    RIGHTGTS
 0447   REF   3  LAST  425   33,2545  0 5235 0  WTGTSMPL TC      TWIDDLE
 0448   REF   1              E5,1540                     EBANK=  ALTIM
 0449   REF   1              33,2546   02574 0           ADRES   ALLOOP
 0451   REF 221  LAST  436   33,2547  0 0154 1           TC      MPAC
 0452   REF   7  LAST  361   33,2550  3 5015 0  RIGHTGTS CAF     FOUR                    SET UP NEXT WAITLIST-ALLOW SOME TIME
 0453   REF   1              33,2551  0 2545 1           TC      WTGTSMPL                END OF WAITLIST SECTION

R0454    STORE AND LOAD DATA SECTIONS FOR RESTART PROOFING

 0455   REF   2  LAST  354      4113                    25DECML  EQUALS  OCT31
 0456   REF   1              33,2552  3 4113 0  STOREDTA CAF     25DECML
 0457   REF 222  LAST  436   33,2553  54 154 0           TS      MPAC
 0458   REF 223  LAST  436   33,2554  50 154 1           INDEX   MPAC
 0459   REF   2  LAST  100   33,2555  31'460 1           CAE     THETAX1
 0460   REF 224  LAST  436   33,2556  50 154 1           INDEX   MPAC
 0461   REF   1              33,2557  55'577 1           TS      RESTARPT
 0462   REF 225  LAST  436   33,2560  10 154 0           CCS     MPAC
 0463   REF   1              33,2561  1 2553 1           TCF     STOREDTA +1
 0464   REF 149  LAST  431   33,2562  0 0002 0           TC      Q

 0465   REF   2  LAST  436   33,2563  3 4113 0  LOADSTDT CAF     25DECML
 0466   REF 226  LAST  436   33,2564  54 154 0           TS      MPAC
 0467   REF 227  LAST  436   33,2565  50 154 1           INDEX   MPAC
 0468   REF   2  LAST  436   33,2566  3 1577 0           CA      RESTARPT
 0469   REF 228  LAST  436   33,2567  50 154 1           INDEX   MPAC
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L IMU CALIBRATION AND ALIGNMENT USER'S PAGE NO. 15 E5 S3

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0470   REF   3  LAST  436   33,2570  55'460 0          TS     THETAX1
0471   REF 229  LAST  436   33,2571  10 154 0          CCS    MPAC
0472   REF   1                33,2572  1 2564 0          TCF    LOADSTDT +1
0473   REF 150  LAST  436   33,2573  0 0002 0          TC     Q

R0474   COMES HERE EVERY ITERATION BY A WAITLIST CALL SET IN SLEEPIE

0475   REF   9  LAST  436   33,2574  3 0025 0  ALLOOP  CA     TIME1
0476   REF   3  LAST  436   33,2575  55'645 0          TS     GTSWTLT1       STORE TIME TO SET UP NEXT WAITLIST.
0477   REF   2  LAST  436   33,2576  3 1540 1  ALLOOP3 CA     ALTIM
0478   REF   1                33,2577  55'631 0          TS     GEOSAVE1
0479   REF   8  LAST  436   33,2600  0 5412 0          TC     PHASCHNG
0480                          33,2601   00115 1          OCT    00115
0481   REF   2  LAST  437   33,2602  31'631 1  ALLOOP1 CAE    GEOSAVE1
0482   REF   3  LAST  437   33,2603  55'540 0          TS     ALTIM
0483   REF 131  LAST  416   33,2604  10 000 0          CCS    A
0484   REF 132  LAST  437   33,2605  3 0000 1          CA     A              SHOULD NEVER HIT THIS LOCATION
0485   REF   1                33,2606  55'541 1          TS     ALTIMS
0486   REF 133  LAST  437   33,2607  4 0000 0          CS     A
0487   REF   4  LAST  437   33,2610  55'540 0          TS     ALTIM
0488   REF 100  LAST  434   33,2611  3 5021 1          CAF    ZERO
04881  REF   7  LAST  434   33,2612  56 037 0          XCH    PIPAX
0489   REF   7  LAST  434   33,2613  55'162 1          TS     DELVX
0490   REF 101  LAST  437   33,2614  3 5021 1          CAF    ZERO
04901  REF   2  LAST  434   33,2615  56 040 0          XCH    PIPAY
0491   REF   4  LAST  299   33,2616  55'154 1          TS     DELVY
0492   REF 102  LAST  437   33,2617  3 5021 1          CAF    ZERO
04921  REF   2  LAST  434   33,2620  56 041 1          XCH    PIPAZ
0493   REF   3  LAST  300   33,2621  55'166 0          TS     DELVZ
0494   REF   1                33,2622  3 4374 0          CAF    19DECML        23 OCT
0495   REF   1                33,2623  0 4114 1          TC     NEWPHASE
0496                          33,2624   00005 1          OCT    00005
0501   REF   1                33,2625  3 7657 1  SPECSTS CAF    PRIO22
0502   REF  15  LAST  425   33,2626  0 5147 0          TC     FINDVAC
0503   REF   3  LAST  437   E5,1631                    EBANK= GEOSAVE1
0504   REF   1                33,2627   02632 1          2CADR  ALFLT          START THE JOB
0504   REF   1                33,2630   66065 1
0505   REF  20  LAST  425   33,2631  0 5324 1          TC     TASKOVER
```

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R0506    THIS IS PART OF THE JOB DONE EVERY ITERATION

 0507   REF   2  LAST  436   33,2632  0 2552 1  ALFLT    TC      STOREDTA        STORE DATA IN CASE OF RESTART IN JOB
 0508   REF   9  LAST  437   33,2633  0 5412 0           TC      PHASCHNG      THIS IS THE JOB DONE EVERY ITERATION
 0509                        33,2634   00215 1           OCT     00215
 0510                        33,2635  1 2637 0           TCF     +2
 0511   REF   2  LAST  437   33,2636  0 2563 0  ALFLT1   TC      LOADSTDT        COMES HERE ON RESTART

 0512   REF   3  LAST  434   33,2637  11'643 0           CCS     GEOCOMP1
 0513                        33,2640  0 2642 0           TC      +2
 0514   REF   1              33,2641  0 2645 1           TC      NORMLOP
 0515   REF   2  LAST  436   33,2642  0 3406 0           TC      CHKCOMED          SEE IF PRELAUNCH OVER
 0516   REF  69  LAST  434   33,2643  0 4662 1           TC      BANKCALL        COMPENSATION IF IN COMPASS
 0517   REF   1              33,2644   15262 0           CADR    1/PIPA

 0518   REF  22  LAST  434   33,2645  0 6006 1  NORMLOP  TC      INTPRET
 0519                        33,2646   77745 1           DLOAD
 0520   REF   2  LAST  434   33,2647   27120 1                   INTVAL
 0521   REF   5  LAST  410   33,2650   24051 0           STOVL   S1
 0522   REF   8  LAST  437   33,2651   01163 1                   DELVX
 0523                        33,2652   76505 0           VXM     VSL1
 0524   REF  23  LAST  434   33,2653   02672 0                   XSM
 0525                        33,2654   57545 1           DLOAD   DCOMP
 0526   REF 230  LAST  437   33,2655   00160 0                   MPAC +3
 0527   REF   1              33,2656   16533 0           STODL   DPIPAY
 0528   REF 231  LAST  438   33,2657   00162 1                   MPAC +5
 0529   REF   1              33,2660   02537 1           STORE   DPIPAZ

 0530                        33,2661   76001 1           SETPD   AXT,1
 0531                        33,2662   00001 0                   0
 0532                        33,2663   00010 0                   8D
 0533                        33,2664   57535 0           SLOAD   DCOMP
 0534   REF   4  LAST  438   33,2665   02644 0                   GEOCOMP1
 0535                        33,2666   77640 0           BMN
 0536   REF   1              33,2667   67210 0                   ALWAYSG         DO A QUICK COMPASS
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R0537 NOW WE HAVE JUST THE CALIBRATION PARTS OF THE PROGRAM-NEXT PAGES

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05375  REF   2 LAST  422 TO  431:   314   314*          COUNT   33/COMST

0538                          33,2670   50135 0  ALCGKK   SLOAD   BMN
0539   REF   2  LAST  437     33,2671   02542 0           ALTIMS
0540   REF   1                33,2672   66705 0           ALFLT3          NO NEW GAINS NEEDED
0541                          33,2673   72174 0  ALKCG    AXT,2   LXA,1           LOADS SLOPES AND TIME CONSTANTS AT RQST
0542                          33,2674   00014 1           12D
0543   REF   2  LAST  434     33,2675   02454 0           ALX1S
0544                          33,2676   62143 0  ALKCG2   DLOAD*  INCR,1
0545   REF   1                33,2677   02243 0           ALFDK +144D,1
0546                          33,2700   77775 1           DEC     -2
0547   REF   1                33,2701   12555 1           STORE   ALDK +10D,2
0548                          33,2702   66104 1           TIX,2   SXA,1
0549   REF   1                33,2703   66676 0           ALKCG2
0550   REF   3  LAST  439     33,2704   02454 0           ALX1S

0551                          33,2705   77770 1  ALFLT3   AXT,1                   MEASUREMENT INCORPORATION ROUTINES
0552                          33,2706   00010 0           8D                      AND GAIN UPDATES
0553                          33,2707   41343 0  DELMLP   DLOAD*  DMP
0554   REF   2  LAST  438     33,2710   02543 1           DPIPAY +8D,1
0555   REF   1                33,2711   27705 0           PIPASC
0556                          33,2712   43661 1           SLR     BDSU*
0557                          33,2713   21212 0           9D
0558   REF   1                33,2714   02511 0           INTY +8D,1
0559   REF   2  LAST  439     33,2715   06511 1           STORE   INTY +8D,1
0560                          33,2716   40725 0           PDDL    DMP*
0561   REF   1                33,2717   27707 1           VELSC
0562   REF   1                33,2720   02531 1           VLAUN +8D,1
0563                          33,2721   77732 1           SL2R
0564                          33,2722   45425 0           DSU     STADR
0565   REF   1                33,2723   71206 0           STORE   DELM +8D,1
0566   REF   2  LAST  439     33,2724   06573 0           STORE   DELM +10D,1
0567                          33,2725   77100 0           TIX,1   AXT,2
0568   REF   1                33,2726   66707 1                   DELMLP
0569                          33,2727   00004 0                   4
0570                          33,2730   56743 1  ALILP    DLOAD*  DMPR*
0571   REF   3  LAST  100     33,2731   75314 0                   ALK +4,2
0572   REF   2  LAST  439     33,2732   75230 1                   ALDK +4,2
0573   REF   4  LAST  439     33,2733   12463 0           STORE   ALK +4,2
0574                          33,2734   77104 1           TIX,2   AXT,2
0575   REF   1                33,2735   66730 0                   ALILP
0576                          33,2736   00010 0                   8D
0577                          33,2737   66140 1  ALKLP    LXC,1   SXA,1
0578   REF   1                33,2740   02455 1                   CMPX1
0579   REF   2  LAST  439     33,2741   02455 1                   CMPX1
0580                          33,2742   56743 1           DLOAD*  DMPR*
0581   REF   5  LAST  439     33,2743   02460 1                   ALK +1,1
0582   REF   3  LAST  439     33,2744   75206 1                   DELM +8D,2
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0583                          33,2745  77613 0          DAD*
0584  REF   3  LAST  439      33,2746  75266 1                INTY +8D,2
0585  REF   4  LAST  440      33,2747  12511 1          STORE INTY +8D,2
0586                          33,2750  42743 1          DLOAD* DAD*
0587  REF   6  LAST  439      33,2751  75304 1                ALK +12D,2
0588  REF   3  LAST  439      33,2752  75220 0                ALOK +12D,2
0589  REF   7  LAST  440      33,2753  12473 1          STORE ALK  +12D,2
0590                          33,2754  42673 0          DMPR*  DAD*
0591  REF   4  LAST  439      33,2755  75206 1                DELM +8D,2
0592  REF   5  LAST  440      33,2756  75256 1                INTY +16D,2
0593  REF   6  LAST  440      33,2757  12521 1          STORE INTY +16D,2
0594                          33,2760  40743 0          DLOAD* DMP*
0595  REF   1                 33,2761  27712 0                ALSK +1,1
0596  REF   5  LAST  440      33,2762  75206 1                DELM +8D,2
0597                          33,2763  42772 0          SLIR   DAD*
0598  REF   2  LAST  439      33,2764  75246 0                VLAUN +8D,2
0599  REF   3  LAST  440      33,2765  12531 0          STORE VLAUN +8D,2
0600                          33,2766  76104 0          TIX,2  AXT,1
0601  REF   1                 33,2767  66737 1                ALKLP
0602                          33,2770  00010 0                8D

0603                          33,2771  64743 0  LOOSE   DLOAD* PDDL*          EXTRAPOLATE SWAY VARIABLES
0604  REF   1                 33,2772  02533 0                ACCWD +8D,1
0605  REF   4  LAST  440      33,2773  02531 1                VLAUN +8D,1
0606                          33,2774  55523 0          PDDL*  VDEF
0607  REF   1                 33,2775  02541 0                POSNV +8D,1
0608                          33,2776  76521 0          MXV    VSL1
0609  REF   2  LAST   92      33,2777  02001 1                TRANSM1
0610                          33,3000  77745 1          DLOAD
0611  REF 232  LAST  438      33,3001  00155 0                MPAC
0612  REF   2  LAST  440      33,3002  06541 1          STORE  POSNV +8D,1
0613                          33,3003  77745 1          DLOAD
0614  REF 233  LAST  440      33,3004  00160 0                MPAC +3
0615  REF   5  LAST  440      33,3005  06531 0          STORE  VLAUN +8D,1
0616                          33,3006  77745 1          DLOAD
0617  REF 234  LAST  440      33,3007  00162 1                MPAC +5
0618  REF   2  LAST  440      33,3010  06533 1          STORE  ACCWO +8D,1
0619                          33,3011  77700 0          TIX,1
0620  REF   1                 33,3012  66771 0                LOOSE

0621                          33,3013  76174 1          AXT,2  AXT,1          EVALUATE SINES AND COSINES
0622                          33,3014  00006 1                6
0623                          33,3015  00002 0                2
0624                          33,3016  57343 1  BOOP    DLOAD* DMPR
0625  REF   1                 33,3017  02513 1                ANGX +2,1
0626  REF   1                 33,3020  27715 1                GEORGEJ
0627                          33,3021  77722 0          SR2R
0628                          33,3022  73406 1          PUSH   SIN
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 0629                                33,3023   56072 1           SL3R    XAD,1
 0630   REF   1                     33,3024   00046 0                   X1
 0631                                33,3025   10021 0           STORE   160,2
 0632                                33,3026   77745 1           DLOAD
 0633                                33,3027   77746 1           COS
 0634                                33,3030   10027 0           STORE   220,2          COSINES
 0635                                33,3031   77704 1           TIX,2
 0636   REF   1                     33,3032   67016 1                   BOOP
 0637                                33,3033   77776 1  PERFERAS EXIT
 0638   REF   2  LAST  258          33,3034   3 5060 1          CA      EBANK7
 0639   REF   5  LAST  280          E7,1400                     EBANK=  LAT(SPL)
 06395  REF  19  LAST  378          33,3035   54 003 0          TS      EBANK
 0640   REF   6  LAST  441          33,3036   0 1400 1          TC      LAT(SPL)       GO TO ERASABLE ONLY TO RETURN

R0641             CAUTION

R0642   THE ERASABLE PROGRAM THAT DOES THE CALCULATIONS MUST BE LOADED
R0643   BEFORE ANY ATTEMPT IS MADE TO RUN THE IMU PERFORMANCE TEST

 0734   REF   9  LAST  436          E5,1412                     EBANK=  LENGTHOT
 0735   REF  10  LAST  441          33,3037   11'412 0 ONCEMORE CCS     LENGTHOT
 0736   REF   2  LAST  434          33,3040   0 2522 0          TC      SLEEPIE        TEST NOT OVER SET UP NEXT WAITLIST

 07361  REF   6  LAST  436          33,3041   11'450 0          CCS     TORONDX
 07362                               33,3042   1 3044 0          TCF     +2
 07363  REF   1                     33,3043   0 3046 0          TC      SETUPER1
 07364  REF   9  LAST  426          33,3044   3 0032 0          CA      COUX
 07365  REF   3  LAST  426          33,3045   55'414 0          TS      LOSVEC +1      FOR TROUBLESHOOTING POSNS 2&4 VD
 0737   REF  23  LAST  438          33,3046   0 6006 1 SETUPER1 TC      INTPRET        DRIFT TEST OVER
 0738                               33,3047    65345 0          DLOAD   PDDL           ANGLES FROM DRIFT TEST ONLY
 0739   REF   1                     33,3050    02503 0                  ANGZ
 0740   REF   1                     33,3051    02507 1                  ANGY
 0741                               33,3052    55525 0          PDDL    VDEF
 0742   REF   2  LAST  440          33,3053    02511 0                  ANGX
 0743                               33,3054    74276 1          VCOMP   VXSC
 0744   REF   2  LAST  440          33,3055    27715 1                  GEORGEJ
 0745                               33,3056    74521 1          MXV     VSR1
 0746   REF  24  LAST  438          33,3057    02672 0                  XSM
 0747   REF  10  LAST  431          33,3060    02760 1          STORE   OGC
 0748                               33,3061    77776 1          EXIT

 0749   REF  10  LAST  438          33,3062   0 5412 0 TORQINCH TC      PHASCHNG
 0750                               33,3063    00005 1          OCT     00005
 0751   REF   1                     33,3064   3 2444 1          CA      OGCPL
 0752   REF  70  LAST  438          33,3065   0 4662 1          TC      BANKCALL
 0753   REF   3  LAST  303          33,3066    17206 0          CADR    IMUPULSE
 0754   REF   5  LAST  430          33,3067   0 2316 1          TC      IMUSTLLG
 0755   REF   7  LAST  441          33,3070   11'450 0          CCS     TORONDX        + IF IN VERTICAL DRIFT TEST
 0756   REF   1                     33,3071   0 2262 0          TC      VALMIS         VERT DRIFT TEST OVER
 0757   REF  24  LAST  441          33,3072   0 6006 1          TC      INTPRET
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07571                          33,3073   77624 1            CALL                    SET UP ERATE FOR PIP TEST OR COMPASS
07572  REF   2  LAST  434      33,3074   64000 0                       ERTHRVSE
07573                          33,3075   77776 1            EXIT
0758   REF   1                33,3076  0 2122 1            TC      TORQUE          GO TO IMU2 FOR A PIPA TEST AND DISPLAY

0759   REF  21  LAST  257      33,3077  0 5650 1  SOMEERRR  TC      ALARM
0760                           33,3100   01600 0            OCT     1600
0761                           33,3101  0 3104 1            TC      +3
0762   REF  22  LAST  442      33,3102  0 5650 1  SOMERR2   TC      ALARM
0763                           33,3103   01601 1            OCT     1601
0764   REF  11  LAST  441      33,3104  0 5412 0            TC      PHASCHNG
0765                           33,3105   00005 1            OCT     00005
0766   REF   2  LAST  431      33,3106  0 2267 0            TC      ENDTEST1

R0767    THE FAMOUS MAGIC NUMBERS OF SCHMIDT ARE NOW PART OF AN ERASABLE LOAD.

0768                           33,3107   02222 1  DEC585    OCT     02222           1170 B+14  ORDER IS NOW IMPORTANT
0769                           33,3110   00000 1  SCHZEROS  2DEC    .00000000
0769                           33,3111   00000 1
0770                           33,3112   00000 1            2DEC    .00000000
0770                           33,3113   00000 1
0771                           33,3114   00000 1            OCT     00000
0772                           33,3115   00000 1  ONEDPP    OCT     00000
0773                           33,3116   00001 0            OCT     00001                   ABOVE ORDER IS IMPORTANT

0774                           33,3117   00004 0  INTVAL    OCT     4
0775                           33,3120   00002 0            OCT     2
0776                           33,3121   00220 1            DEC     144
0777                           33,3122   77776 1            DEC     -1
0778                           33,3123   35730 0  SOUPLY    2DEC    .93505870       INITIAL GAINS FOR PIP OUTPUTS
0778                           33,3124   00035 1
0779                           33,3125   10317 0            2DEC    .26266423       INITIAL GAINS/4 FOR ERECTION ANGLES
0779                           33,3126   17550 1

0780                           33,3127   00115 1  77DECML   DEC     77
0781   REF   4  LAST  439      33,3130   01453 1  ALXXXZ    GENADR  ALX1S -1
R0789    GYROCOMPASS PORTIONS FINISH THIS LOG SECTION

07895  REF   1                                              COUNT   33/P01

R0790    INITIALIZATION SECTION

0791   REF  14  LAST  391      33,3131  3 0075 0  GTSCPSS   CA      FLAGWRD1        CALLED BY V37
07911  REF   3  LAST  247      33,3132  7 5004 1            MASK    NOP01BIT
```

```
07913                          33,3133  0 0006 1           EXTEND
07914  REF   1                 33,3134  1 3137 0           BZF     GTSCPSSA
07915  REF   4  LAST  373      33,3135  0 5721 0           TC      POODOO
07916                          33,3136   01521 0           OCT     1521              NODO ALARM FOR P01 - P11 ALREADY DONE

07917  REF  56  LAST  425      33,3137  3 5017 1  GTSCPSSA CAF     ONE
0792   REF   5  LAST  438      33,3140  55'643 0           TS      GEOCOMP1          THIS IS THE LEAD IN FOR COMPASS.
0793   REF   1                 33,3141  3 3435 0           CA      1/PIPAGT
0794   REF   8  LAST  423      33,3142  55'074 1           TS      1/PIPADT
0795   REF  21  LAST  303      33,3143  3 5010 0  NXXTBNN  CA      BIT8
0796   REF  11  LAST  441      33,3144  55'412 0           TS      LENGTHOT
0797   REF   1                 33,3145  3 5036 1           CAF     1/2SECX           COMPASS IS A .5 SEC LOOP
0798   REF   3  LAST  436      33,3146  55'644 1           TS      1SECXT1
0799   REF  57  LAST  443      33,3147  3 5017 1           CAF     ONE
0800   REF   1                 33,3150  55'632 0           TS      PREMTRX1
08005  REF   2  LAST  424      33,3151  55'657 0           TS      PERFDLAY +1
08006  REF 103  LAST  437      33,3152  3 5021 1           CAF     ZERO
08007  REF   3  LAST  443      33,3153  55'656 1           TS      PERFDLAY
0801                           33,3154  0 0006 1           EXTEND
0802   REF   4  LAST  100      33,3155  3 1634 1           DCA     LUNCHAZ1
0803   REF   1                 33,3156  53'636 1           DXCH    NEWAZ1
08031                          33,3157  0 0006 1           EXTEND
08032  REF   5  LAST  443      33,3160  3 1634 1           DCA     LUNCHAZ1
08033  REF   1                 33,3161  53'640 0           DXCH    DLOAZMTH
0804   REF   2  LAST  423      33,3162  3 4375 1  SETUPGC  CA      DEC17
0805   REF   5  LAST  434      33,3163  55'655 1           TS      ZERONDX1
0806   REF   1                 33,3164  3 2446 0           CA      XSMADR
0807   REF   3  LAST  434      33,3165  0 2356 0           TC      ZEROING
0808   REF   1                 33,3166  0 3170 1           TC      POSN17C
0809   REF   1                 33,3167  0 2030 0           TC      GEOIMUTT          GO TO IMU2 FOR FURTHER INITIALIZATION

0810                           33,3170  0 0006 1  POSN17C  EXTEND                    COMPASS POSITION Z DOWN,X DOWNRANGE
0811   REF  13  LAST  431      33,3171  23'425 0           QXCH    QPLACE            FROM NORTH IN REVOLUTIONS + CLOCKWSE
0812   REF   2  LAST  424      33,3172  4 5002 1           CS      HALF              ALL THIS TO INITIALIZE MATRIX
0813   REF   2  LAST   95      33,3173  55'705 0           TS      ZSM
0814   REF  25  LAST  441      33,3174  0 6006 1           TC      INTPRET
0815                           33,3175   41545 0           DLOAD   PUSH
0816   REF   2  LAST  443      33,3176   02636 0                   NEWAZ1
0817                           33,3177   77756 0           SIN
0818   REF  25  LAST  441      33,3200   02676 1           STORE   XSM +4
0819   REF   2  LAST   95      33,3201   16702 0           STODL   YSM +2
0820                           33,3202   77746 1           COS
0821   REF   3  LAST  443      33,3203   02704 0           STORE   YSM +4
0822                           33,3204   77676 0           DCOMP
0823   REF  26  LAST  443      33,3205   02674 0           STORE   XSM +2
0824                           33,3206   77776 1           EXIT
0825   REF  14  LAST  443      33,3207  0 1425 0           TC      QPLACE
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L IMU CALIBRATION AND ALIGNMENT USER'S PAGE NO. 22 E5 S3

R0826 JOB DONE EVERY ITERATION THROUGH COMPASS PROGRAM.SET BY TASK ALLOOP

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 08268  REF   2 LAST  434 TO  439:   141   141*          COUNT  337/P02

 0827                          33,3210   44743 1  ALWAYSG  DLOAD*  DSU*            COMPASS AND ERECT
 0828   REF   3  LAST  439     33,3211   02543 1                    DPIPAY +8D,1
 0829   REF   2  LAST  100     33,3212   02505 0                    FILDELV1 +8D,1
 0830                          33,3213   42675 0           DMPR     DAD*
 0831   REF   1                33,3214   27717 0                    GEOCONS1
 0832   REF   3  LAST  444     33,3215   02505 0                    FILDELV1 +8D,1
 0833   REF   4  LAST  444     33,3216   06505 1           STORE    FILDELV1 +8D,1
 0834                          33,3217   77613 0           DAD*
 0835   REF   1                33,3220   02507 1                    INTVEC1 +8D,1
 0836   REF   2  LAST  444     33,3221   06507 0           STORE    INTVEC1 +8D,1
 0837                          33,3222   42675 0           DMPR     DAD*
 0838   REF   1                33,3223   27721 0                    GEOCONS2
 0839   REF   5  LAST  444     33,3224   02505 0                    FILDELV1 +8D,1
 0840                          33,3225   41475 1           DMPR     PUSH
 0841   REF   1                33,3226   15333 0                    GEOCONS5
 0842                          33,3227   67300 0           TIX,1    SLOAD
 0843   REF   2  LAST  438     33,3230   67210 0                    ALWAYSG
 0844   REF   1                33,3231   02647 0                    ERECTIM1
 0845                          33,3232   71254 1           BZE      DLOAD
 0846   REF   1                33,3233   67244 1                    COMPGS
 0847   REF   2  LAST  100     33,3234   02471 1                    THETAN1 +2
 0848                          33,3235   45423 0           DSU      STADR
 0849   REF   3  LAST  444     33,3236   61306 0           STODL    THETAN1 +2      ERECTION ONLY.
 0850                          33,3237   77621 1           BDSU
 0851   REF   4  LAST  444     33,3240   02473 0                    THETAN1 +4
 0852   REF   5  LAST  444     33,3241   02473 0           STORE    THETAN1 +4
 0853                          33,3242   77650 1           GOTO
 0854   REF   1                33,3243   67266 1                    ADDINDRF
 0855                          33,3244   43345 1  COMPGS   DLOAD    DAD             COMPASS
 0856   REF   6  LAST  444     33,3245   02467 0                    THETAN1
 0857   REF   6  LAST  444     33,3246   02475 0                    FILDELV1
 0858   REF   7  LAST  444     33,3247   16467 0           STODL    THETAN1
 0859   REF   7  LAST  444     33,3250   02475 0                    FILDELV1
 0860                          33,3251   44275 1           DMPR     BDSU
 0861   REF   1                33,3252   27723 1                    GEOCONS3
 0862   REF   8  LAST  444     33,3253   02473 0                    THETAN1 +4
 0863   REF   9  LAST  444     33,3254   16473 0           STODL    THETAN1 +4
 0864   REF   8  LAST  444     33,3255   02501 1                    FILDELV1 +4
 0865                          33,3256   44275 1           DMPR     BDSU
 0866   REF   2  LAST  444     33,3257   27723 1                    GEOCONS3
 0867   REF  10  LAST  444     33,3260   02471 1                    THETAN1 +2
 0868                          33,3261   57325 1           PDDL     DMPR
 0869   REF   3  LAST  444     33,3262   02503 0                    INTVEC1 +4
 0870   REF   1                33,3263   27725 1                    GEOCONS4
 0871                          33,3264   45421 1           BDSU     STADR
 0872   REF  11  LAST  444     33,3265   75306 0           STORE    THETAN1 +2
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0873                        33,3266   77776 1  ADDINDRF EXIT

0874   REF  12  LAST  443   33,3267  11'412 0  ENDGTSAL CCS    LENGTHOT       IS 5 SEC OVER-THE TIME TO TORQ PLATFORM
0875   REF   3  LAST  441   33,3270  0 2522 0           TC     SLEEPIE        NO-SET UP NEXT WAITLIST CALL FOR .5 SEC
0876   REF   3  LAST  438   33,3271  0 3406 0           TC     CHKCOMED
0877   REF   2  LAST  192   33,3272  11'304 0           CCS    LGYRO          YES BUT ARE GYROS BUSY
0878   REF   4  LAST  445   33,3273  1 2523 0           TCF    SLEEPIE +1     BUSY-GET THEM .5 SECONDS FROM NOW

0879   REF  26  LAST  443   33,3274  0 6006 1  LASTGTS  TC     INTPRET
0880                        33,3275   77775 1           VLOAD
0881   REF   9  LAST  430   33,3276   02650 0                  ERCOMP1
0882   REF   4  LAST  437   33,3277   16461 0           STODL  THETAX1
0883   REF   4  LAST  430   33,3300   02443 0                  TMARK
0884   REF   8  LAST  440   33,3301   02457 0           STORE  ALK
0885                        33,3302   77776 1           EXIT                  PREVIOUS SECTION WAS FOR RESTARTS

0886   REF  12  LAST  442   33,3303  0 5412 0  RESTAIER TC     PHASCHNG
0887                        33,3304   00275 1           OCT    00275
0888   REF  27  LAST  445   33,3305  0 6006 1           TC     INTPRET        ADD COMPASS COMMANDS INTO ERATE
0889                        33,3306   64375 1           VLOAD  MXV
0890   REF  12  LAST  444   33,3307   02467 0                  THETAN1
0891   REF  27  LAST  443   33,3310   02672 0                  XSM
0892                        33,3311   53372 1           VSL1   VAD
0893   REF   5  LAST  445   33,3312   02461 0                  THETAX1
0894   REF  10  LAST  445   33,3313   16650 0           STODL  ERCOMP1
0895   REF   9  LAST  445   33,3314   02457 0                  ALK
0896   REF   5  LAST  445   33,3315   02443 0           STORE  TMARK
0897                        33,3316   77776 1           EXIT
0898   REF   5  LAST  436   33,3317  0 2417 1           TC     EARTHR*        TORQUE IT ALL IN
0899   REF   2  LAST  444   33,3320  31'646 1           CAE    ERECTIM1
0900   REF   4  LAST  437   33,3321  55'631 0           TS     GEOSAVE1
0901   REF  13  LAST  445   33,3322  0 5412 0           TC     PHASCHNG
0902                        33,3323   00155 0           OCT    00155
0903   REF  28  LAST  445   33,3324  0 6006 1  RESTEST1 TC     INTPRET
0904                        33,3325   77775 1           VLOAD
0905   REF   5  LAST  434   33,3326   27111 0                  SCHZEROS
0906   REF  13  LAST  445   33,3327   02467 0           STORE  THETAN1
0907                        33,3330   77776 1           EXIT
0912   REF   1              33,3331  11'632 0           CCS    PREMTRXC
09121  REF   1              33,3332  0 3401 1           TC     NOCHORLD
09122  REF  14  LAST  445   33,3333  0 5412 0           TC     PHASCHNG
0913                        33,3334   00255 0           OCT    00255
09131  REF  29  LAST  445   33,3335  0 6006 1  RESTEST3 TC     INTPRET
0914                        33,3336   77745 1           DLOAD
09142  REF   2  LAST  173   33,3337   02634 1                  LAUNCHAZ
0915                        33,3340   53025 0           DSU    BZE
09151  REF   2  LAST  443   33,3341   02640 1                  DLOAZMTH
09152  REF   1              33,3342   67375 1                  NOAZCHGE
09153                       33,3343   00001 0           STORE  OD
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09154                          33,3344   43335 0           SLOAD   DAD
09155  REF   2  LAST  428      33,3345   27117 0                   ONEDPP +1
0918   REF   2  LAST  445      33,3346   02633 0                   PREMTRXC        DOES NOT CHANGE LAUNCHAZ
0919   REF   3  LAST  446      33,3347   16633 0           STODL   PREMTRXC
0920   REF   3  LAST  445      33,3350   02634 1                   LAUNCHAZ
09201  REF   1                33,3351   16636 0           STODL   NEWAZMTH
09202                          33,3352   00001 0                   DD
09203  REF   1                33,3353   02654 1  ADERCOMP STORE   ERCOMP +4
09204                          33,3354   77776 1           EXIT
09205  REF   2  LAST  443      33,3355   0 3170 1          TC      POSN17C
09206  REF  15  LAST  445      33,3356   0 5412 0          TC      PHASCHNG
09207                          33,3357    00335 1          OCT     00335
0921                           33,3360   0 0006 1  RESCHNG EXTEND
0922   REF   2  LAST  446      33,3361   3 1636 0          DCA     NEWAZMTH
0923   REF   3  LAST  445      33,3362   53'640 0          DXCH    OLDAZMTH
09231  REF  26  LAST  391      33,3363   3 5011 1          CA      BIT7            SPEND 320 SEC ERECTING
09232  REF  13  LAST  445      33,3364   55'412 0          TS      LENGTHOT
0924   REF  16  LAST  446      33,3365   0 5412 0          TC      PHASCHNG
0925                           33,3366    00075 0          OCT     00075
0926   REF   1                33,3367   3 3434 1  SPITGYRO CA      ERCOMPPL
0927   REF  71  LAST  441      33,3370   0 4662 1          TC      BANKCALL
0928   REF   4  LAST  441      33,3371    17206 0          CADR    IMUPULSE
0929   REF  72  LAST  446      33,3372   0 4662 1          TC      BANKCALL
0930   REF   7  LAST  428      33,3373    17577 1          CADR    IMUSTALL
0931   REF   2  LAST  428      33,3374   0 3102 1          TC      SOMERR2
09311  REF   3  LAST  427      33,3375   0 2453 1          TC      ESTIMS          RE-INITIALIZE

0932                           33,3376    77776 1  NOAZCHGE EXIT
0933   REF  58  LAST  443      33,3377   3 5017 1          CA      ONE
0934   REF   4  LAST  446      33,3400   55'632 0          TS      PREMTRXC
0941   REF   5  LAST  445      33,3401   11'631 0  NOCHORLD CCS     GEOSAVE1
0942   REF   3  LAST  445      33,3402   55'646 0          TS      ERECTIM1        COUNTS DOWN FOR ERECTION.

0943   REF   1                33,3403   3 4334 1  ANNNNNN CAF     NINE
0944   REF  14  LAST  446      33,3404   55'412 0          TS      LENGTHOT
0945   REF   5  LAST  445      33,3405   0 2523 1          TC      SLEEPIE +1

0946                           33,3406   0 0004 0  CHKCOMED INHINT
09461  REF   8  LAST  392      33,3407   4 1011 1          CS      MODREG          CHECK FOR MM 07 FIRST
09462  REF  10  LAST  374      33,3410   6 5023 0          AD      SEVEN
09463                          33,3411   0 0006 1          EXTEND
09464  REF   1                33,3412   1 3426 0          BZF     GOBKCALB        IF MM 07 RETURN TO PERF TEST
0947   REF 104  LAST  443      33,3413   4 5021 0          CS      ZERO
0948                           33,3414   0 0006 1          EXTEND
0949   REF   5  LAST  250      33,3415   06 030 1          RXOR    CHAN30          READ AND INVERT BITS IN CHANNEL 30
0950   REF  21  LAST  426      33,3416   7 5013 1          MASK    BIT5            LIFTOFF BIT
0951   REF 134  LAST  437      33,3417   10 000 0          CCS     A
0952   REF   1                33,3420   1 3427 1          TCF     PRELTERM        LIFTOFF HAS OCCURRED
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0953   REF   2  LAST  250   33,3421  3 5013 0          CA     GRRBKBIT       CHECK FOR BACKUP LIFTOFF
0954   REF   6  LAST  390   33,3422  7 0101 0          MASK   FLAGWRD5       BIT5 FLAGWRD5
0955   REF 135  LAST  446   33,3423  10 000 0          CCS    A
0956   REF   2  LAST  446   33,3424  1 3427 1          TCF    PRELTERM       BACKUP RECEIVED

0957                        33,3425  0 0003 1          RELINT
0958   REF 151  LAST  437   33,3426  0 0002 0 GOBKCALB TC     Q

0959   REF   2  LAST  437   33,3427  3 7657 1 PRELTERM CA     PRIO22         PRELAUNCH DONE - SET UP P11
0960   REF   4  LAST  392   33,3430  0 5210 1          TC     PRIOCHNG       INCREASE PRIORITY HIGHER THAN SERVICER
0961                        33,3431  0 0004 0          INHINT
0962   REF  37  LAST  416   33,3432  0 4701 0          TC     POSTJUMP
0963   REF   1              33,3433   70002 1          CADR   P11


0965   REF   2  LAST  446   33,3434   02647 0 ERCOMPPL ECADR  ERCOMP

0968   REF   3  LAST  396   26,3332           GEOCONS5 EQUALS HIDPHALF
0969                        33,3435   06200 0 1/PIPAGT OCT    06200
0970   REF   6  LAST  431      4375           17DECML  =      ND1            OCT 21
0971   REF  16  LAST  431      4374           19DECML  =      VD1            OCT 23
0972   REF   3  LAST  188      5036           1/2SECX  =      .5SEC
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09725 REF 55 LAST 436 5217 GEOSTRT4 EQUALS ENDOFJOB

P0973 OPTICAL VERIFICATION ROUTINES FOR GYROCOMPASS

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 09735  REF   1                                          COUNT  33/P03

 0974   REF  17  LAST  446   33,3436  0 5412 0  GCOMPVER TC     PHASCHNG        OPTICAL VERIFICATION ROUTINE
 0975                        33,3437   00154 1           OCT    00154
 0976   REF   4  LAST  434   33,3440  0 5354 0           TC     NEWMODEX        ENTERED BY VERB 65 ENTER
 0977                        33,3441   00003 1           MM     03
 09771  REF   1              33,3442  0 2037 1  SETNBPOS TC     NBPOSPL
 0978   REF  73  LAST  446   33,3443  0 4662 1           TC     BANKCALL
 0979   REF   2  LAST  427   33,3444   16063 0           CADR   MKRELEAS
 0980   REF  30  LAST  385   33,3445  3 5017 1  OPTDATA  CAF    BIT1            CALLS FOR AZIMUTH AND ELEVATION OF TARGE
 0981                        33,3446  22 007 0           ZL                     T 1,THEN TARGET 2
 0982   REF   1              33,3447  23'427 1           LXCH   RUN             AZIMUTH CLOCKWSE FROM NORTH TO TARGET
 0983   REF  20  LAST  366   33,3450  55'047 1           TS     OSPTEM1 +2      ELEVATION MEASURED FROM HORIZONTAL
 0984                        33,3451  0 0006 1           EXTEND
 0985   REF   2  LAST  449   33,3452  5 1427 1           INDEX  RUN
 0986   REF   1              33,3453  3 1433 1           DCA    TAZEL1
 0987   REF  21  LAST  449   33,3454  53'046 0           DXCH   DSPTEM1
 0988   REF   1              33,3455  3 3500 1           CAF    V05N30E
 0989   REF  74  LAST  449   33,3456  0 4662 1           TC     BANKCALL
 0990   REF   1              33,3457   20673 1           CADR   GODSPRET
 0991   REF   1              33,3460  3 3466 0           CAF    VN0641
 09911  REF  75  LAST  449   33,3461  0 4662 1           TC     BANKCALL
 09912  REF   4  LAST  431   33,3462   20720 0           CADR   GOFLASH
 09913  REF   1              33,3463  0 3620 0           TC     GCOMP5
 09914                       33,3464  0 3467 1           TC     +3
 09915                       33,3465  0 3455 0           TC     -8D
 09916                       33,3466   01451 0  VN0641   VN     0641
 0992   REF  22  LAST  449   33,3467  53'046 0           DXCH   DSPTEM1         TAZEL1  TARGET 1 AZIMUTH
 0993   REF   3  LAST  449   33,3470  51'427 1           INDEX  RUN
 0994   REF   2  LAST  449   33,3471  53'433 0           DXCH   TAZEL1          TAZEL1 +2 TARGET 2 AZIMUTH
 0995   REF   4  LAST  449   33,3472  11'427 0           CCS    RUN
 0996                        33,3473  1 3477 1           TCF    +4
 0997   REF  27  LAST  425   33,3474  3 5016 0           CAF    TWO
 0999   REF  56  LAST  431   33,3475  54 001 1           TS     L
 0999   REF   1              33,3476  1 3447 1           TCF    OPTDATA +2      MPAC    1ST PASS=0  2ND PASS=2


 09991  REF   1              33,3477  0 3541 1           TC     CONTIN33

 099921                      33,3500   01236 1  V05N30E  VN     0530

 10136  REF  30  LAST  445   33,3501  0 6006 1           TC     INTPRET          UNDYNAMIC ASSEMBLER
 1014                        33,3502   77170 1  TAP/EREF AXT,1  AXT,2           TARGET VECTOR
 1015                        33,3503   00002 0                  2               SIN(EL)  -COS(AZ)COS(EL)   SIN(AZ)COS(EL
 1016                        33,3504   00014 1                  12D
 1017                        33,3505   40331 1           SSP    SETPD
 1018   REF   3  LAST  430   33,3506   00052 0                  S2
 1019                        33,3507   00006 1                  6
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1020                          33,3510   00001 0                 0
1021                          33,3511   60533 1  TAR1   SLOAD*  $R2              X1=2 X2=12 S2=6 X1=0 X2=6 S2=6
1022  REF  3  LAST  449       33,3512   02436 1                  TAZEL1 +3,1
1023                          33,3513   00001 0          STORE   0               PD00    ELEVATION    PD00
1024                          33,3514   77756 0          SIN
1025                          33,3515   10023 1          STORE   18D,2           PD06 ***    SIN(EL)   ***PD12
1026                          33,3516   77745 1          DLOAD
1027                          33,3517   00001 0                  0
1028                          33,3520   41546 0          COS     PUSH            PD00     COS(EL)   PD00
1029                          33,3521   47133 0          SLOAD*  RTB
1030  REF  4  LAST  450       33,3522   02435 1                  TAZEL1 +2,1
1031  REF  4  LAST  405       33,3523   45513 1                  COULOGIC
1032                          33,3524   00003 1          STORE   2               PD02        AZIMUTH   PD02
1033                          33,3525   41356 1          SIN     DMP
1034                          33,3526   00001 0                  0
1035                          33,3527   77752 1          SL1
1036                          33,3530   10027 0          STORE   22D,2           PD10  *** SIN(AZ)COS(EL)  ***PD16
1037                          33,3531   71545 0          DLOAD   COS
1038                          33,3532   00003 1                  2
1039                          33,3533   72405 0          DMP     SL1
1040                          33,3534   76076 1          DCOMP   AXT,1
1041                          33,3535   00000 1                  0
1042                          33,3536   10025 1          STORE   20D,2           PD08 ***   -COS(AZ)COS(EL)  ***PD14
1043                          33,3537   43504 1          TIX,2   RVQ
1044  REF  1                  33,3540   67511 0                  TAR1


10443                         33,3541                    BANK    33
104435 REF  4  LAST  434      33,2000                    SETLOC  IMUCAL
10444                         33,3541                    BANK
104445 REF  1                                            COUNT*  $$/PD3

10445 REF  59  LAST  446      33,3541   3 5017 1 CONTIN33 CA      ONE
10446 REF   3  LAST  281      33,3542   54 735 1          TS      STARCODE
10447 REF 105  LAST  446      33,3543   3 5021 1          CA      ZERO
10448 REF   1                 33,3544   0 3635 1          TC      TARGDRVE
10449 REF  31  LAST  449      33,3545   0 6006 1          TC      INTPRET
104492                        33,3546    77624 1          CALL
104494 REF  1                 33,3547    67502 1                  TAR/EREF
104496                        33,3550    64375 1 NEXTBNKS VLOAD   MXV
1045                          33,3551    00007 0                  6D
1047  REF  28  LAST  445      33,3552    02672 0                  XSM
10471                         33,3553    77772 0          VSL1
1048  REF   3  LAST   95      33,3554    26736 1          STOVL   STARAD
1049                          33,3555    00015 0                  12D
1050                          33,3556    76521 0          MXV     VSL1
1051  REF  29  LAST  450      33,3557    02672 0                  XSM
1052  REF   4  LAST  450      33,3560    36744 0          STCALL  STARAD +6
1054  REF   1                 33,3561    67726 0                  LITTLSUB
1060  REF   4  LAST  441      33,3562    02414 1          STORE   LOSVEC
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1061                              33,3563   77776 1           EXIT
1062   REF  76  LAST  449         33,3564  0 4662 1           TC      BANKCALL
1063   REF   3  LAST  449         33,3565   16063 0           CADR    MKRELEAS

1069   REF  28  LAST  449         33,3566  3 5016 0  NEXBNKSS CAF     TWO
1070   REF   4  LAST  450         33,3567  54 735 1           TS      STARCODE
1071   REF  16  LAST  416         33,3570  3 6211 0           CAF     SIX
1072   REF   2  LAST  450         33,3571  0 3635 1           TC      TARGDRVE
1073   REF  32  LAST  450         33,3572  0 6006 1           TC      INTPRET
1074                              33,3573   77624 1           CALL
1075   REF   2  LAST  450         33,3574   67726 0                   LITTLSUB
10751                             33,3575   24015 0           STOVL   120
10752  REF   5  LAST  450         33,3576   02414 1                   LOSVEC
10753                             33,3577   34007 1           STCALL  06D
10754  REF   1                    33,3600   47401 1                   AXISGEN
10755                             33,3601   77624 1           CALL
10756  REF   1                    33,3602   47205 0                   CALCGTA
10757                             33,3603   77776 1           EXIT
1076   REF   1                    33,3604  3 3631 0  GCOMP4   CAF     V06N93S
1077   REF  77  LAST  451         33,3605  0 4662 1           TC      BANKCALL
1078   REF   5  LAST  449         33,3606   20720 0           CADR    GOFLASH
1079   REF   2  LAST  449         33,3607  0 3620 0           TC      GCOMP5
1080                              33,3610  1 3612 0           TCF     +2
1081   REF   1                    33,3611  1 3604 1           TCF     GCOMP4
1082   REF  33  LAST  451         33,3612  0 6006 1           TC      INTPRET
1083                              33,3613   53375 0           VLOAD   VAD
1084   REF  11  LAST  441         33,3614   02760 1                   OGC
1085   REF  11  LAST  445         33,3615   02650 0                   ERCOMP1
1086   REF  12  LAST  451         33,3616   02650 0           STORE   ERCOMP1
1087                              33,3617   77776 1           EXIT
1088   REF  78  LAST  451         33,3620  0 4662 1  GCOMP5   TC      BANKCALL
1089   REF   4  LAST  451         33,3621   16063 0           CADR    MKRELEAS
10895  REF  23  LAST  427         33,3622  0 5560 1           TC      DOWNFLAG
10896  REF   2  LAST  232         33,3623   00032 0           ADRES   TRM03FLG

1090   REF   5  LAST  449         33,3624  0 5354 0           TC      NEWMODEX
1091                              33,3625   00002 0           MM      02
1092   REF  18  LAST  449         33,3626  0 5412 0           TC      PHASCHNG
1093                              33,3627   00004 0           OCT     00004
1094   REF  56  LAST  448         33,3630  0 5217 0           TC      ENDOFJOB
1097                              33,3631   01535 0  V06N93S  VN      0693
1098   REF  23  LAST  442         33,3632  0 5650 1  GTSOPTCS TC      ALARM
1099                              33,3633   01602 1  GTSOPTSS OCT     01602
1100   REF   3  LAST  451         33,3634  0 3620 0           TC      GCOMP5

11001                             34,2002                     BANK    34
11002  REF   1                    04,2000                     SETLOC  IMUCAL1
11003                             04,2613                     BANK
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110035 REF   1                                                  COUNT  34/COMST

1119                          04,2613   62545 1  LATAZCHK DLOAD  SL2          CALLS FOR AZIMUTH AND LATITUDE
1120   REF   4  LAST  430     04,2614   02403 1                  LATITUDE
1121   REF  23  LAST  449     04,2615   15047 0           STODL  DSPTEM1 +1
1122   REF   3  LAST  424     04,2616   02401 0                  AZIMUTH
1123                          04,2617   77434 1           RTB    EXIT
1124   REF   3  LAST  288     04,2620   45546 1                  1STO2S
1125   REF 235  LAST  440     04,2621  56 154 1           XCH    MPAC
1126   REF  24  LAST  452     04,2622  55'045 0           TS     DSPTEM1
1127   REF  79  LAST  451     04,2623  0 4662 1           TC     BANKCALL
1128   REF   1                04,2624   20703 1           CADR   CLEANDSP
1129   REF   1                04,2625  3 2644 0           CAF    VNG0641
11291  REF  80  LAST  452     04,2626  0 4662 1           TC     BANKCALL
11292  REF   6  LAST  451     04,2627   20720 0           CADR   GOFLASH
11293                          04,2630  0 2632 1           TC     +2            NOT ALLOWED
11294                          04,2631  0 2633 0           TC     +2
11295                          04,2632  0 2625 1           TC     -5
1130   REF  34  LAST  451     04,2633  0 6006 1           TC     INTPRET
1131                          04,2634   47135 0           SLOAD  RTB
1132   REF  25  LAST  452     04,2635   01046 1                  DSPTEM1
1133   REF   5  LAST  450     04,2636   45513 1                  COULOGIC
1134   REF   4  LAST  452     04,2637   02401 0           STORE  AZIMUTH
11341                          04,2640   60535 1           SLOAD  SR2
11342  REF  26  LAST  452     04,2641   01047 0                  DSPTEM1 +1
11343  REF   5  LAST  452     04,2642   02403 1           STORE  LATITUDE
1135                          04,2643   77616 0           RVQ

11351                          04,2644   01451 0  VNG0641  VN     0641
1136                           33,3635                    BANK   33
1137   REF   5  LAST  450     33,2000                    SETLOC IMUCAL
1138                           33,3635                    BANK

1139   REF   2 LAST  449 TO  450:     67    67*          COUNT* $$/P03
1140                          33,3635  0 0006 1  TARGDRVE EXTEND
1141   REF   1                33,3636  23'424 1           QXCH   OPLAC
1142   REF   1                33,3637  55'431 1           TS     TARG1/2
11421  REF  35  LAST  452     33,3640  0 6006 1           TC     INTPRET
1143                          33,3641   77624 1           CALL
1144   REF   2  LAST  450     33,3642   67502 1                  TAR/EREF
1145                          33,3643   76740 0           LXC,1  VLOAD*
1146   REF   2  LAST  452     33,3644   02431 0                  TARG1/2
1147                          33,3645   00007 0                  60,1
1148   REF   7  LAST  288     33,3646   36766 0           STCALL STAR
1149   REF   1                33,3647   46053 0                  SXTANG
1150                          33,3650   77776 1           EXIT
1151   REF   6  LAST  288     33,3651  3 1773 0           CA     SAC
1152   REF   4  LAST  242     33,3652  55'161 1           TS     DESOPTS
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1153   REF   6  LAST  288   33,3653  3 1775 0          CA     PAC
1154   REF   5  LAST  242   33,3654  55'160 0          TS     DESOPTT
1155   REF 106  LAST  450   33,3655  3 5021 1  RETARG  CAF    ZERO
1156   REF  22  LAST  392   33,3656  55'303 1          TS     OPTIND
1157   REF  60  LAST  450   33,3657  3 5017 1          CAF    ONE
1158   REF  81  LAST  452   33,3660  0 4662 1          TC     BANKCALL
1159   REF   1               33,3661   16002 1         CADR   SXTMARK
1160   REF  82  LAST  453   33,3662  0 4662 1          TC     BANKCALL
1161   REF   1               33,3663   17573 0         CADR   OPTSTALL
1162   REF   1               33,3664  0 3632 0          TC     GTSOPTCS
116201 REF  15  LAST  442   33,3665  30 075 0          CAE    FLAGWRD1
116202 REF   1               33,3666  7 5014 0          MASK   TRM03BIT
116203 REF 136  LAST  447   33,3667  10 000 0          CCS    A
116204 REF   4  LAST  451   33,3670  0 3620 0          TC     GCOMP5

11621  REF  26  LAST  267   33,3671  51'330 0          INDEX  MARKSTAT
11622  REF   8  LAST  265   33,3672  3 0052 0          CA     QPRET
11623                        33,3673  0 0006 1          EXTEND
11624  REF   1               33,3674  1 3676 1          BZF    RETARG1
1163   REF   2  LAST  452   33,3675  0 1424 1          TC     QPLAC

1164   REF 107  LAST  453   33,3676  3 5021 1  RETARG1 CA     ZERO          RELEASE PREVIOUSLY GRABBED VAC AREA
1165   REF  27  LAST  453   33,3677  57'330 0          XCH    MARKSTAT
1166   REF 137  LAST  453   33,3700  10 000 0          CCS    A
1167   REF 138  LAST  453   33,3701  50 000 1          INDEX  A
1168   REF 139  LAST  453   33,3702  54 000 0          TS     A
1169   REF   1               33,3703  1 3655 0          TCF    RETARG        GO DO SXTMARK AGAIN
1170                        33,3704                    BANK   33
1171   REF   6  LAST  452   33,2000                    SETLOC IMUCAL
1172                        33,3704                    BANK
1173   REF   3 LAST  452 TO  453:    39   106*        COUNT* $$/P03
1200                        33,3704   30341 1  PIPASC  2DEC   .76376833
1200                        33,3705   22444 0
1201                        33,3706   57223 0  VELSC   2DEC   -.52223476
1201                        33,3707   66451 1
1202                        33,3710   05427 0  ALSK    2DEC   .17329931
1202                        33,3711   12577 1
1203                        33,3712   77567 0          2DEC   -.00835370
1203                        33,3713   44202 1
1204                        33,3714   24276 1  GEORGEJ 2DEC   .63661977
1204                        33,3715   14066 1
1207                        33,3716   03146 1  GEOCONS1 2DEC  .1
1207                        33,3717   14632 0
1208                        33,3720   00121 0  GEOCONS2 2DEC  .005
1208                        33,3721   35341 1
1209                        33,3722   01767 0  GEOCONS3 2DEC  .062
1209                        33,3723   31666 0
1210                        33,3724   00004 0  GEOCONS4 2DEC  .0003
1210                        33,3725   35223 1
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12525  REF   3 LAST  444 TO  449:   150   291*          COUNT  33/P02
1253                        33,3726   77620 0  LITTLSUB STQ
1254   REF   3  LAST  453   33,3727   02424 1           OPLAC
1255                        33,3730   76740 0           LXC,1  VLOAD*
1256   REF  28  LAST  453   33,3731   01330 0           MARKSTAT
1257                        33,3732   00003 1           2,1
1258   REF   4  LAST   75   33,3733   34767 0           STCALL CDUSPOT
1259   REF   1              33,3734   46000 0           SXTNB
1260                        33,3735   77624 1           CALL
1261   REF   1              33,3736   47637 0           TRG*NBSM
1262                        33,3737   77650 1           GOTO
1263   REF   4  LAST  454   33,3740   02424 1           OPLAC


1265                        33,3741   77776 1           EXIT
1300   REF  36  LAST  452   33,3742   0 6006 1  AZMTHCG1 TC     INTPRET
1301                        33,3743   47145 1           DLOAD  RTB
1302   REF   3  LAST  446   33,3744   02636 0           NEWAZMTH
1303   REF   4  LAST  452   33,3745   45546 1           1STO2S
1304                        33,3746   77776 1           EXIT
1305   REF 236  LAST  452   33,3747   56 154 1          XCH    MPAC
1306   REF  27  LAST  452   33,3750   55'045 0          TS     OSPTEM1
1307   REF  83  LAST  453   33,3751   0 4662 1          TC     BANKCALL
1308   REF   2  LAST  452   33,3752   20703 1           CADR   CLEANDSP
1309   REF   1              33,3753   3 3775 1          CAF    VN0629
1310   REF  84  LAST  454   33,3754   0 4662 1          TC     BANKCALL
1311   REF   7  LAST  452   33,3755   20720 0           CADR   GOFLASH
1312                        33,3756   1 3760 1          TCF    +2
1313                        33,3757   1 3761 0          TCF    +2
1314                        33,3760   1 3753 1          TCF    -5
1315   REF  37  LAST  454   33,3761   0 6006 1          TC     INTPRET
1316                        33,3762   47135 0           SLOAD  RTB
1317   REF  28  LAST  454   33,3763   01046 1           OSPTEM1
1318   REF   6  LAST  452   33,3764   45513 1           CDULOGIC
1319   REF   4  LAST  446   33,3765   02634 1           STORE  LAUNCHAZ
1320                        33,3766   77776 1           EXIT
1321   REF 108  LAST  453   33,3767   3 5021 1          CA     ZERO
1322   REF   5  LAST  446   33,3770   55'632 0          TS     PREMTRXC
1323   REF  19  LAST  451   33,3771   0 5412 0          TC     PHASCHNG
1324                        33,3772   00004 0           OCT    00004
1325   REF  38  LAST  447   33,3773   0 4701 0          TC     POSTJUMP
13255  REF   5  LAST  368   33,3774   21272 0           CADR   PINBRNCH

1326                        33,3775   01435 1  VN0629   VN     0629
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*** END OF COMAID .029 ***

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P0001   GROUND TRACKING DETERMINATION PROGRAM P21
R0002   PROGRAM DESCRIPTION
R0003   MOD NO - 1
R0004   MOD BY - N.M.NEVILLE
R0005   FUNCTIONAL DECRIPTION-
R0006
R0007   TO PROVIDE THE ASTRONAUT DETAILS OF THE LM OR CSM GROUND TRACK WITHOUT
R0008   THE NEED FOR GROUND COMMUNICATION (REQUESTED BY DSKY).
R0009   CALLING SEQUENCE -
R0010
R0011   ASTRONAUT REQUEST THROUGH DSKY V37E21E
R0012   SUBROUTINES CALLED-
R0013
R0014   GOPERF4
R0015   GOFLASH
R0016   THISPREC
R0017   OTHPREC
R0018   LAT-LONG
R0019   NORMAL EXIT MODES-
R0020
R0021   ASTRONAUT REQUEST TROUGH DSKY TO TERMINATE PROGRAM V34E
R0022   ALARM OR ABORT EXIT MODES-
R0023
R0024   NONE
R0025   OUTPUT -
R0026
R0027   OCTAL DISPLAY OF OPTION CODE AND VEHICLE WHOSE GROUND TRACK IS TO BE
R0028   COMPUTED
R0029           OPTION CODE  00002
R0030           THIS         00001
R0031           OTHER        00002
R0032   DECIMAL DISPLAY OF TIME TO BE INTEGRATED TO HOURS , MINUTES , SECONDS
R0033   DECIMAL DISPLAY OF LAT,LONG,ALT
R0034   ERASABLE INITIALIZATION REQUIRED
R0035
R0036   AXO     2DEC   4.652459653 E-5   RADIANS       %68-69 CONSTANTS"
R0037
R0038   -AYO    2DEC   2.147535898 E-5   RADIANS
R0039
R0040   AZO     2DEC   .7753206164       REVOLUTIONS
R0041   FOR LUNAR ORBITS 504LM VECTOR IS NEEDED
R0042
R0043   504LM   2DEC   -2.700340600 E-5  RADIANS
R0044
R0045   504LM_2 2DEC   -7.514128400 E-4  RADIANS
R0046
R0047   504LM_4 2DEC   -2.553198641 E-4  RADIANS
R0048
R0049   NONE
R0050   DEBRIS
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R0051
R0052   CENTRALS-A,Q,L
R0053   OTHER-THOSE USED BY THE ABOVE LISTED SUBROUTINES
R0054   SEE LEMPREC,LAT-LONG
 0055   REF   5  LAST  389   30,2000                        SBANK= LOWSUPER        FOR LOW 2CADR'S.

 0056                        33,3776                        BANK   33
 0057   REF   1              37,2000                        SETLOC P20S
 0058                        37,2001                        BANK

 0059   REF   3  LAST  262   E4,1715                        EBANK= P21TIME
 0060   REF   1                                             COUNT  24/P21

 0061   REF  61  LAST  453   37,2001  3 5017 1  PROG21      CAF    ONE
 0062   REF   2  LAST  281   37,2002  55'132 1              TS     OPTION2         ASSUMED VEHICLE IS LM , R2 = 00001
 0063   REF  22  LAST  375   37,2003  3 5016 0              CAF    BIT2             OPTION 2
 0064   REF  85  LAST  454   37,2004  0 4662 1              TC     BANKCALL
 0065   REF   1              37,2005   21055 1              CADR   GOPERF4
 0066   REF   3  LAST  392   37,2006  0 4106 1              TC     GOTOPOOH        TERMINATE
 0067                        37,2007  0 2011 0              TC     +2              PROCEED VALUE OF ASSUMED VEHICLE OK
 0068                        37,2010  0 2003 0              TC     -5              R2 LOADED THROUGH DSKY
 0069   REF   1              37,2011  3 2152 0  P21PROG1    CAF    V6N34           LOAD DESIRED TIME OF LAT-LONG.
 0070   REF  86  LAST  457   37,2012  0 4662 1              TC     BANKCALL
 0071   REF   8  LAST  454   37,2013   20720 0              CADR   GOFLASH
 0072   REF   4  LAST  457   37,2014  0 4106 1              TC     GOTOPOOH        TERM
 0073                        37,2015  0 2017 0              TC     +2              PROCEED VALUES OK
 0074                        37,2016  0 2011 0              TC     -5              TIME LOADED THROUGH DSKY
 0075   REF  38  LAST  454   37,2017  0 6006 1              TC     INTPRET
 0076                        37,2020   77745 1              DLOAD
00763   REF  29  LAST  454   37,2021   01045 1                     DSPTEM1
 0077   REF   2  LAST  210   37,2022   34041 0              STCALL TDEC1           INTEG TO TIME SPECIFIED IN TDEC
00773   REF   6  LAST  265   37,2023   27442 0                     INTSTALL
00776                        37,2024   43014 0              BON    SET
 0078   REF   1              37,2025   01303 0                     P21FLAG
00783   REF   1              37,2026   76044 0                     P21CONT         ON...RECYCLE USING BASE VECTOR
00786   REF   4  LAST  210   37,2027   01474 1                     VINTFLAG        OFF..1ST PASS CALC BASE VECTOR
 0079                        37,2030   70535 0              SLOAD  SR1
 0080   REF   3  LAST  457   37,2031   01133 1                     OPTION2
00805                        37,2032   43030 0              BHIZ   CLEAR
 0081                        37,2033   76035 0                     +2              ZERO..THIS VEHICLE (CM)
00813   REF   5  LAST  457   37,2034   01674 0                     VINTFLAG        ONE...OTHER VEHICLE(LM)
00816                        37,2035   43014 0              CLEAR  CLEAR
 0082   REF   3  LAST  210   37,2036   01676 1                     DIMOFLAG
00823   REF   1              37,2037   01673 1                     INTYPFLG        PRECISION
00826                        37,2040   77624 1              CALL
 0083   REF   3  LAST  210   37,2041   27162 1                     INTEGRV         CALCULATE
 0084                        37,2042   77650 1              GOTO                   .AND
00845   REF   1              37,2043   76065 0                     P21VSAVE        ..SAVE BASE VECTOR
 0085                        37,2044   77775 1  P21CONT     VLOAD                  RECYCLE..INTEG FROM BASE VECTOR
 0086   REF   2  LAST  129   37,2045   03605 1                     P21BASER
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0087   REF  4  LAST  289   37,2046   25535 0          STOVL  RCV              ..POS
0088   REF  2  LAST  129   37,2047   03613 0                 P21BASEV
0089   REF  4  LAST  290   37,2050   15543 1          STODL  VCV              ..VEL
0090   REF  4  LAST  457   37,2051   02316 1                 P21TIME
0091   REF  4  LAST  289   37,2052   01517 0          STORE  TET              ..TIME
0093                       37,2053   43014 0          CLEAR  CLEAR
0094   REF  4  LAST  457   37,2054   01676 1                 DIMOFLAG
0095   REF  1               37,2055   00263 0                 MOONFLAG
0096                       37,2056   53135 0          SLOAD  BZE
00965  REF  2  LAST  129   37,2057   03604 0                 P21ORIG
0097                       37,2060   76063 0                 +3               ZERO = EARTH
00975                      37,2061   77614 1          SET                     ...2 = MOON
0098   REF  2  LAST  458   37,2062   00063 1                 MOONFLAG
00985                      37,2063   77624 1          CALL
0099   REF  1               37,2064   27135 0                 INTEGRVS
00995                      37,2065   77745 1  P21VSAVE DLOAD                  SAVE CURRENT BASE VECTOR
0100   REF  1               37,2066   00015 0                 TAT
01003  REF  5  LAST  458   37,2067   26316 1          STOVL  P21TIME          ..TIME
01006  REF  1               37,2070   00017 1                 RATT1
0101   REF  3  LAST  457   37,2071   27605 1          STOVL  P21BASER         ..POS B-29 OR B-27
01013  REF  1               37,2072   00025 0                 VATT1
01016  REF  3  LAST  458   37,2073   03613 0          STORE  P21BASEV         ..VEL B-7  OR B-5
01017                      37,2074   53646 0          ABVAL  SL*
010172                     37,2075   57576 1                 0,2
010175 REF  3  LAST  281   37,2076   27623 0          STOVL  P21VEL           /VEL/ FOR N73 DSP
01018  REF  1               37,2077   00001 0                 RATT
010185                     37,2100   50256 0          UNIT   DOT
010188 REF  1               37,2101   00007 0                 VATT            U(R).(V)
01019                      37,2102   67471 1          DDV    ASIN             U(R).U(V)
010192 REF  4  LAST  458   37,2103   03623 0                 P21VEL
010195 REF  2  LAST  281   37,2104   03625 0          STORE  P21GAM           SIN-1 U(R).U(V), -90 TO +90
0102                       37,2105   43134 0          SXA,2  SET
01025  REF  3  LAST  458   37,2106   03603 1                 P21ORIG          0 = EARTH  2 = MOON
01026  REF  2  LAST  457   37,2107   01063 0                 P21FLAG
0103                       37,2110   67214 1  P21DSP  CLEAR  SLOAD            GENERATE DISPLAY DATA
01033  REF  1               37,2111   01663 0                 LUNAFLAG
01036  REF  1               37,2112   00050 1                 X2
0104                       37,2113   43054 1          BZE    SET
01043                      37,2114   76116 0                 +2               0 = EARTH
01046  REF  2  LAST  458   37,2115   01463 1                 LUNAFLAG
0105                       37,2116   77775 1          VLOAD
01053  REF  2  LAST  458   37,2117   00001 0                 RATT
01056  REF  2  LAST   89   37,2120   16152 0          STODL  ALPHAV
0106   REF  2  LAST  458   37,2121   00015 0                 TAT
01063                      37,2122   45014 0          CLEAR  CALL
01066  REF  1               37,2123   00662 0                 ERADFLAG
0107   REF  1               37,2124   26370 1                 LAT-LONG
01072                      37,2125   77605 1          DMP                     MPAC = ALT, METERS B-29
01075  REF  1               37,2126   36154 1                 K.01
01078  REF  3  LAST  281   37,2127   03621 1          STORE  P21ALT           ALT/100 FOR N73 DSP
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L GROUND TRACKING DETERMINATION PROGRAM - P21 USER'S PAGE NO. 4 E4 S3

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0108                                37,2130   77776 1           EXIT
0109  REF   1                     37,2131  3 2151 0           CAF     V06N43          DISPLAY LAT,LONG,ALT
0110  REF  87  LAST  457          37,2132  0 4662 1           TC      BANKCALL        LAT,LONG = REVS  80   BOTH EARTH/MOON
0111  REF   9  LAST  457          37,2133   20720 0           CADR    GOFLASH         ALT = METERS B-29     BOTH EARTH/MOON
0112  REF   5  LAST  457          37,2134  0 4106 1           TC      GOTOPOOH        TERM
0113  REF   6  LAST  459          37,2135  0 4106 1           TC      GOTOPOOH
0114  REF  39  LAST  457          37,2136  0 6006 1           TC      INTPRET         V32E RECYCLE
0115                               37,2137   43345 1           DLOAD   DAD
0116  REF   6  LAST  458          37,2140   02316 1                   P21TIME
0117  REF   1                     37,2141   36146 1                   600SEC          600 SECONDS OR 10 MIN
0118  REF  30  LAST  457          37,2142   01046 1           STORE   DSPTEM1
0119                               37,2143   77634 0           RTB
0120  REF   1                     37,2144   76011 0                   P21PROG1
0121                               37,2145   00003 1  600SEC   2DEC    60000           10 MIN
0121                               37,2146   25140 0
0122                               37,2147   00001 0  P21ONENN OCT     00001           NEEDED TO DETERMINE VEHICLE
0123                               37,2150   00000 1           OCT     00000           TO BE INTEGRATED
0124                               37,2151   01453 1  V06N43   VN      00643
0125                               37,2152   01442 1  V6N34    VN      00634
0131                               37,2153   00243 1  K.01     2DEC    .01
0131                               37,2154   32703 1
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P0010   TRANSFER PHASE INITIATION (TPI) PROGRAMS (P34 AND P74)

R0011   MOD NO -1       LOG SECTION - P32-P35, P72-P75
R0012   MOD BY WHITE.P  DATE 1JUNE67

R0013   PURPOSE

R0014         (1) TO CALCULATE THE REQUIRED DELTA V AND OTHER INITIAL CONDITIONS
R0015             REQUIRED BY THE ACTIVE VEHICLE FOR EXECUTION OF THE TRANSFER
R0016             PHASE INITIATION (TPI) MANEUVER, GIVEN -

R0017               (A) TIME OF IGNITION TIG (TPI) OR THE ELEVATION ANGLE (E) OF
R0018                   THE ACTIVE/PASSIVE VEHICLE LOS AT TIG (TPI).

R0019               (B) CENTRAL ANGLE OF TRANSFER (CENTANG) FROM TIG (TPI) TO
R0020                   INTERCEPT TIME (TIG (TPF)).

R0021         (2) TO CALCULATE TIG (TPI) GIVEN E OR E GIVEN TIG (TPI).

R0022         (3) TO CALCULATE THESE PARAMETERS BASED UPON MANEUVER DATA
R0023             APPROVED AND KEYED INTO THE DSKY BY THE ASTRONAUT.

R0024         (4) TO DISPLAY TO THE ASTRONAUT AND THE GROUND CERTAIN DEPENDENT
R0025             VARIABLES ASSOCIATED WITH THE MANEUVER FOR APPROVAL BY THE
R0026             ASTRONAUT/GROUND.

R0027         (5) TO STORE THE TPI TARGET PARAMETERS FOR USE BY THE DESIRED
R0028             THRUSTING PROGRAM.

R0029   ASSUMPTIONS

R0030         (1) LM ONLY - THIS PROGRAM IS BASED UPON PREVIOUS COMPLETION OF
R0031             THE CONSTANT DELTA ALTITUDE (CDH) PROGRAM (P33/P73).
R0032             THEREFORE -

R0033               (A) AT A SELECTED TPI TIME (NOW IN STORAGE) THE LINE OF SIGHT
R0034                   BETWEEN THE ACTIVE AND PASSIVE VEHICLES WAS SELECTED TO BE
R0035                   A PRESCRIBED ANGLE (E) (NOW IN STORAGE) FROM THE
R0036                   HORIZONTAL PLANE DEFINED BY THE ACTIVE VEHICLE POSITION.

R0037               (B) THE TIME BETWEEN CDH IGNITION AND TPI IGNITION WAS
R0038                   COMPUTED TO BE GREATER THAN 10 MINUTES.

R0039               (C) THE VARIATION OF THE ALTITUDE DIFFERENCE BETWEEN THE
R0040                   ORBITS WAS MINIMIZED.

R0041               (D) THE PERICENTER ALTITUDES OF ORBITS FOLLOWING CSI AND

R0042                   CDH WERE COMPUTED TO BE GREATER THAN 35,000 FT FOR LUNAR
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ORBIT OR 85 NM FOR EARTH ORBIT.

(E) THE CSI AND CDH MANEUVERS WERE ASSUMED TO BE PARALLEL TO THE PLANE OF THE PASSIVE VEHICLE ORBIT. HOWEVER, CREW MODIFICATION OF DELTA V (LV) COMPONENTS MAY HAVE RESULTED IN AN OUT-OF-PLANE MANEUVER.

(2) STATE VECTOR UPDATED BY P27 ARE DISALLOWED DURING AUTOMATIC STATE VECTOR UPDATING INITIATED BY P20 (SEE ASSUMPTION (4)).

(3) THIS PROGRAM MUST BE DONE OVER A TRACKING STATION FOR REAL TIME GROUND PARTICIPATION IN DATA INPUT AND OUTPUT. COMPUTED VARIABLES MAY BE STORED FOR LATER VERIFICATION BY THE GROUND. THESE STORAGE CAPABILITIES ARE LIMITED ONLY TO THE PARAMETERS FOR ONE THRUSTING MANEUVER AT A TIME EXCEPT FOR CONCENTRIC FLIGHT PLAN MANEUVER SEQUENCES.

(4) THE RENDEZVOUS RADAR MAY OR MAY NOT BE USED TO UPDATE THE LM OR CSM STATE VECTORS FOR THIS PROGRAM. IF RADAR USE IS DESIRED THE RADAR WAS TURNED ON AND LOCKED ON THE CSM BY PREVIOUS SELECTION OF P20. RADAR SIGHTING MARKS WILL BE MADE AUTOMATICALLY APPROXIMATELY ONCE A MINUTE WHEN ENABLED BY THE TRACK AND UPDATE FLAGS (SEE P20). THE RENDEZVOUS TRACKING MARK COUNTER IS ZEROED BY THE SELECTION OF P20 AND AFTER EACH THRUSTING MANEUVER.

(5) THE ISS NEED NOT BE ON TO COMPLETE THIS PROGRAM.

(6) THE OPERATION OF THE PROGRAM UTILIZES THE FOLLOWING FLAGS -

ACTIVE VEHICLE FLAG - DESIGNATES THE VEHICLE WHICH IS DOING RENDEZVOUS THRUSTING MANEUVERS TO THE PROGRAM WHICH CALCULATES THE MANEUVER PARAMETERS. SET AT THE START OF EACH RENDEZVOUS PRE-THRUSTING PROGRAM.

FINAL FLAG - SELECTS FINAL PROGRAM DISPLAYS AFTER CREW HAS SELECTED THE FINAL MANEUVER COMPUTATION CYCLE.

EXTERNAL DELTA V FLAG - DESIGNATES THE TYPE OF STEERING REQUIRED FOR EXECUTION OF THIS MANEUVER BY THE THRUSTING PROGRAM SELECTED AFTER COMPLETION OF THIS PROGRAM.

(7) ONCE THE PARAMETWRS REQUIRED FOR COMPUTION OF THE MANEUVER HAVE BEEN COMPLETELY SPECIFIED, THE VALUE OF THE ACTIVE VEHICLE CENTRAL ANGLE OF TRANSFER IS COMPUTED AND STORED. THIS NUMBER WILL BE AVAILABLE FOR DISPLAY TO THE ASTRONAUT THROUGH THE USE OF V06N52.

THE ASTRONAUT WILL CALL THIS DISPLAY TO VERIFY THAT THE CENTRAL ANGLE OF TRANSFER OF THE ACTIVE VEHICLE IS NOT WITHIN

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R0082              170 TO 190 DEGREES.  IF THE ANGLE IS WITHIN THIS ZONE THE
R0083              ASTRONAUT SHOULD REASSESS THE INPUT TARGETING PARAMETERS BASED
R0084              UPON DELTA V AND EXPECTED MANEUVER TIME.

R0085          (8) THIS PROGRAM IS SELECTED BY THE ASTRONAUT BY DSKY ENTRY -

R0086                  P34 IF THIS VEHICLE IS ACTIVE VEHICLE.

R0087                  P74 IF THIS VEHICLE IS PASSIVE VEHICLE.

R0088   INPUT

R0089          (1) TTPI      TIME OF THE TPI MANEUVER
R0090          (2) ELEV      DESIRED LOS ANGLE AT TPI
R0091          (3) CENTANG   ORBITAL CENTRAL ANGLE OF THE PASSIVE VEHICLE DURING
R0092                        TRANSFER FROM TPI TO TIME OF INTERCEPT

R0093   OUTPUT

R0094          (1) TRKMKCNT NUMBER OF MARKS
R0095          (2) TTOGO    TIME TO GO
R0096          (3) +MGA     MIDDLE GIMBAL ANGLE
R0097          (4) TTPI     COMPUTED TIME OF TPI MANEUVER
R0098                OR
R0099               ELEV    COMPUTED LOS ANGLE AT TPI
R0100          (5) POSTTPI  PERIGEE ALTITUDE AFTER THE TPI MANEUVER
R0101          (6) DELVTPI  MAGNITUDE OF DELTA V AT TPI
R0102          (7) DELVTPF  MAGNITUDE OF DELTA V AT INTERCEPT
R0103          (8) DVLOS    DELTA VELOCITY AT TPI - LINE OF SIGHT
R0104          (9) DELVLVC  DELTA VELOCITY AT TPI - LOCAL VERTICAL COORDINATES

R0105   DOWNLINK

R0114          (1) TTPI     TIME OF THE TPI MANEUVER
R0115          (2) TIG      TIME OF THE TPI MANEUVER
R0116          (3) ELEV     DESIRED LOS ANGLE AT TPI
R0117          (4) CENTANG  ORBITAL CENTRAL ANGLE OF THE PASSIVE VEHICLE DURING
R0118                       TRANSFER FROM TPI TO TIME OF INTERCEPT
R0119          (5) DELVEET3 DELTA VELOCITY AT TPI - REFERENCE COORDINATES
R0120          (6) TPASS4   TIME OF INTERCEPT
R0121   COMMUNICATION TO THRUSTING PROGRAMS

R0122          (1) TIG      TIME OF THE TPI MANEUVER
R0123          (2) RTARG    OFFSET TARGET POSITION
R0124          (3) TPASS4   TIME OF INTERCEPT
R0125          (4) XDELVFLG RESET TO INDICATE LAMBERT (AIMPOINT) VG COMPUTATION

R0126   SUBROUTINES USED

R0127          AVFLAGA
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R0128           AVFLAGP
R0129           VNPOOH
R0130           DISPLAYE
R0131           SELECTMU
R0132           PRECSET
R0133           S33/34.1
R0134           ALARM
R0135           BANKCALL
R0136           GOFLASH
R0137           GOTOPOOH
R0138           TIMETHET
R0139           S34/35.2
R0140           PERIAPO1
R0141           SHIFTR1
R0142           S34/35.5
R0143           VN1645

 0144   REF   1              35,2000                        SETLOC CSI/CDH
 0145                        35,2000                        BANK
 0146   REF   9  LAST  255   E4,1770                        EBANK= SUBEXIT
 0147   REF   1                                            COUNT  35/P3474

 0148   REF   1              35,2000  0 4627 0  P34        TC     AVFLAGA
 0149   REF   1              35,2001  0 2003 0             TC     P34/P74A
 0150   REF   1              35,2002  0 4642 0  P74        TC     AVFLAGP
 0151   REF   1              35,2003  0 4647 0  P34/P74A   TC     P20FLGON        SET UPDATFLG, TRACKFLG
 01515  REF   1              35,2004  3 4614 0             CAF    V06N37          TTPI
 0152   REF   1              35,2005  0 4575 1             TC     VNPOOH
 01521  REF  40  LAST  459   35,2006  0 6006 1             TC     INTPRET
 01522                       35,2007   77531 0             SSP    EXIT
 01528  REF   2  LAST  127   35,2010   03766 0                    NN
 01529                       35,2011   00000 1                    0
 0153   REF   1              35,2012  0 3070 0             TC     DISPLAYE        ELEV AND CENTANG
 0154   REF  41  LAST  483   35,2013  0 6006 1             TC     INTPRET
 0155                        35,2014   71214 0             CLEAR  DLOAD
 0156   REF   3  LAST   51   35,2015   01270 0                    ETPIFLAG
 0157   REF   4  LAST  272   35,2016   03663 1                    TTPI
 0158   REF  16  LAST  272   35,2017   17413 1             STODL  TIG
 0159   REF   4  LAST  280   35,2020   03744 0                    ELEV
 0160                        35,2021   43054 1             BZE    SET
 0161   REF   1              35,2022   72024 1                    P34/P74B
 0162   REF   4  LAST  463   35,2023   01070 1                    ETPIFLAG
 0163                        35,2024   77624 1  P34/P74B   CALL
 0164   REF   1              35,2025   10712 1                    SELECTMU
 0165                          0032               DELELO   EQUALS 26D
 0166                        35,2026   43145 0  P34/P74C   DLOAD  SET
 0167   REF   2  LAST   34   35,2027   15335 0                    ZEROVECS
 0168   REF   1              35,2030   03461 1                    ITSWICH
 0169                        35,2031   43014 0             BON    CLEAR
 0170   REF   5  LAST  463   35,2032   01310 1                    ETPIFLAG
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0171   REF   1                  35,2033   72035 1                    SWCHSET
0172   REF   2  LAST  463       35,2034   03661 0                    ITSWICH
0173   REF   1                  35,2035   02364 1  SWCHSET  STORE    NOMTPI
0174                            35,2036   43345 1  INTLOOP  DLOAD    DAD
0175   REF   5  LAST  463       35,2037   03663 1                    TTPI
0176   REF   2  LAST  464       35,2040   02364 1                    NOMTPI
0177   REF   3  LAST  457       35,2041   34041 0           STCALL   TDEC1
0178   REF   1                  35,2042   45215 0                    PRECSET
0179                            35,2043   77624 1           CALL
0180   REF   1                  35,2044   72216 1                    S33/34.1
0181                            35,2045   77454 1           BZE      EXIT
0182   REF   1                  35,2046   72057 0                    SWCHCLR
0183   REF  24  LAST  451       35,2047   0 5650 1          TC       ALARM
0184                            35,2050    00611 1          OCT      611
0185   REF   1                  35,2051   3 5050 1          CAF      V05N09
0186   REF  88  LAST  459       35,2052   0 4662 1          TC       BANKCALL
0187   REF  10  LAST  459       35,2053    20720 0          CADR     GOFLASH
0188   REF   7  LAST  459       35,2054   0 4106 1          TC       GOTOPOOH
0189   REF   2  LAST  463       35,2055   0 2003 0          TC       P34/P74A        PROCEED
0190                            35,2056   0 2047 0          TC       -7              V32

0191                            35,2057    43014 0  SWCHCLR  BONCLR   BON
0192   REF   3  LAST  464       35,2060   03601 0                    ITSWICH
0193   REF   1                  35,2061    72036 1                   INTLOOP
0194   REF   6  LAST  463       35,2062    01310 1                   ETPIFLAG
0195   REF   1                  35,2063    72067 0                   P34/P74D        DISPLAY TTPI
0196                            35,2064    77776 1          EXIT
0197   REF   2  LAST  463       35,2065   0 3070 0          TC       DISPLAYE        DISPLAY ELEV AND CENTANG
0198   REF   1                  35,2066   0 2072 0          TC       P34/P74E
0199                            35,2067    77776 1  P34/P74D EXIT
0200   REF   2  LAST  463       35,2070   3 4614 0          CAF      V06N37          TTPI
0201   REF   2  LAST  463       35,2071   0 4575 1          TC       VNPOOH
0202   REF  42  LAST  463       35,2072   0 6006 1  P34/P74E TC       INTPRET
0203                            35,2073    71201 1          SETPD    DLOAD
0204                            35,2074    00001 0                   0D
0205   REF   2  LAST  126       35,2075    03746 1                   RTX1
0206   REF   2  LAST  441       35,2076    14047 1          STODL    X1
0207   REF   5  LAST  280       35,2077    03754 1                   CENTANG
0208                            35,2100    71406 0          PUSH     COS
0209   REF   2  LAST   96       35,2101    16734 0          STODL    CSTH
0210                            35,2102    77756 0          SIN
0211   REF   2  LAST   96       35,2103    26732 0          STOVL    SNTH
0212   REF   2  LAST  122       35,2104    03554 0                   RPASS3
0213                            35,2105    77657 0          VSR*
0214                            35,2106    57176 0                   0,2
0215   REF   1                  35,2107    26657 1          STOVL    RVEC
0216   REF   2  LAST  122       35,2110    03562 0                   VPASS3
0217                            35,2111    43057 1          VSR*     SET
0218                            35,2112    57176 0                   0,2
0219   REF   1                  35,2113    03466 0                   RVSW
```

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0220   REF   2  LAST   96   35,2114   36746 1          STCALL VVEC
0221   REF   1               35,2115   24744 0                 TIMETHET
0222                         35,2116   77745 1          DLOAD
0223   REF   6  LAST  464   35,2117   03663 1                 TTPI
0224   REF   2  LAST  123   35,2120   03503 1          STORE  INTIME          FOR INITVEL
0225   .                    35,2121   77615 0          DAD
0226   REF   1               35,2122   00037 0                 T              RENDEZVOUS TIME
0227   REF   5  LAST  175   35,2123   37656 0          STCALL TPASS4          FOR INITVEL
0228   REF   1               35,2124   72526 0                 S34/35.2
0229                         35,2125   51575 1          VLOAD  ABVAL
0230   REF   3  LAST  175   35,2126   03646 0                 DELVEET3
0231   REF   4  LAST  280   35,2127   26635 0          STOVL  DELVTPI
0232   REF   2  LAST  123   35,2130   03640 0                 VPASS4
0233                         35,2131   51451 0          VSU    ABVAL
0234   REF   3  LAST  123   35,2132   03620 0                 VTPRIME
0235   REF   4  LAST  280   35,2133   26637 1          STOVL  DELVTPF
0236   REF   3  LAST  122   35,2134   03540 0                 RACT3
0237                         35,2135   45115 0          PDVL   CALL
0238   REF   3  LAST  123   35,2136   03612 1                 VIPRIME
0239   REF   1               35,2137   45153 1                 PERIAPO1
0240                         35,2140   77624 1          CALL
0241   REF   1               35,2141   45263 1                 SHIFTR1
0242   REF   2  LAST  280   35,2142   16641 0          STODL  POSTTPI
0243   REF   7  LAST  465   35,2143   03663 1                 TTPI
0244   REF  17  LAST  463   35,2144   03413 1          STORE  TIG
0245                         35,2145   77776 1          EXIT
0246   REF   1               35,2146   3 4616 1         CAF    V06N58
0247   REF   3  LAST  464   35,2147   0 4575 1         TC     VNPOOH
0248   REF  43  LAST  464   35,2150   0 6006 1         TC     INTPRET
0249                         35,2151   77624 1          CALL
0250   REF   1               35,2152   72741 0                 S34/35.5
0251                         35,2153   77624 1          CALL
0252   REF   1               35,2154   73002 1                 VN1645
0253                         35,2155   77650 1          GOTO
0254   REF   1               35,2156   72026 0                 P34/P74C
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P0255   RENDEZVOUS MID-COURSE MANEUVER PROGRAMS (P35 AND P75)

R0256   MOD NO -1        LOG SECTION - P32-P35, P72-P75
R0257   MOD BY WHITE.P   DATE  1JUNE67

R0258   PURPOSE

R0259           (1) TO CALCULATE THE REQUIRED DELTA V AND OTHER INITIAL CONDITIONS
R0260               REQUIRED BY THE ACTIVE VEHICLE FOR EXECUTION OF THE NEXT
R0261               MIDCOURSE CORRECTION OF THE TRANSFER PHASE OF AN ACTIVE
R0262               VEHICLE RENDEZVOUS.

R0263           (2) TO DISPLAY TO THE ASTRONAUT AND THE GROUND CERTAIN DEPENDENT
R0264               VARIABLES ASSOCIATED WITH THE MANEUVER FOR APPROVAL BY THE
R0265               ASTRONAUT/GROUND.

R0266           (3) TO STORE THE TPM TARGET PARAMETERS FOR USE BY THE DESIRED
R0267               THRUSTING PROGRAM.

R0268   ASSUMPTIONS

R0269           (1) THE ISS NEED NOT BE ON TO COMPLETE THIS PROGRAM.

R0270           (2) STATE VECTOR UPDATES BY P27 ARE DISALLOWED DURING AUTOMATIC
R0271               STATE VECTOR UPDATING INITIATED BY P20 (SEE ASSUMPTION (3)).

R0272           (3) THE RENDEZVOUS RADAR IS ON AND IS LOCKED ON THE CSM.  THIS WAS
R0273               DONE DURING PREVIOUS SELECTION OF P20.  RADAR SIGHTING MARKS
R0274               WILL BE MADE AUTOMATICALLY APPROXIMATELY ONCE A MINUTE WHEN
R0275               ENABLED BY THE TRACK AND UPDATE FLAGS (SEE P20). THE
R0276               RENDEZVOUS TRACKING MARK COUNTER IS ZEROED BY THE SELECTION OF
R0277               P20 AND AFTER EACH THRUSTING MANEUVER.

R0278           (4) THE OPERATION OF THE PROGRAM UTILIZES THE FOLLOWING FLAGS -

R0279                   ACTIVE VEHICLE FLAG - DESIGNATES THE VEHICLE WHICH IS
R0280                   DOING RENDEZVOUS THRUSTING MANEUVERS TO THE PROGRAM WHICH
R0281                   CALCULATES THE MANEUVER PARAMETERS.  SET AT THE START OF
R0282                   EACH RENDEZVOUS PRE-THRUSTING PROGRAM.

R0283                   FINAL FLAG - SELECTS FINAL PROGRAM DISPLAYS AFTER CREW HAS
R0284                   SELECTED THE FINAL MANEUVER COMPUTATION CYCLE.

R0285                   EXTERNAL DELTA V FLAG - DESIGNATES THE TYPE OF STEERING
R0286                   REQUIRED FOR EXECUTION OF THIS MANEUVER BY THE THRUSTING
R0287                   PROGRAM SELECTED AFTER COMPLETION OF THIS PROGRAM.

R0288           (5) THE TIME OF INTERCEPT (T(INT)) WAS DEFINED BY PREVIOUS
R0289               COMPLETION OF THE TRANSFER PHASE INITIATION (TPI) PROGRAM
R0290               (P34/P74) AND IS PRESENTLY AVAILABLE IN STORAGE.
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R0291          (6) ONCE THE PARAMETERS REQUIRED FOR COMPUTION OF THE MANEUVER
R0292              HAVE BEEN COMPLETELY SPECIFIED, THE VALUE OF THE ACTIVE
R0293              VEHICLE CENTRAL ANGLE OF TRANSFER IS COMPUTED AND STORED.
R0294              THIS NUMBER WILL BE AVAILABLE FOR DISPLAY TO THE ASTRONAUT
R0295              THROUGH THE USE OF V06N52.

R0296              THE ASTRONAUT WILL CALL THIS DISPLAY TO VERIFY THAT THE
R0297              CENTRAL ANGLE OF TRANSFER OF THE ACTIVE VEHICLE IS NOT WITHIN
R0298              170 TO 190 DEGREES.  IF THE ANGLE IS WITHIN THIS ZONE THE
R0299              ASTRONAUT SHOULD REASSESS THE INPUT TARGETING PARAMETERS BASED
R0300              UPON DELTA V AND EXPECTED MANEUVER TIME.

R0301          (7) THIS PROGRAM IS SELECTED BY THE ASTRONAUT BY DSKY ENTRY -

R0302                  P35 IF THIS VEHICLE IS ACTIVE VEHICLE.

R0303                  P75 IF THIS VEHICLE IS PASSIVE VEHICLE.

R0304    INPUT

R0305          (1) TPASS4   TIME OF INTERCEPT - SAVED FROM P34/P74
R0306    OUTPUT

R0307          (1) TRKMKCNT NUMBER OF MARKS
R0308          (2) TTOGO    TIME TO GO
R0309          (3) +MGA     MIDDLE GIMBAL ANGLE
R0310          (4) DVLOS    DELTA VELOCITY AT MID - LINE OF SIGHT
R0311          (5) DELVLVC  DELTA VELOCITY AT MID - LOCAL VERTICAL COORDINATES

R0312    DOWNLINK

R0325          (1) TIG      TIME OF THE TPM MANEUVER
R0326          (2) DELVEET3 DELTA VELOCITY AT TPM - REFERENCE COORDINATES
R0327          (3) TPASS4   TIME OF INTERCEPT
R0328    COMMUNICATION TO THRUSTING PROGRAMS

R0329          (1) TIG      TIME OF THE TPM MANEUVER
R0330          (2) RTARG    OFFSET TARGET POSITION
R0331          (3) TPASS4   TIME OF INTERCEPT
R0332          (4) XDELVFLG RESET TO INDICATE LAMBERT (AIMPOINT) VG COMPUTATION

R0333    SUBROUTINES USED

R0334          AVFLAGA
R0335          AVFLAGP
R0336          LOADTIME
R0337          SELECTMU
R0338          PRECSET
R0339          S34/35.1
R0340          S34/35.2
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L P34-P35, P74-P75 USER'S PAGE NO. 9 E4 S3

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R0341          S34/35.5
R0342          VN1645

 0343   REF   1                                        COUNT   35/P3575

 0344   REF   6  LAST  208   E4,1763                   EBANK=  KT

 0345   REF   2  LAST  463   35,2157  0 4627 0  P35    TC      AVFLAGA
 0346                        35,2160  0 0006 1          EXTEND
 0347   REF   1              35,2161  3 1422 1          DCA     ATIGINC
 0348   REF   1              35,2162  0 2166 1          TC      P35/P75A
 0349   REF   2  LAST  463   35,2163  0 4642 0  P75     TC      AVFLAGP
 0350                        35,2164  0 0006 1          EXTEND
 0351   REF   1              35,2165  3 1424 1          DCA     PTIGINC
 0352   REF   7  LAST  468   35,2166  53'764 1  P35/P75A DXCH    KT
 03525  REF   2  LAST  463   35,2167  0 4647 0          TC      P20FLGON        SET UPDATFLG, TRACKFLG
 0353   REF  44  LAST  465   35,2170  0 6006 1          TC      INTPRET
 0359                        35,2171   77624 1          CALL
 0360   REF   2  LAST  463   35,2172   10712 1                  SELECTMU
 0361                        35,2173   77634 0  P35/P75B RTB
 0362   REF   3  LAST  430   35,2174   45510 1                  LOADTIME
 03621  REF   3  LAST  125   35,2175   03665 1          STORE   TSTRT
 03622                       35,2176   77615 0          DAD
 03623  REF   8  LAST  468   35,2177   02364 1                  KT
 03624  REF  18  LAST  465   35,2200   03413 1          STORE   TIG
 0363   REF   3  LAST  465   35,2201   03503 1          STORE   INTIME         FOR INITVEL
 0364   REF   4  LAST  464   35,2202   34041 0          STCALL  TDEC1
 0365   REF   2  LAST  464   35,2203   45215 0                  PRECSET         ADVANCE BOTH VEHICLES
 0366                        35,2204   77624 1          CALL
 0367   REF   1              35,2205   74000 1                  S34/35.1        GET NORM AND LOS FOR TRANSFORM
 0368                        35,2206   77624 1          CALL
 0369   REF   2  LAST  465   35,2207   72526 0                  S34/35.2        GET DELTA V(LV)
 0370                        35,2210   77624 1          CALL
 0371   REF   2  LAST  465   35,2211   72741 0                  S34/35.5
 0372                        35,2212   77624 1          CALL
 0373   REF   2  LAST  465   35,2213   73002 1                  VN1645
 0379                        35,2214   77650 1          GOTO
 0380   REF   1              35,2215   72173 1                  P35/P75B
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P0381   ..... S33/34.1  .....

 0382                          35,2216   66220 1  S33/34.1 STO    SSP
 0383   REF   1                35,2217   01340 1                   NORMEX
 0384   REF   3  LAST  129     35,2220   03665 1                   TITER
 0385                          35,2221   40000 0           DCT     40000
 0386                          35,2222   40345 1           DLOAD   SETPD
 0387   REF   1                35,2223   33111 0                   MAX250
 0388                          35,2224   00001 0                   OD
 0389   REF   2  LAST  122     35,2225   27454 1           STOVL   SECMAX
 0390   REF   4  LAST  465     35,2226   03540 0                   RACT3
 0391   REF   1                35,2227   27576 0           STOVL   RAPREC
 0392   REF   3  LAST  129     35,2230   03546 0                   VACT3
 0393   REF   1                35,2231   27570 0           STOVL   VAPREC
 0394   REF   3  LAST  464     35,2232   03554 0                   RPASS3
 0395   REF   1                35,2233   27620 0           STOVL   RPPREC
 0396   REF   3  LAST  464     35,2234   03562 0                   VPASS3
 0397   REF   1                35,2235   03612 1           STORE   VPPREC
 0398                          35,2236   77624 1  ELCALC   CALL
 0399   REF   2  LAST  468     35,2237   74000 1                   S34/35.1        NORMAL AND LOS
 0400                          35,2240   63235 0           VXV     PDVL
 0401   REF   5  LAST  469     35,2241   03540 0                   RACT3           (RA*VA)*RA OD
 0402                          35,2242   53515 0           PDVL    UNIT            ULOS AT 60
 0403   REF   6  LAST  469     35,2243   03540 0                   RACT3
 0404                          35,2244   46315 1           PDVL    VPROJ           XCHNJ AND UP
 0405                          35,2245   51352 1           VSL2    BVSU
 0406   REF   2  LAST   93     35,2246   02625 1                   ULOS
 0407                          35,2247   53256 0           UNIT    PDVL            UP AT OD
 0408                          35,2250   63241 0           DOT     PDVL            UP.UN*RA AT OD
 0409                          35,2251   00001 0                   OD              UP IN MPAC
 0410                          35,2252   75241 1           DOT     SIGN
 0411   REF   3  LAST  469     35,2253   02625 1                   ULOS
 0412                          35,2254   65552 0           SL1     ACOS
 0413                          35,2255   50315 0           PDVL    DOT             EA AT OD
 0414   REF   4  LAST  469     35,2256   02625 1                   ULOS
 0415   REF   7  LAST  469     35,2257   03540 0                   RACT3
 0416                          35,2260   71244 0           BPL     DLOAD
 0417   REF   1                35,2261   72264 1                   TESTY
 0418   REF   2  LAST  428     35,2262   15343 1                   DPPOSMAX
 0419                          35,2263   41425 1           DSU     PUSH
 0420                          35,2264   71214 0  TESTY    BOFF    DLOAD
 0421   REF   4  LAST  464     35,2265   03741 0                   ITSWICH
 0422   REF   1                35,2266   72513 0                   ELEX
 0423   REF   2  LAST  122     35,2267   03452 1                   DELEL
 0424   REF   1                35,2270   14033 1           STODL   DELELO
 0425                          35,2271   77625 0           DSU
 0426   REF   5  LAST  463     35,2272   03744 0                   ELEV
 0427   REF   3  LAST  469     35,2273   03452 1           STORE   DELEL
 0428                          35,2274   45246 0           ABS     DSU
 0429   REF   1                35,2275   33115 1                   ELEPS
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0430                                35,2276   77640 0           BMN
0431  REF   1                     35,2277   72523 0                     TIMEX          COMMERCIALS EVERYWHERE
0432                                35,2300   70535 0  FIGTIME  SLOAD   SR1
0433  REF   4  LAST  469           35,2301   03665 1                     TITER
0434                                35,2302   72030 1           BHIZ    LXA,1
0435  REF   2  LAST  469           35,2303   01340 1                     NORMEX         TOO MANY ITERATIONS
0436  REF 237  LAST  454           35,2304   00154 1                     MPAC
0437                                35,2305   77330 1           SXA,1   VLOAD
0438  REF   5  LAST  470           35,2306   03664 0                     TITER
0439  REF   4  LAST  469           35,2307   03554 0                     RPASS3
0440                                35,2310   65256 0           UNIT    PDDL
0441                                35,2311   00045 0                     36D
0442                                35,2312   53515 0           PDVL    UNIT
0443  REF   8  LAST  469           35,2313   03540 0                     RACT3
0444                                35,2314   77725 1           PDDL
0445                                35,2315   41525 0           PDDL    PUSH
0446                                35,2316   00045 0                     36D
0447                                35,2317   77621 1           BDSU
0448                                35,2320   00015 0                     12D
0449                                35,2321   14037 0           STODL   30D            RP - RA MAGNITUDES
0450  REF   7  LAST  410           35,2322   15333 0                     DPHALF
0451                                35,2323   41425 1           DSU     PUSH
0452  REF   6  LAST  469           35,2324   03744 0                     ELEV
0453                                35,2325   50165 0           SIGN    BMN
0454                                35,2326   00037 0                     30D
0455  REF   3  LAST  470           35,2327   01340 1                     NORMEX
0456                                35,2330   71545 0           DLOAD   COS
0457                                35,2331   56205 0           DMP     DDV
0458                                35,2332   00017 1                     14D
0459                                35,2333   00015 0                     12D
0460                                35,2334   77676 0           DCOMP                  SINCE COS(180-A)=-COS A
0461                                35,2335   00035 1           STORE   28D
0462                                35,2336   44246 1           ABS     BDSU
0463  REF   8  LAST  470           35,2337   15333 0                     DPHALF
0464                                35,2340   77240 1           BMN     VLOAD
0465  REF   4  LAST  470           35,2341   01340 1                     NORMEX
0466  REF   2  LAST   93           35,2342   02617 0                     UNRM
0467                                35,2343   53435 0           VXV     UNIT
0468                                35,2344   00007 0                     6D             UN*RA
0469                                35,2345   41241 0           DOT     DMP
0470  REF   4  LAST  469           35,2346   03546 0                     VACT3
0471                                35,2347   00015 0                     12D
0472                                35,2350   47315 0           PDVL    VXV
0473                                35,2351   00001 0                     0D
0474  REF   4  LAST  469           35,2352   03562 0                     VPASS3
0475                                35,2353   53435 0           VXV     UNIT
0476                                35,2354   00001 0                     0D             (RP*VP)*RP
0477                                35,2355   41241 0           DOT     DMP
0478  REF   5  LAST  470           35,2356   03562 0                     VPASS3
0479                                35,2357   00017 1                     14D
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0480                          35,2360   77621 1          BDSU
0481                          35,2361   63301 0          NORM    PDVL            NORMALIZED WA - WP 12D
0482  REF   3  LAST  464      35,2362   00047 1                  X1
0483                          35,2363   00007 0                  6D
0484                          35,2364   50235 0          VXV     DOT
0485                          35,2365   00001 0                  0D
0486  REF   3  LAST  470      35,2366   02617 0                  UNRM            RA*RP.UN 14D
0487                          35,2367   50315 0          PDVL    DOT
0488                          35,2370   00001 0                  0D
0489                          35,2371   00007 0                  6D
0490                          35,2372   65552 0          SL1     ACOS
0491                          35,2373   77765 0          SIGN
0492                          35,2374   43225 0          DSU     DAD             ALPHA   PI
0493  REF   9  LAST  470      35,2375   15333 0                  DPHALF
0494  REF   7  LAST  470      35,2376   03744 0                  ELEV
0495                          35,2377   65525 0          PDDL    ACOS
0496                          35,2400   00035 1                  28D
0497                          35,2401   75221 1          BDSU    SIGN
0498  REF  10  LAST  471      35,2402   15333 0                  DPHALF
0499                          35,2403   00037 0                  30D             CONTAINS RP-RA
0500                          35,2404   77615 0          DAD
0501                          35,2405   56205 0          DMP     DDV
0502  REF   1                 35,2406   33107 1                  TWOPI
0503                          35,2407   77605 1          DMP
0504                          35,2410   41257 1          SL*     DMP
0505                          35,2411   20176 0                  0 -3,1
0506                          35,2412   51406 1          PUSH    ABS
0507                          35,2413   50025 0          DSU     BMN
0508  REF   3  LAST  469      35,2414   03454 1                  SECMAX
0509  REF   1                 35,2415   72421 0                  OKMAX
0510                          35,2416   75345 1          DLOAD   SIGN            REPLACE TIME WITH MAX TIME SIGNED
0511  REF   4  LAST  471      35,2417   03454 1                  SECMAX
0512                          35,2420   77606 1          PUSH
0513                          35,2421   51135 1  OKMAX   SLOAD   BPL             TEST FIRST ITERATION
0514  REF   6  LAST  470      35,2422   03665 1                  TITER
0515  REF   1                 35,2423   72431 1                  REPETE
0516                          35,2424   71331 0          SSP     DLOAD
0517  REF   7  LAST  471      35,2425   03665 1                  TITER
0518                          35,2426   37777 1          DCT     37777
0519                          35,2427   77650 1          GOTO
0520  REF   1                 35,2430   72467 1                  STORDELT
0521                          35,2431   41345 0  REPETE  DLOAD   DMP
0522  REF   4  LAST  469      35,2432   03452 1                  DELEL
0523  REF   2  LAST  469      35,2433   00033 1                  DELFLO
0524                          35,2434   71244 0          BPL     DLOAD
0525  REF   1                 35,2435   72445 1                  NEXTES
0526  REF   5  LAST  471      35,2436   03454 1                  SECMAX
0527                          35,2437   77605 1          DMP
0528  REF   1                 35,2440   33113 1                  THIRD
0529  REF   6  LAST  471      35,2441   17454 1          STODL   SECMAX
```

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```
0530                                35,2442   70446 0                 ABS     SR1             CROSSED OVER SOLUTION
0531                                35,2443   52076 1                 DCOMP   GOTO            DT=(-SIGN(DTO)//DT//)/2
0532  REF   1                       35,2444   72455 0                         RESIGN
0533                                35,2445   51545 1  NEXTES         DLOAD   ABS
0534  REF   5  LAST  471            35,2446   03452 1                         DELEL
0535                                35,2447   51525 1                 PDDL    ABS
0536  REF   3  LAST  471            35,2450   00033 1                         DELELO
0537                                35,2451   77625 0                 DSU
0538                                35,2452   71240 1                 BMN     DLOAD
0539  REF   1                       35,2453   72460 0                         REVERS          WRONG DIRECTION
0540                                35,2454   77646 0                 ABS
0541                                35,2455   52165 1  RESIGN         SIGN    GOTO
0542  REF   2  LAST  122            35,2456   03450 0                         DELTEEO
0543  REF   2  LAST  471            35,2457   72467 1                         STORDELT
0544                                35,2460   57545 1  REVERS         DLOAD   DCOMP
0545  REF   3  LAST  472            35,2461   03450 0                         DELTEEO
0546                                35,2462   70406 1                 PUSH    SR1
0547  REF   4  LAST  472            35,2463   03450 0                 STORE   DELTEEO
0548                                35,2464   77615 0                 DAD
0549                                35,2465   77650 1                 GOTO
0550  REF   1                       35,2466   72470 1                         ADTIME
0551  REF   5  LAST  472            35,2467   03450 0  STORDELT       STORE   DELTEEO
0552                                35,2470   77615 0  ADTIME         DAD
0553  REF   3  LAST  464            35,2471   02364 1                         NOMTPI          SUM OF DELTA T:S
0554  REF   4  LAST  472            35,2472   02364 1                 STORE   NOMTPI
0555                                35,2473   63375 0                 VLOAD   PDVL
0556  REF   2  LAST  469            35,2474   03570 0                         VAPREC
0557  REF   2  LAST  469            35,2475   03576 0                         RAPREC
0558                                35,2476   77624 1                 CALL
0559  REF   1                       35,2477   72701 1                         GOINT
0560                                35,2500   77624 1                 CALL
0561  REF   1                       35,2501   45237 0                         ACTIVE          STORE NEW RACT3 VACT3
0562                                35,2502   63375 0                 VLOAD   PDVL
0563  REF   2  LAST  469            35,2503   03612 1                         VPPREC
0564  REF   2  LAST  469            35,2504   03620 0                         RPPREC
0565                                35,2505   77624 1                 CALL
0566  REF   2  LAST  472            35,2506   72701 1                         GOINT
0567                                35,2507   77624 1                 CALL
0568  REF   1                       35,2510   45247 1                         PASSIVE         STORE NEW RPASS3 VPASS3
0569                                35,2511   77650 1                 GOTO
0570  REF   1                       35,2512   72236 0                         ELCALC
0571                                35,2513   43345 1  ELEX           DLOAD   DAD
0572  REF   8  LAST  465            35,2514   03663 1                         TTPI
0573  REF   5  LAST  472            35,2515   02364 1                         NOMTPI
0574  REF   9  LAST  472            35,2516   17663 1                 STODL   TTPI
0575                                35,2517   77614 1                 BON
0576  REF   7  LAST  464            35,2520   01310 1                         ETPIFLAG
0577  REF   2  LAST  470            35,2521   72523 0                         TIMEX
0578  REF   8  LAST  471            35,2522   03744 0                 STORE   ELEV
0579                                35,2523   52145 0  TIMEX          DLOAD   GOTO
```

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```
 0580   REF   3  LAST  463   35,2524   15335 0                ZEROVECS
 0581   REF   5  LAST  470   35,2525   01340 1                NORMEX
```

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```
P0582   ..... S34/35.1 .....

R0583   COMPUTE UNIT NORMAL AND LINE OF SIGHT VECTORS GIVEN THE ACTIVE AND
R0584   PASSIVE POS AND VEL AT TIME T3
 05845  REF   I                 36,2000                         SETLOC  S3435LOC
 05846                          36,2000                         BANK

 0585                           36,2000   52375 1  S34/35.1 VLOAD  VSU
 0586   REF   5  LAST  470      36,2001   03554 0                  RPASS3
 0587   REF   9  LAST  470      36,2002   03540 0                  RACT3
 0588                           36,2003   41456 0           UNIT   PUSH
 0589   REF   5  LAST  469      36,2004   26625 1           STOVL  ULOS
 0590   REF  10  LAST  474      36,2005   03540 0                  RACT3
 0591                           36,2006   53435 0           VXV    UNIT
 0592   REF   5  LAST  470      36,2007   03546 0                  VACT3
 0593   REF   4  LAST  471      36,2010   02617 0           STORE  UNRM
 0594                           36,2011   77615 0           RVQ
```

```
P0595   ..... S34/35.2  .....

R0596   ADVANCE PASSIVE VEH TO RENDEZVOUS TIME AND GET REQ VEL FROM LAMBERT
 05965  REF   2  LAST  463   35,2000                        SETLOC CSI/CDH
 05966                       35,2526                        BANK

 0597                        35,2526   77220 1  S34/35.2 STQ    VLOAD
 0598   REF  10  LAST  463   35,2527   02370 1                   SUBEXIT
 0599   REF   6  LAST  470   35,2530   03562 0                   VPASS3
 0600                        35,2531   65315 0           PDVL    PDDL
 0601   REF   6  LAST  474   35,2532   03554 0                   RPASS3
 0602   REF   4  LAST  468   35,2533   03503 1                   INTIME
 0603                        35,2534   65325 0           PDDL    PDDL
 0604   REF   6  LAST  465   35,2535   03656 1                   TPASS4
 0605   REF   2  LAST  471   35,2536   33107 1                   TWOPI          CONIC
 0606                        35,2537   46125 0           PDDL    BHIZ
 06061  REF   3  LAST  463   35,2540   03766 0                   NN
 06062  REF   1               35,2541   72544 1                   S3435.23
 06063                       35,2542   65345 0           DLOAD   PDDL
 06065  REF   4  LAST  473   35,2543   15335 0                   ZEROVECS       PRECISION
 06066                       35,2544   77624 1  S3435.23 CALL
 0607   REF   1               35,2545   72705 0                   INTINT         GET TARGET VECTOR
 0608   REF   4  LAST  175   35,2546   27415 1  S3435.25 STOVL   RTARG
 0609   REF   2  LAST  458   35,2547   00007 0                   VATT
 0610   REF   3  LAST  465   35,2550   27640 0           STOVL   VPASS4
 0611   REF   5  LAST  475   35,2551   03415 1                   RTARG
R0612   COMPUTE PHI = PI +(ACOS(UNIT RA.UNIT RP)-PI)SIGN(RA*RP.U)
 0613                        35,2552   63256 0           UNIT    PDVL           UNIT RP
 0614   REF  11  LAST  474   35,2553   03540 0                   RACT3
 0615                        35,2554   41456 0           UNIT    PUSH           UNIT RA
 0616                        35,2555   50235 0           VXV     DOT
 0617                        35,2556   00001 0                   OD
 0618   REF   5  LAST  474   35,2557   02617 0                   UNRM           RA*RP.U
 0619                        35,2560   77715 1           PDVL
 0620                        35,2561   72441 0           DOT     SL1            UNIT RA.UNIT RP
 0621                        35,2562   00001 0                   OD
 0622                        35,2563   75326 1           ACOS    SIGN
 0623                        35,2564   43244 1           BPL     DAD
 0624   REF   1               35,2565   72567 0                   NOPIE
 0625   REF   3  LAST  469   35,2566   15343 1                   DPPOSMAX       REASONABLE TWO PI
 0626   REF   3  LAST  280   35,2567   16633 0  NOPIE    STODL   ACTCENT
 0627   REF   7  LAST  475   35,2570   03656 1                   TPASS4
 0628                        35,2571   77625 0           DSU
 0629   REF   5  LAST  475   35,2572   03503 1                   INTIME
 0630   REF   4  LAST  175   35,2573   03423 1           STORE   DELLT4
 0631                        35,2574   40335 0           SLOAD   SETPD
 0632   REF   4  LAST  475   35,2575   03766 0                   NN             NUMBER OF OFFSETS
 0633                        35,2576   00001 0                   OD
 06331                       35,2577   63325 0           PDDL    PDVL
 06332  REF   1               35,2600   32122 0                   EPSFOUR
```

```
06333  REF  12  LAST  475   35,2601   03540 0            RACT3
06334  REF   3  LAST  123   35,2602   27570 0     STOVL  RINIT
06335  REF   6  LAST  474   35,2603   03546 0            VACT3
06336  REF   3  LAST  123   35,2604   37576 1     STCALL VINIT
06337  REF   1               35,2605   22000 1            INITVEL
0634                         35,2606   77624 1     CALL
0635   REF   1               35,2607   72666 1            LOMAT
0636                         35,2610   64375 1     VLOAD  MXV
0637   REF   4  LAST  465   35,2611   03646 0            DELVEET3
0638                         35,2612   00001 0            OD
0639                         35,2613   77772 0     VSL1
0640   REF  10  LAST  282   35,2614   37405 1     STCALL DELVLVC
0641   REF  11  LAST  475   35,2615   02370 1            SUBEXIT
```

P0642 ..... S34/35.3 .....

```
0643                          35,2616   45020 1  S34/35.3 STQ    CALL
0644   REF   6  LAST  473     35,2617   01340 1                   NORMEX
0645   REF   2  LAST  476     35,2620   72666 1                   LOMAT          GET MATRIX IN PUSH LIST
0646                          35,2621   61375 1           VLOAD   VXM
0647   REF  11  LAST  476     35,2622   03405 0                   DELVLVC        NEW DEL V TPI
0648                          35,2623   00001 0                   OD
0649                          35,2624   77772 0           VSL1
0650   REF   5  LAST  476     35,2625   03646 0           STORE   DELVEET3       SAVE FOR TRANSFORM
0651                          35,2626   63255 0           VAD     PDVL
0652   REF   7  LAST  476     35,2627   03546 0                   VACT3          NEW V REQ
0653   REF  13  LAST  476     35,2630   03540 0                   RACT3
0654                          35,2631   65325 0           PDDL    PDDL
0655   REF  19  LAST  468     35,2632   03413 1                   TIG
0656   REF   8  LAST  475     35,2633   03656 1                   TPASS4
0657                          35,2634   41525 0           PDDL    PUSH
0658   REF   4  LAST  475     35,2635   15343 1                   DPPOSMAX
0659                          35,2636   77624 1           CALL                   INTEG. FOR NEW TARGET VEC
0660   REF   2  LAST  475     35,2637   72705 0                   INTINT
0661                          35,2640   77775 1           VLOAD
0662   REF   3  LAST  458     35,2641   00001 0                   RATT
0663   REF   6  LAST  475     35,2642   03415 1           STORE   RTARG
0664                          35,2643   41575 0  NOVRWRT  VLOAD   PUSH
0665   REF   6  LAST  474     35,2644   02625 1                   ULOS
0666                          35,2645   57435 1           VXV     VCOMP
0667   REF   6  LAST  475     35,2646   02617 0                   UNRM
0668                          35,2647   41456 0           UNIT    PUSH
0669                          35,2650   76435 1           VXV     VSL1
0670   REF   7  LAST  477     35,2651   02625 1                   ULOS
0671                          35,2652   77715 1           PDVL
0672                          35,2653   64315 1           PDVL    MXV
0673   REF   6  LAST  477     35,2654   03646 0                   DELVEET3
0674                          35,2655   00001 0                   OD
0675                          35,2656   77772 0           VSL1
0676   REF  11  LAST  280     35,2657   36611 1           STCALL  DVLOS
0677   REF   7  LAST  477     35,2660   01340 1                   NORMEX
```

P0678 ..... S34/35.4 .....

```
0679                        35,2661   40220 0  S34/35.4 STQ    SETPD          NO ASTRONAUT OVERWRITE
0680   REF   8  LAST  477   35,2662   01340 1                   NORMEX
0681                        35,2663   00001 0                   OD
0682                        35,2664   77650 1           GOTO
0683   REF   1              35,2665   72643 0                   NOVRWRT
```

P0684 ..... LOMAT .....

```
0685                          35,2666  57575 1  LOMAT   VLOAD  VCOMP
0686  REF   7  LAST  477      35,2667  02617 0          UNRM
0687                          35,2670  24007 0          STOVL  6D              Y
0688  REF  14  LAST  477      35,2671  03540 0          RACT3
0689                          35,2672  57456 1          UNIT   VCOMP
0690                          35,2673  00015 0          STORE  12D
0691                          35,2674  76435 1          VXV    VSL1
0692  REF   8  LAST  479      35,2675  02617 0          UNRM           Z*-Y
0693                          35,2676  00001 0          STORE  0D
0694                          35,2677  43401 0          SETPD  RVQ
0695                          35,2700  00023 0                 18D
0696                          35,2701  65325 0  GOINT   PDDL   PDDL           DO
0697  REF   5  LAST  475      35,2702  15335 0                 ZEROVECS         NOT
0698  REF   6  LAST  472      35,2703  02364 1                 NOMTPI
0699                          35,2704  41406 0          PUSH   PUSH                    ORDER OR INSERT BEFORE INTINT
0700                          35,2705  45020 1  INTINT  STQ    CALL
0701  REF   2  LAST   91      35,2706  02367 1                 RTRN
0702  REF   7  LAST  457      35,2707  27442 0                 INTSTALL
0703                          35,2710  71214 0          CLEAR  DLOAD
0704  REF   2  LAST  457      35,2711  01673 1                 INTYPFLG
0705                          35,2712  43054 1          BZE    SET
0706                          35,2713  72715 1                 +2
0707  REF   3  LAST  479      35,2714  01473 0                 INTYPFLG
0708                          35,2715  45545 1          DLOAD  STADR
0709  REF   5  LAST  468      35,2716  63736 0          STODL  TDEC1
0710                          35,2717  73014 0          SET    LXA,2
0711  REF   3  LAST  458      35,2720  00063 1                 MOONFLAG
0712  REF   2  LAST  126      35,2721  03745 1                 RTX2
0713                          35,2722  43014 0          BON    CLEAR
0714  REF   2  LAST   34      35,2723  04303 0                 CMOONFLG
0715  REF   1                 35,2724  72726 1                 ALLSET
0716  REF   4  LAST  479      35,2725  00263 0                 MOONFLAG
0717  REF   5  LAST  458      35,2726  25517 0  ALLSET  STOVL  TET
0718                          35,2727  77657 0          VSR*
0719                          35,2730  57176 0                 0,2
0720  REF   5  LAST  458      35,2731  25535 0          STOVL  RCV
0721                          35,2732  77657 0          VSR*
0722                          35,2733  57176 0                 0,2
0723  REF   5  LAST  458      35,2734  35543 0          STCALL VCV
0724  REF   2  LAST  458      35,2735  27135 0                 INTEGRVS
0725                          35,2736  52175 0          VLOAD  GOTO
0726  REF   4  LAST  477      35,2737  00001 0                 RATT
0727  REF   3  LAST  479      35,2740  02367 1                 RTRN
```

```
P0728   ..... S34/35.5  .....
R0729   SUBROUTINES USED

R0730           BANKCALL
R0731           GOFLASH
R0732           GOTOPOOH
R0733           S34/35.3
R0734           S34/35.4
R0735           VNPOOH

 0736                                35,2741   43020 1  S34/35.5 STQ    BON
 0737   REF  12  LAST  476           35,2742   02370 1                   SUBEXIT
 0738   REF   1                      35,2743   01311 0                   FINALFLG
 0739   REF   1                      35,2744   72750 0                   FLAGON
 0740                                35,2745   52014 0           SET     GOTO
 0741   REF   2  LAST  259           35,2746   00470 1                   UPDATFLG
 0742   REF   1                      35,2747   72772 0                   FLAGOFF
 0743                                35,2750   77775 1  FLAGON   VLOAD
 0744   REF  12  LAST  477           35,2751   03405 0                   DELVLVC
 0745   REF  12  LAST  477           35,2752   02611 0            STORE  DVLOS          SAVE DELTA V BEFORE DISPLAY
 0746                                35,2753   77776 1           EXIT
 0747   REF   1                      35,2754  3 4620 1           CAF    V06N81
 0748   REF   4  LAST  465           35,2755  0 4575 1           TC     VNPOOH
 0749   REF  45  LAST  468           35,2756  0 6006 1           TC     INTPRET
 0750                                35,2757   52375 1           VLOAD  VSU            TEST FOR OVERWRITE OF COMPUTED
 0751   REF  13  LAST  480           35,2760   03405 0                  DELVLVC                      DELTA V
 0752   REF  13  LAST  480           35,2761   02611 0                  DVLOS
 0753                                35,2762   53046 0           ABVAL  BZE
 0754   REF   1                      35,2763   72766 0                  NOCHG        NO OVERWRITE
 0755                                35,2764   77624 1           CALL
 0756   REF   1                      35,2765   72616 0                  S34/35.3     COMPUTE NEW TARGET VECTOR
 0759                                35,2766   77214 0  NOCHG    CLEAR  VLOAD
 0760   REF   1                      35,2767   01267 0                  XDELVFLG
 0761   REF   7  LAST  477           35,2770   03646 0                  DELVEET3
 0762   REF   3  LAST  123           35,2771   03646 0           STORE  DELVSIN
 0763                                35,2772   77624 1  FLAGOFF  CALL
 0764   REF   1                      35,2773   72661 0                  S34/35.4
 0765                                35,2774   77776 1           EXIT
 0766   REF   1                      35,2775  3 4617 0           CAF    V06N59
 0767   REF   5  LAST  480           35,2776  0 4575 1           TC     VNPOOH
 0768   REF  46  LAST  480           35,2777  0 6006 1           TC     INTPRET
 0769                                35,3000   77650 1           GOTO
 0770   REF  13  LAST  480           35,3001   02370 1                  SUBEXIT
```

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P0771   ..... VN1645    .....

R0772   SUBROUTINES USED

R0773           P3XORP7X
R0774           GET+MGA
R0775           BANKCALL
R0776           DELAYJOB
R0777           COMPTGO
R0778           GOFLASHR
R0779           GOTOPOOH
R0780           FLAGUP

 0781                           35,3002   71220 1  VN1645   STO     DLOAD
 0782   REF  14  LAST  480      35,3003   02370 1                   SUBEXIT
 0783   REF   1                 35,3004   33120 1                   DP-.01
 0784   REF   4  LAST  280      35,3005   03626 0           STORE   +MGA           MGA = -.01
 0785                           35,3006   71214 0           BOFF    DLOAD
 0786   REF   2  LAST  480      35,3007   01351 1                   FINALFLG
 0787   REF   1                 35,3010   73030 0                   GET45
 0788   REF   2  LAST  481      35,3011   33120 1                   DP-.01
 0789                           35,3012   77615 0           DAD
 0790   REF   3  LAST  481      35,3013   33120 1                   DP-.01
 0791   REF   5  LAST  481      35,3014   03626 0           STORE   +MGA           MGA = -.02
 0792                           35,3015   77414 0           BOFF    EXIT
 0793   REF   1                 35,3016   01742 1                   REFSMFLG
 0794   REF   2  LAST  481      35,3017   73030 0                   GET45
 0795   REF   1                 35,3020   0 3100 0          TC      P3XORP7X
 0796                           35,3021   0 3023 0          TC      +2              P3X
 0797   REF   3  LAST  481      35,3022   0 3031 0          TC      GET45 +1        P7X
 0798   REF  47  LAST  480      35,3023   0 6006 1          TC      INTPRET
 0799                           35,3024   41575 0           VLOAD   PUSH
 0800   REF   4  LAST  480      35,3025   03646 0                   DELVSIN
 0801                           35,3026   77624 1           CALL                    COMPUTE MGA
 0802   REF   1                 35,3027   10654 1                   GET+MGA
 0803                           35,3030   77776 1  GET45    EXIT
 0804   REF   1                 35,3031   0 3304 0          TC      COMPTGO         INITIATE TASK TO UPDATE TTOGO
 0805   REF  15  LAST  481      35,3032   3 1770 0          CA      SUBEXIT
 0806   REF   2  LAST   91      35,3033   55'766 0          TS      QSAVED
 0807   REF   6  LAST  431      35,3034   3 5041 1          CAF     1SEC
 0808   REF  89  LAST  464      35,3035   0 4662 1          TC      BANKCALL
 0809   REF   2  LAST  198      35,3036   01732 0           CADR    DELAYJOB
 0810   REF   1                 35,3037   3 4621 0          CAF     V16N45          TRKMKCNT, TTOGO, +MGA
 0811   REF  90  LAST  481      35,3040   0 4662 1          TC      BANKCALL
 0812   REF  11  LAST  464      35,3041   20720 0           CADR    GOFLASH
 0813   REF   1                 35,3042   0 3045 0          TC      KILCLOCK        TERMINATE
 0814   REF   1                 35,3043   0 3050 1          TC      N45PROC         PROCEED
 0815   REF   1                 35,3044   0 3060 1          TC      CLUPDATE        RECYCLE - RETURN FOR INITIAL COMPUTATION
 0816   REF  13  LAST  348      35,3045   3 0005 1  KILCLOCK CA      Z
 0817   REF   1                 35,3046   54 000 0          TS      DISPDEX
```

```
0818   REF   8  LAST  464   35,3047  0 4106 1           TC      GOTOPOOH
0819   REF   7  LAST  304   35,3050  4 0076 1  N45PROC  CS      FLAGWRD2
0820   REF  29  LAST  390   35,3051  7 5012 0           MASK    BIT6
0821                        35,3052  0 0006 1           EXTEND
0822   REF   2  LAST  481   35,3053  1 3045 1           BZF     KILCLOCK      FINALFLG IS SET-FLASH V37-AWAIT NEW PGM
0823   REF  20  LAST  454   35,3054  0 5412 0           TC      PHASCHNG
0824                        35,3055   04024 0           OCT     04024
0825   REF  17  LAST  398   35,3056  0 5546 0           TC      UPFLAG        SET
0826   REF   3  LAST  481   35,3057   00047 1           ADRES   FINALFLG      FINALFLG
0827   REF  14  LAST  481   35,3060  3 0005 1  CLUPDATE CA      Z
0828   REF   2  LAST  481   35,3061  54 000 0           TS      DISPDEX
0829   REF  21  LAST  482   35,3062  0 5412 0           TC      PHASCHNG
0830                        35,3063   04024 0           OCT     04024
0831   REF  48  LAST  481   35,3064  0 6006 1           TC      INTPRET
0832                        35,3065   52014 0           CLEAR   GOTO
0833   REF   3  LAST  480   35,3066   00670 0                   UPDATFLG
0834   REF   3  LAST  481   35,3067   02366 0                   QSAVED
```

```
P0835   ..... DISPLAYE .....

R0836   SUBROUTINES USED

R0837           BANKCALL
R0838           GOFLASHR
R0839           GOTOPOOH
R0840           BLANKET
R0841           ENDOFJOB

 0842                                35,3070  0 0006 1  DISPLAYE EXTEND
 0843   REF   9  LAST  478          35,3071  23'340 1            QXCH   NORMEX
 0844   REF   1                     35,3072  3 4615 1            CAF    V06N55
 0845   REF  91  LAST  481          35,3073  0 4662 1            TCR    BANKCALL
 0846   REF  12  LAST  481          35,3074   20720 0            CADR   GOFLASH
 0847   REF   9  LAST  482          35,3075  1 4106 0            TCF    GOTOPOOH
 0848   REF  10  LAST  483          35,3076  0 1340 1            TC     NORMEX
 0849                               35,3077  1 3072 0            TCF    -5
```

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P0853   ..... P3XORP7X  .....

 0854   REF   1                35,3100  3 7713 0  P3XORP7X CAF    HIGH9
 0855   REF   9  LAST  446     35,3101  7 1011 1           MASK   MODREG
 0856                          35,3102  0 0006 1           EXTEND
 0857                          35,3103  1 3105 1           BZF    +2
 0858   REF 152  LAST  447     35,3104  24 002 0           INCR   Q
 0859                          35,3105  0 0002 0           RETURN

R0860   ..... VNPOOH     .....

R0861   SUBROUTINES USED

R0862           BANKCALL
R0863           GOFLASH
R0864           GOTOPOOH

 08645  REF   1                4000                       SETLOC P30SUBS
 08646                         4575                       BANK

 0865                          4575  0 0006 1  VNPOOH     EXTEND
 0866   REF   4  LAST  479     4576  23'767 0            QXCH   RTRN
 0867   REF   2  LAST   91     4577  55'765 0            TS     VERBNOUN
 08671  REF   1                4600  3 4610 1            CAF    VNBANK      ***** THIS ROUTINE MUST REMAIN IN
 08672  REF   3  LAST  382     4601  56 004 0            XCH    FBANK             FIXED-FIXED *****
 08673  REF   1                4602  55'063 1            TS     TBASE5      * WATCH OUT *

 0868   REF   3  LAST  484     4603  3 1765 1            CA     VERBNOUN
 0869   REF  92  LAST  483     4604  0 4662 1            TCR    BANKCALL
 0870   REF  13  LAST  483     4605   20720 0            CADR   GOFLASH
 0871   REF  10  LAST  483     4606  1 4106 0            TCF    GOTOPOOH
 0872                          4607  1 4611 1            TCF    +2
 0873                          4610  0 4603 0  VNBANK     TC     -5

 08731  REF   2  LAST  484     4611  3 1063 0            CA     TBASE5
 08732  REF   4  LAST  484     4612  54 004 1            TS     FBANK
 08733  REF   5  LAST  484     4613  0 1767 0            TC     RTRN
```

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P0874   ..... CONSTANTS .....

 0875                          4614    01445 0  V06N37   VN      0637
 0876                          4615    01467 0  V06N55   VN      0655
 0877                          4616    01472 1  V06N58   VN      0658
 0878                          4617    01473 0  V06N59   VN      0659
 0879                          4620    01521 0  V06N81   VN      0681
 0880                          4621    04055 0  V16N45   VN      1645
 08805  REF   3  LAST  475    35,2000                    SETLOC  CSI/CDH
 08806                        35,3106                    BANK

 0881                         35,3106   14441 0  TWOPI    2DEC    6.283185307 B-4
 0881                         35,3107   37325 1
 0882                         35,3110   00001 0  MAX250   2DEC    25 E3
 0882                         35,3111   20650 0
 0883                         35,3112   12525 0  THIRD    2DEC    .333333333
 0883                         35,3113   12525 0
 0884                         35,3114   00004 0  ELEPS    2DEC    .27777777 E-3
 0884                         35,3115   21505 1
 0885                         35,3116   00002 0  DECTWO   DEC     2
 0886                         35,3117   77777 0  DP-.01   OCT     77777           CONSTANTS
 0887                         35,3120   61337 1           OCT     61337           ADJACENT        -.01 FOR MGA DSP
 08871                        35,3121   01252 0  EPSFOUR  2DEC    .0416666666
                              35,3122   25253 1
```

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P0888   ..... INITVEL .....

R0889   MOD NO -1       LOG SECTION - P34-P35, P74-P75
R0890   MOD BY WHITE.P  DATE  21NOV67

R0891   FUNCTIONAL DESCRIPTION

R0892         THIS SUBROUTINE COMPUTES THE REQUIRED INITIAL VELOCITY VECTOR FOR
R0893         A TRAJECTORY OF SPECIFIED TRANSFER TIME BETWEEN SPECIFIED INITIAL
R0894         AND TARGET POSITIONS.  THE TRAJECTORY MAY BE EITHER CONIC OR
R0895         PRECISION DEPENDING ON AN INPUT PARAMETER (NAMELY, NUMBER OF
R0896         OFFSETS).  IN ADDITION, IN THE PRECISION TRAJECTORY CASE, THE
R0897         SUBROUTINE ALSO COMPUTES AN OFFSET TARGET VECTOR, TO BE USED
R0898         DURING PURE-CONIC CROSS-PRODUCT STEERING.  THE OFFSET TARGET
R0899         VECTOR IS THE TERMINAL POSITION VECTOR OF A CONIC TRAJECTORY WHICH
R0900         HAS THE SAME INITIAL STATE AS A PRECISION TRAJECTORY WHOSE
R0901         TERMINAL POSITION VECTOR IS THE SPECIFIED TARGET VECTOR.

R0902         IN ORDER TO AVOID THE INHERENT SINGULARITIES IN THE 180 DEGREE
R0903         TRANSFER CASE WHEN THE (TRUE OR OFFSET) TARGET VECTOR MAY BE
R0904         SLIGHTLY OUT OF THE ORBITAL PLANE, THIS SUBROUTINE ROTATES THIS
R0905         VECTOR INTO A PLANE DEFINED BY THE INPUT INITIAL POSITION VECTOR
R0906         AND ANOTHER INPUT VECTOR (USUALLY THE INITIAL VELOCITY VECTOR),
R0907         WHENEVER THE INPUT TARGET VECTOR LIES INSIDE A CONE WHOSE VERTEX
R0908         IS THE ORIGIN OF COORDINATES, WHOSE AXIS IS THE 180 DEGREE
R0909         TRANSFER DIRECTION, AND WHOSE CONE ANGLE IS SPECIFIED BY THE USER.

R0910         THE LAMBERT SUBROUTINE IS UTILIZED FOR THE CONIC COMPUTATIONS AND
R0911         THE COASTING INTEGRATION SUBROUTINE IS UTILIZED FOR THE PRECISION
R0912         TRAJECTORY COMPUTATIONS.

R0913   CALLING SEQUENCE

R0914         L          CALL
R0915         L+1                 INITVEL
R0916         L+2        (RETURN - ALWAYS)

R0917   INPUT

R0919         (1) RINIT    INITIAL POSITION RADIUS VECTOR
R0919         (2) VINIT    INITIAL POSITION VELOCITY VECTOR
R0920         (3) RTARG    TARGET POSITION RADIUS VECTOR
R0921         (4) DELLT4   DESIRED TIME OF FLIGHT FROM RINIT TO RTARG
R0922         (5) INTIME   TIME OF RINIT
R0923         (6) OD       NUMBER OF ITERATIONS OF LAMBERT/INTEGRVS
R0924         (7) 2D       ANGLE TO 180 DEGREES WHEN ROTATION STARTS
R0925         (8) RTX1     -2 FOR EARTH, -10D FOR LUNAR
R09251        (9) RTX2     COORDINATE SYSTEM ORIGIN = 0 FOR EARTH, 2 FOR LUNAR
R0926         PUSHLOC SET AT 4D
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L P34-P35, P74-P75 USER'S PAGE NO. 28 E4 S3

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R0927   OUTPUT

R0928           (1) RTARG    OFFSET TARGET POSITION VECTOR
R0929           (2) VIPRIME  MANEUVER VELOCITY REQUIRED
R0930           (3) VTPRIME  VELOCITY AT TARGET AFTER MANEUVER
R0931           (4) DELVEET3 DELTA VELOCITY REQUIRED FOR MANEUVER

R0932   SUBROUTINES USED

R0933           LAMBERT
R0934           INTSTALL
R0935           INTEGRVS

 0936   REF   1                 11,2000                      SETLOC INTVEL
 0937                           11,2000                      BANK

 0938   REF   1                                              COUNT  11/INITV

 0958                           11,2000   77614 1  INITVEL   SET                    COGA GUESS NOT AVAILABLE
 0959   REF   1                 11,2001   00475 1                    GUESSW
 0960                           11,2002   44175 1  HAVEGUES  VLOAD  STQ
 0961   REF   7  LAST  477      11,2003   03415 1                    RTARG
 0962   REF  11  LAST  483      11,2004   01340 1                    NORMEX
 0963   REF   2  LAST  122      11,2005   03604 0           STORE    RTARG1
 0964                           11,2006   46135 1           SLOAD    BHIZ
 0965   REF   3  LAST  479      11,2007   03747 0                    RTX2
 0967   REF   1                 11,2010   22022 1                    INITVEL1
 0968                           11,2011   72575 0           VLOAD    VSL2
 0969   REF   4  LAST  476      11,2012   03570 0                    RINIT          B29
 0970   REF   5  LAST  487      11,2013   27570 0           STOVL    RINIT          B27
 0971   REF   4  LAST  476      11,2014   03576 0                    VINIT          B7
 0972                           11,2015   77752 1           VSL2
 0973   REF   5  LAST  487      11,2016   27576 0           STOVL    VINIT          B5
 0974   REF   3  LAST  487      11,2017   03604 0                    RTARG1
 0975                           11,2020   77752 1           VSL2
 0976   REF   4  LAST  487      11,2021   03604 0           STORE    RTARG1
R0977           INITIALIZATION

 0978                           11,2022   71331 0  INITVEL1 SSP      DLOAD          SET ITCTR TO -1,LOAD MPAC WITH E4(PL 2D)
 0979   REF   1                 11,2023   03505 1                    ITCTR
 0980                           11,2024   77776 1                    0 -1
 0981                           11,2025   70546 1           COSINE   SR1            CALCULATE COSINE (E4)  (+2)
 0982   REF   2  LAST  123      11,2026   17630 1           STODL    COZY4          SET COZY4 TO COSINE(E4)          (PL 0D)
 0983                           11,2027   67154 0           LXA,2    SXA,2
 0984   REF 238  LAST  470      11,2030   00154 1                    MPAC
 0985   REF   2  LAST   96      11,2031   02703 1                    VTARGTAG       SET VTARGTAG TO 0D (SP)
 0986                           11,2032   77775 1           VLOAD
 0987   REF   6  LAST  487      11,2033   03570 0                    RINIT
 0988   REF   3  LAST   96      11,2034   26657 1           STOVL    RIVEC          RIVEC EQ RINIT
 0989   REF   6  LAST  487      11,2035   03604 0                    RTARG1
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 0990   REF   2  LAST   96   11,2036   16665 0           STODL  R2VEC          R2VEC EQ RTARG
 0991   REF   5  LAST  475   11,2037   03423 1                  DELLT4
 0992   REF   2  LAST   96   11,2040   02673 1           STORE  TDESIRED       TDESIRED EQ DELLT4
 0993                       11,2041   77201 1           SETPD  VLOAD
 0994                       11,2042   00001 0                  0D             INITIALIZE PL TO 0D
 0995   REF   7  LAST  487   11,2043   03570 0                  RINIT          MPAC EQ RINIT (+29)
 0996                       11,2044   41456 0           UNIT   PUSH           UNIT(RI)  (+1)                    (PL 6D)
 0997                       11,2045   53435 0           VXV    UNIT
 0998   REF   6  LAST  487   11,2046   03576 0                  VINIT          MPAC EQ UNIT(RI) X VI   (+8)
 0999   REF   2  LAST   96   11,2047   26676 1           STOVL  UN
 1000   REF   6  LAST  487   11,2050   03604 0                  RTARG1
 1001                       11,2051   50256 0           UNIT   DOT            TEMP=URT.URI  (+2)                (PL 0D)
 1002                       11,2052   43015 1           DAD    CLEAR
 1003   REF   3  LAST  487   11,2053   03630 1                  COZY4
 1004   REF   1              11,2054   03665 1                  NORMSW
 1005   REF   4  LAST  488   11,2055   03630 1           STORE  COZY4
 1006                       11,2056   43044 0  INITVEL2 BPL    SET
 1007   REF   1              11,2057   22101 1                  INITVEL3       UN CALCULATED IN LAMBERT
 1008   REF   2  LAST  488   11,2060   03465 0                  NORMSW
R1009      ROTATE RC INTO YC PLANE - SET UNIT NORMAL TO YC

 1010                       11,2061   41575 0           VLOAD  PUSH                                              (PL 6D)
 1011   REF   3  LAST  488   11,2062   02665 0                  R2VEC          RC TO 6D  (+29)
 1012                       11,2063   63246 1           ABVAL  PDVL           RC TO MPAC, ABVAL(RC) (+29) TO 0D(PL 2D)
 1013                       11,2064   46206 1           PUSH   VPROJ                                             (PL 8D)
 1014   REF   3  LAST  488   11,2065   02676 1                  UN
 1015                       11,2066   51352 1           VSL2   BVSU
 1016                       11,2067   74256 0           UNIT   VXSC                                              (PL 0D)
 1017                       11,2070   77772 0           VSL1
 1018   REF   4  LAST  488   11,2071   02665 0           STORE  R2VEC
 1019                       11,2072   67351 1           TLOAD  SLOAD
 1020   REF   2  LAST   34   11,2073   11566 1                  ZEROVEC
 1021   REF   2  LAST  487   11,2074   03505 1                  ITCTR
 1022                       11,2075   77244 0           BPL    VLOAD
 1023   REF   2  LAST  488   11,2076   22101 1                  INITVEL3
 1024   REF   5  LAST  489   11,2077   02665 0                  R2VEC
 1025   REF   7  LAST  488   11,2100   03604 0           STORE  RTARG1
 1026                       11,2101   63345 0  INITVEL3 DLOAD  PDVL                                             (PL 2D)
 1027   REF   1              11,2102   27735 0                  MUEARTH        POSITIVE VALUE
 1028   REF   6  LAST  488   11,2103   02665 0                  R2VEC
 102802                     11,2104   63256 0           UNIT   PDVL           2D = UNIT(R2VEC)                   (PL 8D)
 102804 REF   4  LAST  487   11,2105   02657 1                  R1VEC
 102806                     11,2106   41456 0           UNIT   PUSH           8D = UNIT(R1VEC)                   (PL14D)
 102808                     11,2107   57435 1           VXV    VCOMP          -N = UNIT(R2VEC) X UNIT(R1VEC)
 10281                      11,2110   00003 1                  2D
 10282                      11,2111   77606 1           PUSH                                                     (PL20D)
 10283                      11,2112   71350 1           LXA,1  DLOAD
 10284  REF   3  LAST  464   11,2113   03745 1                  PTX1
 10285                      11,2114   00023 0                  18D
 10286                      11,2115   62040 1           BMN    INCR,1
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 10287                          11,2116   22120 1                 +2
 10288                          11,2117   77767 1          DEC    -8
 10289                          11,2120   67310 1          INCR,1 SLOAD
 1029                           11,2121   00012 1                 10D
 10291  REF   4  LAST  471      11,2122   00047 1                 X1
 10292                          11,2123   77230 0          BHIZ   VLOAD                                    (PL14D)
 10293                          11,2124   22126 1                 +2
 10294                          11,2125   41476 1          VCOMP  PUSH                                     (PL20D)
 10295                          11,2126   77775 1          VLOAD                                           (PL14D)
 10296                          11,2127   50235 0          VXV    DOT                                      (PL 2D)
 1032                           11,2130   71244 0          BPL    DLOAD                                    (PL 0D)
 1033   REF   1                 11,2131   22133 0                 INITVEL4
 1034                           11,2132   41476 1          DCOMP  PUSH                                     (PL 2D)
 1035                           11,2133   67154 0  INITVEL4 LXA,2  SXA,2
 1036                           11,2134   00000 1                 0D
 1037   REF   2  LAST   96      11,2135   02674 0                 GEOMSGN
R1038     SET INPUTS UP FOR LAMBERT

 1039                           11,2136   45150 1          LXA,1  CALL
 1040   REF   4  LAST  488      11,2137   03745 1                 RTX1
R1041      OPERATE THE LAMBERT CONIC ROUTINE (COASTFLT SUBROUTINE)

 1042   REF   1                 11,2140   25224 1                 LAMBERT
R1043          DELETE THRU 4521
R1044   ARRIVED AT SOLUTION IS GOOD ENOUGH ACCORDING TO SLIGHTLY WIDER BOUNDS.

 1045                           11,2141   77214 0          CLEAR  VLOAD
 1046   REF   2  LAST  487      11,2142   00675 0                 GUESSW
 1047   REF   3  LAST  465      11,2143   02746 0                 VVEC
R1048   STORE CALCULATED INITIAL VELOCITY REQUIRED IN VIPRIME
R1049
 1050   REF   4  LAST  465      11,2144   17612 1          STODL  VIPRIME         INITIAL VELOCITY REQUIRED  (+7)
R1051
R1052      IF NUMIT IS ZERO, CONTINUE AT INITVEL8, OTHERWISE
R1053   SET UP INPUTS FOR ENCKE INTEGRATION (INTEGRVS).

 1054   REF   3  LAST  487      11,2145   02704 0                 VTARGTAG
 1055                           11,2146   45030 0          BHIZ   CALL
 1056   REF   1                 11,2147   22224 0                 INITVEL7
 1057   REF   8  LAST  479      11,2150   27442 0                 INTSTALL
 1061                           11,2151   43135 1          SLOAD  CLEAR
 1062   REF   4  LAST  487      11,2152   03747 0                 RTX2
 1063   REF   5  LAST  479      11,2153   00263 0                 MOONFLAG
 1064                           11,2154   43030 0          BHIZ   SET
 1065   REF   1                 11,2155   22157 1                 INITVEL5
 1066   REF   6  LAST  489      11,2156   00063 1                 MOONFLAG
 1067                           11,2157   77775 1  INITVEL5 VLOAD
 1068   REF   8  LAST  488      11,2160   03570 0                 RINIT
 1069   REF   5  LAST  488      11,2161   02657 1          STORE  RIVEC
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 1070   REF   6  LAST  479   11,2162   25535 0          STOVL  RCV
 1071   REF   5  LAST  489   11,2163   03612 1                 VIPRIME
 1072   REF   6  LAST  479   11,2164   15543 1          STODL  VCV
 1073   REF   6  LAST  475   11,2165   03503 1                 INTIME
 1074   REF   6  LAST  479   11,2166   01517 0          STORE  TST
 1075                        11,2167   43015 1          DAD    CLEAR
 1076   REF   6  LAST  488   11,2170   03423 1                 DELLT4
 1077   REF   4  LAST  479   11,2171   01673 1                 INTYPFLG
 1078   REF   6  LAST  479   11,2172   34041 0          STCALL TDEC1
 1079   REF   3  LAST  479   11,2173   27135 0                 INTEGRVS
 1080                        11,2174   77775 1          VLOAD
 1081   REF   2  LAST  458   11,2175   00025 0                 VATT1
 1082   REF   2  LAST   96   11,2176   02705 1          STORE  VTARGET
R1083    IF ITERATION COUNTER (ITCTR) EQ NO. ITERATIONS (NUMIT), CONTINUE AT
R1084   INITVELC, OTHERWISE REITERATE LAMBERT AND ENCKE

 1085                        11,2177   63154 1          LXA,2  INCR,2
 1086   REF   3  LAST  488   11,2200   03504 0                 ITCTR
 1087                        11,2201   00001 0                 1D              INCREMENT ITCTR
 1088                        11,2202   55134 1          SXA,2  XSU,2
 1089   REF   4  LAST  490   11,2203   03504 0                 ITCTR
 1090   REF   4  LAST  489   11,2204   02703 1                 VTARGTAG
 1091                        11,2205   46135 1          SLOAD  BHIZ            IF SP(MPAC) EQ 0, CONTINUE AT INITVELC
 1092   REF   2  LAST  458   11,2206   00050 1                 X2
 1093   REF   1              11,2207   22221 0                 INITVEL6
R1094
R1095     OFFSET CONIC TARGET VECTOR

 1096                        11,2210   52375 1          VLOAD  VSU
 1097   REF   8  LAST  488   11,2211   03604 0                 RTARG1
 1098   REF   2  LAST  458   11,2212   00017 1                 RATT1
 1099                        11,2213   77655 1          VAD
 1100   REF   7  LAST  488   11,2214   02665 0                 R2VEC
 1101   REF   8  LAST  490   11,2215   16665 0          STODL  R2VEC
 1102   REF   5  LAST  488   11,2216   03630 1                 COZY4
 1103                        11,2217   77650 1          GOTO
 1104   REF   1              11,2220   22056 1                 INITVEL2        CONTINUE ITERATING AT INITVEL2
R1105   COMPUTE THE DELTA VELOCITY

 1106                        11,2221   77775 1  INITVEL6 VLOAD
 1107   REF   9  LAST  490   11,2222   02665 0                 R2VEC
 1108   REF   9  LAST  490   11,2223   03604 0          STORE  RTARG1
 1109                        11,2224   52375 1  INITVEL7 VLOAD  VSU
 1110   REF   6  LAST  490   11,2225   03612 1                 VIPRIME
 1111   REF   7  LAST  488   11,2226   03576 0                 VINIT
 1112   REF   8  LAST  480   11,2227   27646 0          STOVL  DELVEET3        DELVEET3 = VIPRIME-VINIT  (+7)
 1113   REF   3  LAST  490   11,2230   02705 1                 VTARGET
 1114   REF   4  LAST  465   11,2231   03620 0          STORE  VTPRIME
 1115                        11,2232   46135 1          SLOAD  BHIZ
 1116   REF   5  LAST  489   11,2233   03747 0                 RTX2
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 1117   REF   1                  11,2234   22251 1                 INITVELX
 11171                           11,2235   70575 1           VLOAD VSR2
 11172  REF   5  LAST  490       11,2236   03620 0                 VTPRIME
 1118   REF   6  LAST  491       11,2237   27620 0           STOVL VTPRIME
 1119   REF   7  LAST  490       11,2240   03612 1                 VIPRIME
 1120                           11,2241   77742 0           VSR2
 1121   REF   8  LAST  491       11,2242   27612 1           STOVL VIPRIME
 1122   REF  10  LAST  490       11,2243   03604 0                 RTARGI
 1123                           11,2244   77742 0           VSR2
 1124   REF  11  LAST  491       11,2245   27604 0           STOVL RTARGI
 1125   REF   9  LAST  490       11,2246   03646 0                 DELVEET3
 1126                           11,2247   77742 0           VSR2
 1127   REF  10  LAST  491       11,2250   03646 0           STORE DELVEET3
 1128                           11,2251   77201 1  INITVELX SETPD VLOAD
 1129                           11,2252   00001 0                 OD
 1130   REF  12  LAST  491       11,2253   03604 0                 RTARGI
 1131   REF   8  LAST  487       11,2254   37415 0           STCALL RTARG
 1134   REF  12  LAST  487       11,2255   01340 1                 NORMEX
R1135
R1136    ..... END OF INITVEL ROUTINE .....
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P1137   ..... MIDGIM .....

R1138   MOD NO. 0, BY WILLMAN, SUBROUTINE RENOGUID, LOG P34-P35, P74-P75
R1139    REVISION 03, 17 FEB 67

R1140             IF THE ACTIVE VEHICLE IS DOING THE COMPUTATION, MIDGIM COMPUTES
R1141   THE POSITIVE MIDDLE GIMBAL ANGLE OF THE ACTIVE VEHICLE TO THE INPUT
R1142   DELTA VELOCITY VECTOR (OD IN PUSH LIST),  OTHERWISE
R1143   MIDGIM CONVERTS THE INPUT DELTA VELOCITY VECTOR FROM INERTIAL COORDIN-
R1144   ATES TO LOCAL VERTICAL COORDINATES OF THE ACTIVE VEHICLE.

R1145     .. INPUTS ..

R1146       NAME        MEANING                                  UNITS/SCALING/MODE

R1147      AVFLAG  INT FLAG - 0 IS CSM ACTIVE, 1 IS LEM ACTIVE                BIT
R1148     COMPUTER INT FLAG - 0 IS LEM COMPUTER, 1 IS CSM COMPUTER            BIT
R1149      RINIT   ACTIVE VEHICLE RADIUS VECTOR          METERS/CSEC (+7) VT
R1150      VINIT   ACTIVE VEHICLE VELOCITY VECTOR        METERS/CSEC (+7) VT
R1151      OD (PL) ACTIVE VEHICLE DELTA VELOCITY VECTOR  METERS/CSEC (+7) VT

R1152     .. OUTPUTS ..

R1153       NAME        MEANING                                  UNITS/SCALING/MODE

R1154        +MGA  + MIDDLE GIMBAL ANGLE                  REVOLUTIONS (+0)  DP
R1155      DELVLVC DELTA VELOCITY VECTOR IN LV COORD.     METERS/CSEC (+7)  VT
R1156     MGLVFLAG INT FLAG - 0 IS +MGA COMPUTED, 1 IS DELVLVC COMP.  -     BIT

R1157     .. CALLING SEQUENCE ..

R1158   L         CALL
R1159   L+1               MIDGIM
R1160   L+2       (RETURN - ALWAYS)

R1161     .. NO SUBROUTINES CALLED ..

R1162     .. DEBRIS - ERASEABLE TEMPORARY USAGE

R1163          A,Q,L, PUSH LIST, MPAC.

R1164     .. ALARMS - NONE ..
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P1165   MIDDLE GIMBAL ANGLE COMPUTATION.

 1166   REF   1              04,2000                    SETLOC MIDDGIM
 1167                       04,2645                    BANK

 1168   REF   1                                         COUNT* $$/MIDG

 1169                       04,2645   20000 0  HALFREV  2DEC   1 B-1
 1169                       04,2646   00000 1
 1170                       04,2647   43014 0  MIDGIM   BON    BOFF
 1171   REF   1            04,2650   01312 0           BOFF   AVFLAG
 1172   REF   1            04,2651   10667 1           BOFF   MIDGIM1
 1173   REF   1            04,2652   02747 1           BOFF   COMPUTER
 1174   REF   1            04,2653   10672 0           BOFF   GET.LVC
R1175   COMPUTE +MGA IF AVFLAG AND COMPUTER HAVE OPPOSITE VALUES.
 1176                       04,2654   53575 0  GET+MGA  VLOAD  UNIT          (PL OD) V (+7) TO MPAC, UNITIZE  UV (+1)
 1177                       04,2655   72441 0           DOT    SL1           DOT UV WITH Y(STABLE MEMBER) AND RESCALE
 1178   REF   3  LAST  173  04,2656   01744 1                  REFSMMAT +6    FROM +2 TO +1 FOR ASIN ROUTINE
 1179                       04,2657   51136 1           ARCSIN BPL
 1180   REF   1            04,2660   10664 1                  SETMGA
 1181                       04,2661   43215 0           DAD    DAD           CONVERT -MGA TO +MGA BY
 1182   REF   1            04,2662   10646 1                  HALFREV       ADDING ONE REVOLUTION
 1183   REF   2  LAST  493  04,2663   10646 1                  HALFREV
 1184   REF   6  LAST  481  04,2664   03626 0  SETMGA   STORE  +MGA
 1185                       04,2665   43414 1           CLR    RVQ           CLEAR MGLVFLAG TO INDICATE +MGA CALC
 1186   REF   1            04,2666   02675 1                  MGLVFLAG           AND EXIT
 1187                       04,2667   77614 1  MIDGIM1  BOFF
 1188   REF   2  LAST  493  04,2670   02747 1                  COMPUTER
 1189   REF   2  LAST  481  04,2671   10654 1                  GET+MGA
R1190   COMPUTE DELVLVC IF AVFLAG AND COMPUTER HAVE SAME VALUES.
 1191                       04,2672   53575 0  GET.LVC  VLOAD  UNIT          (PL 6D)   R (+29) IN MPAC, UNITIZE  UR
 1192   REF   9  LAST  489  04,2673   03570 0                  RINIT
 1193                       04,2674   77676 0           VCOMP                 U(-R)
 1194                       04,2675   00023 0           STORE  18D           U(-R) TO 18D
 1195                       04,2676   53435 0           VXV    UNIT          U(-R)*V EQ V*U(R), U(V*R)
 1196   REF   8  LAST  490  04,2677   03576 0                  VINIT
 1197                       04,2700   00015 0           STORE  12D           U(V*R) TO 12D
 1198                       04,2701   53435 0           VXV    UNIT          U(V*R)*U(-R), U((V*R)*(-R))
 1199                       04,2702   00023 0                  18D
 1200                       04,2703   24007 0           STOVL  6D            TRANSFORMATION MATRIX IS IN 6D (+1)
 1201                       04,2704   00001 0                  0D            DELTA V (+7) IN 0D
 1202                       04,2705   76521 0           MXV    VSL1          CONVERT FROM INER COOR TO LV COOR (+8)
 1203                       04,2706   00007 0                  6D             AND SCALE +7 IN MPAC
 1204   REF  14  LAST  480  04,2707   03405 0           STORE  DELVLVC       STORE IN DELVLVC (+7)
 1205                       04,2710   43414 1           SET    RVQ           SET MGLVFLAG TO INDICATE LVC CALC
 1206   REF   2  LAST  493  04,2711   02475 0                  MGLVFLAG           AND EXIT
R1207     ..... END OF MIDGIM ROUTINE .....
```

```
P1208
 1209                          04,2712   77160 0  SELECTMU AXC,1  AXT,2
 1210                          04,2713   00002 0                  2D
 1211                          04,2714   00000 1                  0D
 1212                          04,2715   77614 1           BOFF
 1213   REF   3  LAST  479     04,2716   04343 1                  CMOONFLG
 1214   REF   1                04,2717   10723 0                  SETMUER
 1215                          04,2720   77160 0           AXC,1  AXT,2
 1216                          04,2721   00012 1                  10D
 1217                          04,2722   00002 0                  2D
 1218                          04,2723   66143 1  SETMUER  DLOAD*  SXA,1
 1219   REF   1                04,2724   11744 0                  MUTABLE +4,1
 1220   REF   5  LAST  489     04,2725   03745 1                  RTX1
 1221   REF   2  LAST  126     04,2726   23752 0           STODL*  RTSR1/MU
 1222   REF   2  LAST  494     04,2727   11736 0                  MUTABLE -2,1
 1223                          04,2730   54214 1           BOFF    SR
 1224   REF   4  LAST  494     04,2731   04343 1                  CMOONFLG
 1225   REF   1                04,2732   10734 0                  RTRNMU
 1226                          04,2733   20607 1                  6D
 1227   REF   2  LAST  126     04,2734   03750 0  RTRNMU  STORE   RTMU
 1228                          04,2735   43134 0           SXA,2   CLEAR
 1229   REF   6  LAST  490     04,2736   03746 1                  RTX2
 1230   REF   4  LAST  482     04,2737   01271 1                  FINALFLG
 1234                          04,2740   77650 1           GOTO
 1235   REF   3  LAST  468     04,2741   73002 1                  VN1645
```

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P1236 ..... PERIAPO .....

R1237 MOD NO -1 LOG SECTION - P34-P35, P74-P75
R1238 MOD BY WHITE.P DATE 18JAN68

R1239 FUNCTIONAL DESCRIPTION

R1240 THIS SUBROUTINE COMPUTES THE TWO BODY APOCENTER AND PERICENTER
R1241 ALTITUDES GIVEN THE POSITION AND VELOCITY VECTORS FOR A POINT ON
R1242 THE TRAJECTORY AND THE PRIMARY BODY.

R1243 SETRAD IS CALLED TO DETERMINE THE RADIUS OF THE PRIMARY BODY.

R1244 APSIDES IS CALLED TO SOLVE FOR THE TWO BODY RADII OF APOCENTER AND
R1245 PERICENTER AND THE ECCENTRICITY OF THE TRAJECTORY.

R1246 CALLING SEQUENCE

R1247 L CALL
R1248 L+1 PERIAPO
R1249 L+2 (RETURN - ALWAYS)

R1250 INPUT

R1251 (1) RVEC POSITION VECTOR IN METERS
R1252 SCALE FACTOR - EARTH +29, MOON +27
R1253 (2) VVEC VELOCITY VECTOR IN METERS/CENTISECOND
R1254 SCALE FACTOR - EARTH +7, MOON +5
R1255 (3) X1 PRIMARY BODY INDICATOR
R1256 EARTH -2, MOON -10

R1257 OUTPUT

R1258 (1) 2D APOCENTER RADIUS IN METERS
R1259 SCALE FACTOR - EARTH +29, MOON +27
R1260 (2) 4D APOCENTER ALTITUDE IN METERS
R1261 SCALE FACTOR - EARTH +29, MOON P27
R1262 (3) 6D PERICENTER RADIUS IN METERS
R1263 SCALE FACTOR - EARTH +29, MOON +27
R1264 (4) 8D PERICENTER ALTITUDE IN METERS
R1265 SCALE FACTOR - EARTH +29, MOON +27
R1266 (5) ECC ECCENTRICITY OF CONIC TRAJECTORY
R1267 SCALE FACTOR - +3
R1268 (6) XXXALT RADIUS OF THE PRIMARY BODY IN METERS
R1269 SCALE FACTOR - EARTH +29, MOON +27
R1270 (7) PUSHLOC EQUALS 10D

R1271 SUBROUTINES USED

R1272 SETRAD

```
R1273          APSIDES

 1274   REF  1              22,2000                    SETLOC  APOPERT
 1275                       22,3151                    BANK

 1276   REF  1                                         COUNT*  $$/PERAP

 1277                       22,3151   00302 0  RPAD    2DEC    6373338 B-29    STANDARD RADIUS  OF PAD 37-B.
 1277                       22,3152   17755 0
A1278                                                                         = 20 909 901.57 FT

 1279                       22,3153   53754 1  PERIAPO1 LXA,2   VSR*
 1280   REF  7  LAST  494   22,3154   03746 1                   RTX2
 1281                       22,3155   57176 0                   0,2
 1282   REF  4  LAST  489   22,3156   26746 0           STOVL   VVEC
 1283                       22,3157   53750 0           LXA,1   VSR*
 1284   REF  6  LAST  494   22,3160   03745 1                   RTX1
 1285                       22,3161   57176 0                   0,2
 1286   REF  2  LAST  464   22,3162   02657 1           STORE   PVEC
 1287                       22,3163   45020 1  PERIAPO  STQ     CALL
 1288   REF 13  LAST  491   22,3164   01340 1                   NORMEX
 1289   REF  1              22,3165   45201 0                   SETRAD
 1290   REF  2  LAST  122   22,3166   37456 1           STCALL  XXXALT
 1291   REF  1              22,3167   25703 1                   APSIDES
 1292                       22,3170   41401 1  SETPD    PUSH            2D = APOCENTER RADIUS   B29 OR B27
 1293                       22,3171   00003 1                   2D
 1294                       22,3172   65225 1  DSU      PDDL            4D = APOGEE ALTITUDE    B29 OR B27
 1295   REF  3  LAST  496   22,3173   03456 0                   XXXALT
 1296                       22,3174   00001 0                   0D
 1297                       22,3175   45206 1  PUSH     DSU             6D = PERICENTER RADIUS  B29 OR B27
 1298   REF  4  LAST  496   22,3176   03456 0                   XXXALT
 1299                       22,3177   52006 0  PUSH     GOTO            8D = PERIGEE ALTITUDE   B29 OR B27
 1300   REF 14  LAST  496   22,3200   01340 1                   NORMEX
```

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```
P1301   SETRAD
 1302                          22,3201   41545 0  SETRAD   DLOAD   PUSH
 1303   REF   1                22,3202   05152 1           RPAD
 1304                          22,3203   63130 0           SXA,1   INCR,2
 1305   REF   3  LAST  490     22,3204   00047 1           X2
 1306                          22,3205   00002 0           2D
 1307                          22,3206   46135 1           SLOAD   BHIZ
 1308   REF   4  LAST  497     22,3207   00050 1           X2
 1309   REF   1                22,3210   45214 1           SETRADX
 1310                          22,3211   51575 1           VLOAD   ABVAL
 1311   REF   2  LAST  179     22,3212   02026 1           RLS
 1312                          22,3213   77725 1           PDDL
 1313                          22,3214   43545 1  SETRADX  DLOAD   RVQ
```

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P1314   PRECSET
 1315                           22,3215   77620 0  PRECSET  STQ
 1316   REF  15  LAST  496      22,3216   01340 1                   NORMEX
 1317   REF   1                 22,3217   36635 1           STCALL  TDEC2
 1318   REF   2  LAST   34      22,3220   27105 0                   LEMPREC
 1319                           22,3221   77624 1           CALL
 1320   REF   1                 22,3222   45233 1                   LEMSTORE
 1321                           22,3223   77745 1           DLOAD
 1322   REF   2  LAST  498      22,3224   02635 0                   TDEC2
 1323   REF   7  LAST  490      22,3225   34041 0           STCALL  TDEC1
 1324   REF   2  LAST   35      22,3226   27071 1                   CSMPREC
 1325                           22,3227   77624 1           CALL
 1326   REF   1                 22,3230   45243 0                   CSMSTORE
 1327                           22,3231   77650 1           GOTO
 1328   REF  16  LAST  498      22,3232   01340 1                   NORMEX
 1329                           22,3233   43175 0  LEMSTORE VLOAD   BOFF
 1330   REF   5  LAST  479      22,3234   00001 0                   RATT
 1331   REF   2  LAST  493      22,3235   01352 1                   AVFLAG
 1332   REF   2  LAST  472      22,3236   45247 1                   PASSIVE
 1333   REF  15  LAST  479      22,3237   27540 0  ACTIVE   STOVL   RACT3
 1334   REF   3  LAST  475      22,3240   00007 0                   VATT
 1335   REF   8  LAST  477      22,3241   03546 0           STORE   VACT3
 1336                           22,3242   77616 0           RVQ
 1337                           22,3243   43175 0  CSMSTORE VLOAD   BOFF
 1338   REF   6  LAST  498      22,3244   00001 0                   RATT
 1339   REF   3  LAST  498      22,3245   01352 1                   AVFLAG
 1340   REF   2  LAST  472      22,3246   45237 0                   ACTIVE
 1341   REF   7  LAST  475      22,3247   27554 0  PASSIVE  STOVL   RPASS3
 1342   REF   4  LAST  498      22,3250   00007 0                   VATT
 1343   REF   7  LAST  475      22,3251   03562 0           STORE   VPASS3
 1344                           22,3252   77616 0           RVQ
```

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```
P1345  VECSHIFT
 1346                          22,3253   53754 1  VECSHIFT LXA,2  VSR*
 1347  REF   8  LAST  496      22,3254   03746 1                  RTX2
 1348                          22,3255   57176 0                  0,2
 1349                          22,3256   63350 1           LXA,1  PDVL
 1350  REF   7  LAST  496      22,3257   03745 1                  RTX1
 1351                          22,3260   63257 1           VSR*   PDVL
 1352                          22,3261   57176 0                  0,2
 1353                          22,3262   77616 0           RVQ
```

```
P1354   SHIFTR1
 1355                          22,3263   53754 1  SHIFTR1  LXA,2  SL*
 1356   REF   9  LAST  499     22,3264   03746 1                  RTX2
 1357                          22,3265   57576 1                  0,2
 1358                          22,3266   77616 0           RVQ
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R1359   PROGRAM DESCRIPTION
R1360   SUBROUTINE NAME       R36  OUT-OF-PLANE RENDEZVOUS ROUTINE
R1361   MOD NO.  2      DATE    2 JANUARY 1969
R1362   MOD BY   A.W.BANCROFT  LOG SECTION  EXTENDED VERBS
R1363   FUNCTIONAL DESCRIPTION

R1364   TO DISPLAY AT ASTRONAUT REQUEST LGC CALCULATED RENDEZVOUS
R1365   OUT-OF-PLANE PARAMETERS (Y , YDOT , PSI). (REQUESTED BY DSKY).

R1366   CALLING SEQUENCE

R1367   ASTRONAUT REQUEST THROUGH DSKY  V 90 E

R1368   SUBROUTINES CALLED

R1369   EXDSPRET
R1370   GOMARKF
R1371   CSMPREC
R1372   LEMPREC
R1373   SGNAGREE
R1374   LOADTIME

R1375   NORMAL EXIT MODES

R1376   ASTRONAUT REQUEST THROUGH DSKY TO TERMINATE PROGRAM V 34 E

R1377   ALARM OR ABORT EXIT MODES

R1378   NONE

R1379   OUTPUT

R1380   DECIMAL DISPLAY OF TIME , Y , YDOT AND PSI

R1381   DISPLAYED VALUES Y , YDOT , AND PSI , ARE STORED IN ERASABLE
R1382   REGISTERS RANGE , RRATE AND RTHETA RESPECTIVELY.

R1383   ERASABLE INITIALIZATION REQUIRED

R1384   CSM AND LEM STATE VECTORS

R1385   DEBRIS

R1386   CENTRALS A,Q,L

R1387   OTHER THOSE USED BY THE ABOVE LISTED SUBROUTINES

 1388                        20,2164                     BANK   20
 1389   REF   1              20,2000                     SETLOC R36CM
 1390                        20,2164                     BANK
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 1391   REF   3  LAST  266   E4,1726                        EBANK= RPASS36

13915   REF   1              41,3727                        SBANK= R36A
 1392   REF   1                                             COUNT* $$/R36

13921   REF  29  LAST  451   20,2164  3 5016 0  R36        CAF    TWO
13922   REF   2  LAST  271   20,2165  55'051 0              TS     OPTIONX
139221  REF  62  LAST  457   20,2166  3 5017 1              CAF    ONE
139222  REF   3  LAST  502   20,2167  55'052 0              TS     OPTIONX +1
13923   REF   1              20,2170  3 2200 1              CAF    OPTION36       V 04 N 12
13924   REF  93  LAST  484   20,2171  0 4662 1              TC     BANKCALL
13925   REF   9  LAST  263   20,2172   20561 1              CADR   GOXDSPF
13926   REF  19  LAST  427   20,2173  0 5534 0              TC     ENDEXT         TERMINATE
13927                        20,2174  0 2176 0              TC     +2             PROCEED
13928                        20,2175  0 2170 0              TC     -5             R2 LOADED VIA DSKY
139281  REF  39  LAST  454   20,2176  0 4701 0              TC     POSTJUMP
139282  REF   2  LAST  502   20,2177   63727 0              CADR   R36A

139283                       20,2200   01014 0  OPTION36    VN     0412

139285  REF   1              41,2000                        SETLOC R36LM
139286                       41,3727                        BANK

 1393                        41,3727  22 007 0  R36A        ZL
 1394   REF 109  LAST  454   41,3730  3 5021 1              CAF    ZERO           SET TIME OF EVENT TO ZERO FOR FIRST
 1395   REF   3  LAST  271   41,3731  53'052 0              DXCH   DSPTEMX        DISPLAY
13955   REF   1              41,3732  23'742 1              LXCH   OPTIONY        SAVE VEH. OPTION
 1396   REF   1              41,3733  3 3775 1  R36P3       CAF    V06N16N
 1397   REF  94  LAST  502   41,3734  0 4662 1              TC     BANKCALL
 1398   REF   2  LAST  246   41,3735   20561 1              CADR   GOMARKF
 1399   REF  20  LAST  502   41,3736  1 5534 1              TCF    ENDEXT         TERMINATE
 1400                        41,3737  1 3741 1              TCF    +2             PROCEED
 1401                        41,3740  1 3733 1              TCF    -5             RECYCLE FOR ASTRONAUT INPUT TIME
 1402   REF   4  LAST  502   41,3741  53'052 0              DXCH   DSPTEMX
 1403                        41,3742  0 0006 1              EXTEND
 1404   REF   1              41,3743  1 3764 0              BZF    LREGCHK        A-REG ZERO GOTO CHECK L-REG FOR ZERO
 1405   REF 239  LAST  487   41,3744  52 155 1  ASTROTIM    DXCH   MPAC           A-REG NON-ZERO, TIME = ASTRO INPUT TIME
 1406   REF  49  LAST  482   41,3745  0 6006 1              TC     INTPRET
 1407                        41,3746   52034 1              RTB    GOTO
 1408   REF   1              41,3747   45716 0                     DPMODE
14085   REF   1              41,3750   65521 1                     R36INT

14086   REF   2  LAST  266   42,2000                        SETLOC R36LM1
14087                        42,3521                        BANK

 1409   REF   8  LAST  498   42,3521   00041 1  R36INT      STORE  TDEC1
14091                        42,3522   70535 0              SLOAD  SR1
14092   REF   2  LAST  502   42,3523   02343 1                     OPTIONY
14094                        42,3524   45030 0              BHIZ   CALL
14095   REF   1              42,3525   65531 0                     R36PROG2       FOR CSM DISPLAY
```

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14096  REF   1                 42,3526   27071 1                    THISPREC        FOR LEM DISPLAY
14097                          42,3527   77650 1            GOTO
14098  REF   1                 42,3530   65533 1                    R36PROG3
14099                          42,3531   77624 1  R36PROG2  CALL
1410   REF   1                 42,3532   27105 0                    OTHPREC
1411                           42,3533   63375 0  R36PROG3  VLOAD   PDVL
1412   REF   5  LAST  498      42,3534   00007 0                    VATT
1413   REF   7  LAST  498      42,3535   00001 0                    RATT            -
1414   REF   4  LAST  502      42,3536   02327 0            STORE   RPASS36         R
1415                           42,3537   63256 0            UNIT    PDVL             P
1416                           42,3540   53435 0            VXV     UNIT            -
1417                           42,3541   77626 0            STADR
1418   REF   2  LAST   90      42,3542   61442 1            STODL   UNP36           U
1419   REF   3  LAST  458      42,3543   00015 0                    TAT
1420   REF   9  LAST  502      42,3544   00041 1            STORE   TDEC1
14201                          42,3545   70535 0            SLOAD   SR1
14202  REF   3  LAST  502      42,3546   02343 1                    OPTIONY
14204                          42,3547   45030 0            BHIZ    CALL
14205  REF   1                 42,3550   65554 0                    R36PROG4        FOR CSM DISPLAY
14206  REF   2  LAST  503      42,3551   27105 0                    OTHPREC         FOR LEM DISPLAY
14207                          42,3552   77650 1            GOTO
14208  REF   1                 42,3553   65556 1                    R36PROG5
14209                          42,3554   77624 1  R36PROG4  CALL
1421   REF   2  LAST  503      42,3555   27071 1                    THISPREC
1422                           42,3556   63375 0  R36PROG5  VLOAD   PDVL
1423   REF   6  LAST  503      42,3557   00007 0                    VATT            VELOCITY VECTOR  V                 00D
1424   REF   8  LAST  503      42,3560   00001 0                    RATT                              A
1425                           42,3561   77725 1            PDDL
1426   REF   4  LAST  503      42,3562   00015 0                    TAT             SAVE TIME IN LOCATION 30D FOR REDISPLAY
1427                           42,3563   24037 0            STOVL   30D                              -
1428                           42,3564   41406 0            PUSH    PUSH            POSITION VECTOR  R   IN  06D AND 12D
1429                           42,3565   63245 1            BVSU    PDVL                            A  -   -
1430   REF   5  LAST  503      42,3566   02327 0                    RPASS36         LINE OF SIGHT VECTOR R - R        12D
1431                           42,3567   72441 0            DOT     SL1                                 P   A
1432   REF   3  LAST  503      42,3570   02335 0                    UNP36               -  -
1433   REF   8  LAST  282      42,3571   26321 0            STOVL   RANGE           Y = U .R
1434                           42,3572   00001 0                    00D                    A
1435                           42,3573   72441 0            DOT     SL1
1436   REF   4  LAST  503      42,3574   02335 0                    UNP36           .   -  -
1437   REF   5  LAST  282      42,3575   26323 1            STOVL   RRATE           Y = U .V
1438                           42,3576   00007 0                    06D             -       A   -
1439                           42,3577   41456 0            UNIT    PUSH            U   = UNIT( R )                  18D
1440                           42,3600   47235 0            VXV     VXV              RA           A
1441                           42,3601   00001 0                    00D              -   -   -    -
1442                           42,3602   00023 0                    18D             (U  XV )XU    =U
1443                           42,3603   53552 0            VSL2    UNIT              RA  A   RA    A
144305                         42,3604   52056 0            UNIT    GOTO
14431  REF   1                 42,3605   61600 0                    R36B

14432  REF   1                 40,2000                      SETLOC  R36CM1
```

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14433                          40,3600                          BANK

1444                           40,3600   24001 0  R36B    STOVL  OOD             UNIT HORIZONTAL IN FORWARD DIR. OOD
1445                           40,3601   00023 0           18D
1446                           40,3602   74241 0  DOT     VXSC   -
1447                           40,3603   00015 0           12D    U
1448                           40,3604   77752 1  VSL2             L
1449                           40,3605   53445 1  BVSU    UNIT
14405                          40,3606   77656 1  UNIT
1450                           40,3607   50206 0  PUSH    DOT            LOS PROJECTED INTO HORIZONTAL    12D
1451                           40,3610   00001 0           OOD            PLANE
1452                           40,3611   65552 0  SL1     ARCCOS                    - -
1453   REF   6  LAST  282      40,3612   26325 1  STOVL   RTHETA         PSI= ARCCOS(U .U )
1454                           40,3613   50235 0  VXV     DOT                       A L
1455                           40,3614   00001 0           OOD
1456                           40,3615   71244 0  BPL     DLOAD
1457   REF   1                 40,3616   63751 1           R36TAG2
1458   REF   5  LAST  477      40,3617   15343 1           DPPOSMAX
1459                           40,3620   77625 0  DSU
1460   REF   7  LAST  504      40,3621   02325 1           RTHETA
1461   REF   8  LAST  504      40,3622   36325 0  STCALL  RTHETA
14611  REF   2  LAST  504      40,3623   63751 1           R36TAG2
14612  REF   2  LAST  502      41,2000            SETLOC  R36LM
14613                          41,3751            BANK

1462                           41,3751   47145 1  R36TAG2 DLOAD  RTB
1463                           41,3752   00037 0           30D
1464   REF   2  LAST  426      41,3753   45544 0           SGNAGREE
1465   REF   5  LAST  502      41,3754   01052 1           STORE  DSPTEMX
1466                           41,3755   77776 1           EXIT
1467   REF   1                 41,3756  3 3776 1           CAF    V06N90N          DISPLAY Y , YDOT , AND PSI
1468   REF  95  LAST  502      41,3757  0 4662 1           TC     BANKCALL
1469   REF   3  LAST  502      41,3760   20561 1           CADR   GOMARKF
1470   REF  21  LAST  502      41,3761  1 5534 1           TCF    ENDEXT           TERMINATE
1471   REF  22  LAST  504      41,3762  1 5534 1           TCF    ENDEXT           PROCEED , END OF PROGRAM
1472   REF   1                 41,3763  1 3733 1           TCF    R36P3            REDISPLAY OUTPUT
1473   REF  57  LAST  449      41,3764  56 001 0  LREGCHK  XCH    L
1474                           41,3765  0 0006 1           EXTEND
1475   REF   1                 41,3766  1 3771 1           BZF    ENTTIM2          L-REG ZERO ,SET TIME = PRESENT TIME
1476   REF  58  LAST  504      41,3767  56 001 0           XCH    L                L-REG NON ZERO, TIME = ASTRO INPUT TIME
1477   REF   1                 41,3770  1 3744 1           TCF    ASTROTIM
1478   REF  50  LAST  502      41,3771  0 6006 1  ENTTIM2  TC     INTPRET
1479                           41,3772   52034 1           RTB    GOTO
1480   REF   4  LAST  455      41,3773   45510 1           LOADTIME
1481   REF   2  LAST  502      41,3774   65521 1           R36INT
1482                           41,3775   01420 0  V06N16N  VN     00616
1483                           41,3776   01532 1  V06N90N  VN     00690
1484   REF   6  LAST  457      30,2000            SBANK=  LOWSUPER
```

L R31 USER'S PAGE NO. 1 EO S?

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P3000
 3001                          34,2002                          BANK   34
 3002   REF   1                31,2000                          SETLOC R31
 3003                          31,2000                          BANK

 3004   REF   1                                                 COUNT* $$/R31

 30041  REF   1                31,2000  3 5057 0  R31CALL      CAF    PRIO3
 30042  REF  16  LAST  437     31,2001  0 5147 0                 TC     FINDVAC
 30043  REF  16  LAST  481     E4,1770                          EBANK= SUBEXIT
 30044  REF   2  LAST   35     31,2002   02032 1                2CADR  V83CALL
 30044                         31,2003   62064 1
 30045  REF   7  LAST  481     31,2004  3 5041 1  DSPDELAY     CAF    1SEC
 30046  REF  96  LAST  504     31,2005  0 4662 1                 TC     BANKCALL
 30047  REF   3  LAST  481     31,2006   01732 0                 CADR   DELAYJOB
 30048  REF   9  LAST  237     31,2007  3 1044 0                 CA     EXTVBACT
 300485 REF  23  LAST  392     31,2010  7 5004 1                 MASK   BIT12
 30049                         31,2011  0 0006 1                 EXTEND
 300495 REF   1                31,2012  1 2004 0                 BZF    DSPDELAY

 3005   REF   7  LAST  265     31,2013  3 0105 0  DISPN5X        CA     FLAGWRD9       TEST R31FLAG (IN SUNDANCE R31FLAG WILL
 30051  REF  21  LAST  386     31,2014  7 5014 0                 MASK   BIT4               ALWAYS BE SET AS R34 DOES NOT EXIST)
 300515                        31,2015  0 0006 1                 EXTEND
 30052                         31,2016  1 2021 1                 BZF    +3
 30053  REF   1                31,2017  3 2136 1                 CAF    V16N54         R31    USE NOUN 54
 30054                         31,2020  0 2022 0                 TC     +2
 30055  REF   1                31,2021  3 2137 0                 CAF    V16N53         R34    USE NOUN 53
 3006   REF  97  LAST  505     31,2022  0 4662 1                 TC     BANKCALL
 3007   REF   4  LAST  504     31,2023   20561 1                 CADR   GOMARKF
 3008   REF   1                31,2024  0 5625 0                 TC     B5OFF
 3009   REF   2  LAST  505     31,2025  0 5625 0                 TC     B5OFF
 3010   REF   1                31,2026  1 2013 0                 TCF    DISPN5X

 3014   REF  51  LAST  504     31,2027  0 6006 1  V83            TC     INTPRET
 3017                         31,2030   77650 1                 GOTO
 3018   REF   1                31,2031   62171 1                 HAVEBASE       INTEG STATE VECTORS
 3019   REF  52  LAST  505     31,2032  0 6006 1  V83CALL        TC     INTPRET
 3020                         31,2033   77650 1                 GOTO
 3021   REF   1                31,2034   62140 0                 STATEXTP       EXTRAPOLATE STATE VECTORS
 3022                         31,2035   52375 1  COMPDISP       VLOAD  VSU
 3023   REF   9  LAST  503     31,2036   00001 0                 RATT
 3024   REF   3  LAST   90     31,2037   02327 0                 RONE
 3025                         31,2040   51406 1                 PUSH   ABVAL          RATT-RONE TO OD                PD= 6
 3029   REF   9  LAST  503     31,2041   02321 0                 STORE  RANGE          METERS 8-29
 3030                         31,2042   77301 0                 NORM   VLOAD
 3031   REF   5  LAST  489     31,2043   00047 1                 X1     RATT-RONE                                     PD= 0
 30315                        31,2044   77762 1                 VSR1
 3032                         31,2045   53457 1                 VSL*   UNIT
 3033                         31,2046   20201 0                 0,1
 3034                         31,2047   52315 1                 PDVL   VSU             UNIT(LOS) TO OD               PD= 6
```

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3035   REF  7 LAST 503   31,2050   00007 0                VATT
3036   REF  3 LAST  90   31,2051   02335 0                VONE
3037                     31,2052   77641 1         DOT                    (VATT-VONE).UNIT(LOS)          PD= 0
3039                     31,2053   77752 1         SL1
3040   REF  6 LAST 503   31,2054   36323 0         STCALL RRATE           RANGE RATE M/CS B-7
3041   REF  1            31,2055   47477 0                CDUTRIG         TO INITIALIZE FOR *NBSM*
30411                    31,2056   77624 1         CALL
30412  REF  1            31,2057   62311 0                R34LOS          NOTE. PDL MUST = 0.
3042                     31,2060   53575 0 R34ANG  VLOAD  UNIT
3043   REF  4 LAST 505   31,2061   02327 0                RONE
3044                     31,2062   77715 1         PDVL                   UR TO OD                       PD= 6
3045   REF  1            31,2063   15333 0                THISAXIS        UNITX FOR CM, UNITZ FOR LM
30452                    31,2064   77214 0         BON    VLOAD           CHK R31FLAG. ON=R31 THETA. OFF=R34 PHI
30454  REF  1            31,2065   04713 0                R31FLAG
30455                    31,2066   62070 1                +2                  R31-THETA
30456                    31,2067   00015 0                12D
30458                    31,2070   77624 1         CALL
3046   REF  1            31,2071   47646 0                *NBSM*
3047                     31,2072   41505 1         VXM    PUSH            UXORZ TO 6D                    PD=12D
3048   REF  4 LAST 493   31,2073   01736 1                REFSMMAT
3049                     31,2074   72431 1         VPROJ  VSL2
3050                     31,2075   00001 0                0D
3051                     31,2076   53445 1         BVSU   UNIT
3052                     31,2077   00007 0                6D
3053                     31,2100   47315 0         PDVL   VXV             UP/2 TO 12D                    PD=18D
3054   REF  5 LAST 506   31,2101   02327 0                RONE
3055   REF  4 LAST 506   31,2102   02335 0                VONE
3056                     31,2103   47256 0         UNIT   VXV
3057   REF  6 LAST 506   31,2104   02327 0                RONE
3058                     31,2105   63241 0         DOT    PDVL            SIGN TO 12D, UP/2 TO MPAC      PD=18D
3059                     31,2106   00015 0                12D
3060                     31,2107   50372 1         VSL1   DOT             UP.UXORZ
3061                     31,2110   00007 0                6D
3062                     31,2111   72565 1         SIGN   SL1
3063                     31,2112   00015 0                12D
3064                     31,2113   77726 1         ACOS
3065   REF  9 LAST 504   31,2114   26325 1         STODL  RTHETA
3066   REF  7 LAST 506   31,2115   02327 0                RONE
3067                     31,2116   51041 0         DOT    BPL
3068                     31,2117   00007 0                6D
3069                     31,2120   62125 0                +5
3070                     31,2121   44345 0         DLOAD  BDSU            IF UXORZ.R NEG. RTHETA = 1 - RTHETA
3071   REF 10 LAST 506   31,2122   02325 1                RTHETA
3072   REF  6 LAST 504   31,2123   15343 1                DPPOSMAX
3073   REF 11 LAST 506   31,2124   02325 1         STORE  RTHETA          RTHETA BETWEEN 0 AND 1 REV.
3074                     31,2125   77776 1         EXIT
3075   REF 22 LAST 446   31,2126 3 5013 0         CAF    BIT5            HAVE WE BEEN ANSWERED
30751  REF 10 LAST 505   31,2127 7 1044 1         MASK   EXTVBACT
3076                     31,2130 0 0006 1         EXTEND
3077   REF 23 LAST 504   31,2131 1 5534 1         BZF    ENDEXT          YES, DIE
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3078   REF  11  LAST  506   31,2132  4 1044 1            CS     EXTVBACT
3079   REF  24  LAST  505   31,2133  7 5004 1            MASK   BIT12
3080   REF  12  LAST  507   31,2134  27'044 1            ADS    EXTVBACT

30805  REF   1              31,2135  1 2027 1            TCF    V83
3081                        31,2136   04056 0  V16N54    VN     1654
3082                        31,2137   04065 0  V16N53    VN     1653
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P3083   STATEXTP DOES AN INITIAL PRECISION EXTRAPOLATION OF THE
R30835  LEM STATE VECTOR TO PRESENT TIME OR TO PIPTIME IF AV G
R3084   IS ON AND SAVES AS BASE VECTOR. IF AV G IS ON RN + VN
R30845  ARE USED AS THE CM STATE VECTOR AND THE INITIAL R RDOT
R3085   RTHETA ARE COMPUTED WITH NO FURTHER INTEGRATION. IF AV
R3086   G IS OFF A PRECISION EXTRAPOLATION IS MADE OF THE CM
R3087   STATE VECTOR TO PRESENT TIME AND.....
R3088     THE CM + LM STATE VECTORS ARE INTEGRATED TO PRES TIME
R3089     USING PRECISION OR CONIC AS SURFFLAG IS SET OR CLEAR.
R30895    IF AV G IS ON THEN SUBSEQUENT PASSES WILL PROVIDE
R3090     USE OF RN + VN AS CM STATE VECTOR AND THE LM STATE
R30905    VECTOR WILL BE PRECISION INTEGRATED USING LEMPREC
R3091     IF SURFFLAG IS SET.
R30915      CM STATE VECTOR RONE VONE + LM STATE VECTOR RATT
R3092       VATT ARE USED IN COMPUTING R RDOT RTHETA.
R30925
 3093                          31,2140   43034 1  STATEXTP RTB    BOF             INITIAL INTEGRATION
 30933  REF   5  LAST  504    31,2141   45510 1                   LOADTIME
 30936  REF   1               31,2142   03751 1                   V37FLAG
 3094                          31,2143   62146 0                   +3              AV G OFF, USE PRES TIME
 30943                         31,2144   77624 1           CALL
 30946  REF   1               31,2145   62273 0                   GETRVN                ON,  USE RN VN PIPTIME
 3095   REF   1               31,2146   02343 1           STORE   BASETIME        PRES TIME OR PIPTIME
 3096   REF  10  LAST  503    31,2147   34041 0           STCALL  TDEC1
 3097   REF   3  LAST  498    31,2150   27105 0                   LEMPREC
 3098                         31,2151   77775 1           VLOAD                   BASE VECTOR, LM
 3099   REF   3  LAST  490    31,2152   00017 1                   RATT1
 3100   REF   1               31,2153   26225 0           STOVL   BASEOTP          POS.
 3101   REF   3  LAST  490    31,2154   00025 0                   VATT1
 3102   REF   1               31,2155   02241 1           STORE   BASEOTV          VEL.
 3103                         31,2156   71214 0           BON     DLOAD
 3104   REF   2  LAST  508    31,2157   03711 0                   V37FLAG
 3105   REF   1               31,2160   62035 0                   COMPDISP        COMPUTE R RDOT RTHETA FROM
R3106                                    RONE(RN) VONE(VN) RATT+VATT(LEMPREC)
 3107   REF   5  LAST  503    31,2161   00015 0                   TAT
 3109   REF  11  LAST  508    31,2162   34041 0           STCALL  TDEC1
 31093  REF   3  LAST  498    31,2163   27071 1                   CSMPREC
 31096                        31,2164   77775 1           VLOAD                   BASE VECTOR, CM
 3110   REF   4  LAST  508    31,2165   00017 1                   RATT1
 31103  REF   1               31,2166   26255 1           STOVL   BASETHP          POS.
 31106  REF   4  LAST  508    31,2167   00025 0                   VATT1
 3111   REF   1               31,2170   02263 1           STORE   BASETHV          VEL.
 3112                         31,2171   47014 1  HAVEBASE BON     RTB             SUBSEQUENT INTEGRATIONS
 3113   REF   3  LAST  508    31,2172   03711 0                   V37FLAG
 3114   REF   1               31,2173   62256 1                   GETRVNS
 3115   REF   6  LAST  508    31,2174   45510 1                   LOADTIME
 3116   REF  12  LAST  508    31,2175   34041 0           STCALL  TDEC1           AV G OFF, SET INTEG. OF CM
 3117   REF   9  LAST  489    31,2176   27442 0                   INTSTALL
 3118                         31,2177   43175 0           VLOAD   CLEAR
 3119   REF   2  LAST  508    31,2200   02255 1                   BASETHP
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3120   REF   7  LAST  489   31,2201   00263 0              MOONFLAG
3121   REF   7  LAST  490   31,2202   25535 0       STOVL  RCV
3122   REF   2  LAST  508   31,2203   02263 1              BASETHV
3123   REF   7  LAST  490   31,2204   15543 1       STODL  VCV
3124   REF   2  LAST  508   31,2205   02343 1              BASETIME
3125                        31,2206   43014 0       BOF    SET              GET APPROPRIATE MOONFLAG SETTING
3126   REF   4  LAST  265   31,2207   04343 1              MOONTHIS
3127                        31,2210   62212 1              +2
3128   REF   8  LAST  509   31,2211   00063 1              MOONFLAG
3129                        31,2212   77614 1       CLEAR
31293  REF   5  LAST  490   31,2213   01673 1              INTYPFLG
31296                       31,2214   43014 0       BON    SET
3130   REF   4  LAST  267   31,2215   04307 1              SURFFLAG
31303                       31,2216   62220 0              +2               PREC. IF LM DOWN
31306  REF   6  LAST  509   31,2217   01473 0              INTYPFLG         CONIC IF LM NOT DOWN
3131   REF   7  LAST  490   31,2220   35517 1       STCALL TET
3132   REF   4  LAST  490   31,2221   27135 0              INTEGRVS         INTEGRATION --- AT LAST---
3133                        31,2222   77775 1       VLOAD
3134   REF  10  LAST  505   31,2223   00001 0              RATT
3135   REF   8  LAST  506   31,2224   26327 0       STOVL  RONE
3136   REF   8  LAST  506   31,2225   00007 0              VATT
3137   REF   5  LAST  506   31,2226   16335 0       STODL  VONE             GET SET FOR CONIC EXTRAP..OTHER
31395  REF   6  LAST  508   31,2227   00015 0              TAT
3140                        31,2230   45014 0       BON    CALL
31405  REF   5  LAST  509   31,2231   04307 1              SURFFLAG
3141   REF   1              31,2232   62267 0              GETRVN6          LEMPREC IF LM DOWN
31413  REF  10  LAST  508   31,2233   27442 0              INTSTALL         ..CONIC IF NOT DOWN
31415                       31,2234   77614 1       SET
31417  REF   7  LAST  509   31,2235   01473 0              INTYPFLG
3142   REF  13  LAST  508   31,2236   00041 1 OTHINT STORE  TDEC1            ENTERED IF AV G ON TO INTEG LM
3143                        31,2237   43175 0       VLOAD  CLEAR
3144   REF   2  LAST  508   31,2240   02225 0              BASEOTP
3145   REF   9  LAST  509   31,2241   00263 0              MOONFLAG
3146   REF   8  LAST  509   31,2242   25535 0       STOVL  RCV
3147   REF   2  LAST  508   31,2243   02241 1              BASEOTV
3148   REF   8  LAST  509   31,2244   15543 1       STODL  VCV
3149   REF   3  LAST  509   31,2245   02343 1              BASETIME
3150                        31,2246   43014 0       BOF    SET
3151   REF   5  LAST  509   31,2247   04343 1              MOONTHIS
3152                        31,2250   62252 0              +2
3153   REF  10  LAST  509   31,2251   00063 1              MOONFLAG
3154   REF   8  LAST  509   31,2252   35517 1       STCALL TET
3155   REF   5  LAST  509   31,2253   27135 0              INTEGRVS
3156                        31,2254   77650 1       GOTO
3157   REF   2  LAST  508   31,2255   62035 0              COMPDISP         COMPUTE R RDOT RTHETA
3158                        31,2256   77624 1 GETRVN5 CALL                  AV G ON
31585  REF   2  LAST  508   31,2257   62273 0              GETRVN
31595                       31,2260   45014 0       BON    CALL
3160   REF   6  LAST  509   31,2261   04307 1              SURFFLAG
31603  REF   2  LAST  509   31,2262   62267 0              GETRVN6          LM DOWN, LMPREC
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 31613  REF  11  LAST  509   31,2263   27442 0            INTSTALL
 31616                      31,2264   52014 0      CLEAR  GOTO
 3162   REF   8  LAST  509   31,2265   01673 1            INTYPFLG
 31623  REF   1              31,2266   62236 1            OTHINT
 31626  REF  14  LAST  509   31,2267   34041 0  GETRVN6   STCALL TDEC1
 3163   REF   4  LAST  508   31,2270   27105 0            LEMPREC
 31635                      31,2271   77650 1      GOTO
 3164   REF   3  LAST  509   31,2272   62035 0            COMPDISP        COMPUTE R RDOT RTHEAT
 31645                      31,2273   77620 0  GETRVN    STQ
 31646                      31,2274   00000 1            0D
 31647                      31,2275   52175 0      VLOAD  GOTO            AV G ON, RONE = RN  VONE = VN
 3165   REF   5  LAST  289   31,2276   01171 1            RN               AND USE PIPTIME
 31655                      31,2277   62300 0            +1
 3166   REF   9  LAST  509   31,2300   36327 1      STCALL RONE
 3167                       31,2301   62302 1            +1
 3168                       31,2302   52175 0      VLOAD  GOTO
 3169   REF   5  LAST  289   31,2303   01177 1            VN
 31695                      31,2304   62305 0            +1
 3170   REF   6  LAST  509   31,2305   16335 0      STODL  VONE
 31705  REF   4  LAST  289   31,2306   01205 1            PIPTIME
 3171                       31,2307   77650 1      GOTO
 31711                      31,2310   00000 1            0D
 3172   REF   1              31,2000                SETLOC R34
 3173                       31,2311                BANK
 3174                       31,2311    77776 1  R34LOS   EXIT
 3175   REF   8  LAST  282   31,2312   3 0036 1           CA     CDUS
 3176   REF   2  LAST  265   31,2313   50 120 1           INDEX  FIXLOC
 3177                       31,2314   54 011 0           TS     9D
 3178   REF   7  LAST  282   31,2315   3 0035 1           CA     COUT
 3179   REF   3  LAST  510   31,2316   50 120 1           INDEX  FIXLOC
 3180                       31,2317   54 013 1           TS     11D
 3181   REF   4  LAST  510   31,2320   3 0120 1           CA     FIXLOC
 3182   REF  17  LAST  451   31,2321   6 6211 0           AD     SIX
 3183                       31,2322   4 0000 0           COM
 3184   REF   5  LAST  510   31,2323   50 120 1           INDEX  FIXLOC
 3185   REF   6  LAST  505   31,2324   54 045 1           TS     X1
 3186   REF  53  LAST  505   31,2325   0 6006 1           TC     INTPRET
 3187                       31,2326    77624 1           CALL
 3188   REF   2  LAST  454   31,2327    46000 0                  SXTNB
 3189                       31,2330    34015 1           STCALL 12D
 3190   REF   1              31,2331    62060 0                  R34ANG
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P5000   1) PROGRAM NAME - TARGET DELTA V PROGRAM (P76).
R5001   2) FUNCTIONAL DESCRIPTION - UPON ENTRY BY ASTRONAUT ACTION, P76 FLASHES DSKY REQUESTS TO THE ASTRONAUT
R5003           TO PROVIDE VIA DSKY (1) THE DELTA V TO BE APPLIED TO THE OTHER VEHICLE STATE VECTOR AND (2) THE
R5005           TIME (TIG) AT WHICH THE OTHER VEHICLE VELOCITY WAS CHANGED BY  EXECUTION OF A THRUSTING MANEUVER. THE
R5007           OTHER VEHICLE STATE VECTOR IS INTEGRATED TO TIG AND UPDATED BY THE ADDITION OF DELTA V (DELTA V HAVING
R5009           BEEN TRANSFORMED FROM LV TO REF COSYS). USING INTEGRVS, THE   PROGRAM THEN INTEGRATES THE OTHER
R5011   VEHICLE STATE VECTOR TO THE STATE VECTOR OF THIS VEHICLE. THUS INSURING THAT THE W-MATRIX AND BOTH VEHICLE
R5013   STATES CORRESPOND TO THE SAME TIME.
R5014   3) ERASABLE INITIALIZATION REQUIRED - NONE.
R5015   4) CALLING SEQUENCES AND EXIT MODES - CALLED BY ASTRONAUT REQUEST THRU DSKY V 37 E 76 E.
R5017           EXITS BY TCF ENDOFJOB.
R5018   5) OUTPUT - OTHER VEHICLE STATE VECTOR INTEGRATED TO TIG AND INCREMENTED BY DELTA V IN REF COSYS.
R5020           THE PUSHLIST CONTAINS THE MATRIX BY WHICH THE INPUT DELTA V MUST BE POST-MULTIPLIED TO CONVERT FROM LV
R5022           TO REF COSYS.
R5023   6) DEBRIS - OTHER VEHICLE STATE VECTOR.
R5024   7) SUBROUTINES CALLED - BANKCALL,GOXDSPF,CSMPREC (OR LEMPREC),ATOPCSM (OR ATOPLEM),INTSTALL,INTWAKE, PHASCHNG
R5026           INTPRET, INTEGRVS, AND MINIRECT.

R5027   8) FLAG USE - MOONFLAG,CMOONFLAG,INTYPFLG,RASFLAG, AND MARKCTR.

 5028                           30,2000                         BANK   30
 5029   REF   1                 13,2000                         SETLOC P76LOC
 5030                           13,2071                         BANK
 5031   REF   1                                                 COUNT* $$/P76

 5032   REF  20  LAST  477      F7,1412                         EBANK= TIG

 5033   REF  18  LAST  482      13,2071  0 5546 0  P76          TC     UPFLAG
 5034   REF   2  LAST  259      13,2072   00031 0               ADRES  TRACKFLG

 5035   REF   1                 13,2073  3 2220 0               CAF    V06N84          FLASH LAST DELTA V,
 5040   REF  98  LAST  505      13,2074  0 4662 1               TC     BANKCALL        AND WAIT FOR KEYBOARD ACTION.
 5041   REF  14  LAST  484      13,2075   20720 0               CADR   GOFLASH
 5042   REF   1                 13,2076  1 2212 0               TCF    ENDP76
 5043                           13,2077  0 2101 0               TC     +2              PROCEED
 5044                           13,2100  0 2073 1               TC     -5              STORE DATA AND REPEAT FLASHING
 5045   REF   2  LAST  511      13,2101  3 2221 1               CAF    V06N84 +1       FLASH VERB 06 NOUN 33, DISPLAY LAST TIG,
 5046   REF  99  LAST  511      13,2102  0 4662 1               TC     BANKCALL        AND WAIT FOR KEYBOARD ACTION.
 5047   REF  15  LAST  511      13,2103   20720 0               CADR   GOFLASH
 5048   REF   2  LAST  511      13,2104  1 2212 0               TCF    ENDP76
 5049                           13,2105  0 2107 0               TC     +2
 5050                           13,2106  0 2101 0               TC     -5
 5051   REF  54  LAST  510      13,2107  0 6006 1               TC     INTPRET         RETURN TO INTERPRETIVE CODE
 5052                           13,2110   77745 1               DLOAD                  SET D(MPAC)=TIG IN CSEC B28
 5053   REF  21  LAST  511      13,2111   03413 1                      TIG
 5054   REF  15  LAST  510      13,2112   34041 0               STCALL TDEC1           SET TDEC1=TIG FOR ORBITAL INTEGRATION
 5055   REF   3  LAST  503      13,2113   27105 0                      OTHPREC
 5056                           13,2114   53575 0  COMPMAT      VLOAD  UNIT
 5057   REF  11  LAST  509      13,2115   00001 0                      RATT
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5058                          13,2116   77676 0          VCOMP                 U(-R)
5059                          13,2117   00031 0          STORE  24D            U(-R) TO 24D
5060                          13,2120   53435 0          VXV    UNIT           U(-R)XV = U(VXR)
5061  REF   9  LAST  509       13,2121   00007 0                 VATT
5062                          13,2122   00023 0          STORE  18D
5063                          13,2123   53435 0          VXV    UNIT           U(VXR)XU(-R) = U((RXV)XR)
5064                          13,2124   00031 0                 24D
5065                          13,2125   24015 0          STOVL  12D
5066  REF   4  LAST  282       13,2126   03540 0                 DELVOV
5067                          13,2127   76505 0          VXM    VSL1           V(MPAC)=DELTA V IN REFCOSYS
5068                          13,2130   00015 0                 12D
5069                          13,2131   77655 1          VAD
5070  REF  10  LAST  512       13,2132   00007 0                 VATT
5071                          13,2133   00007 0          STORE  6              V(PD6)=VATT + DELTA V
5072                          13,2134   77624 1          CALL                  PREVENT WOULD-BE USER OF ORBITAL
5073  REF  12  LAST  510       13,2135   27442 0                 INTSTALL      INTEG FROM INTERFERING WITH UPDATING
5074                          13,2136   77624 1          CALL
5075  REF   1                 13,2137   26222 1                 P76SUB1
5076                          13,2140   53775 1          VLOAD  VSR*
5077                          13,2141   00007 0                 6
5078                          13,2142   57176 0                 0,2
5079  REF   9  LAST  509       13,2143   25543 1          STOVL  VCV
5080  REF  12  LAST  511       13,2144   00001 0                 RATT
5081                          13,2145   77657 0          VSR*
5082                          13,2146   57176 0                 0,2
5083  REF   9  LAST  509       13,2147   15535 0          STODL  RCV
5084  REF  22  LAST  511       13,2150   03413 1                 TIG
5085  REF   9  LAST  509       13,2151   01517 0          STORE  TET
5086                          13,2152   71214 0          CLEAR  DLOAD
5087  REF   9  LAST  510       13,2153   01673 1                 INTYPFLG
5088  REF   1                 13,2154   01571 0                 TETTHIS
5089  REF  16  LAST  511       13,2155   34041 0  INTOTHIS STCALL TDEC1
5090  REF   6  LAST  509       13,2156   27135 0                 INTEGRVS
5091                          13,2157   77624 1          CALL
5093  REF  13  LAST  512       13,2160   27442 0                 INTSTALL
50933                         13,2161   77624 1          CALL
50936 REF   2  LAST  512       13,2162   26222 1                 P76SUB1       SET/CLEAR MOONFLAG
5094                          13,2163   77775 1          VLOAD
5095  REF   5  LAST  508       13,2164   00017 1                 RATT1
5096  REF   2  LAST   85       13,2165   01503 0          STORE  RRECT
5097  REF  10  LAST  512       13,2166   15535 0          STODL  RCV
5098  REF   7  LAST  509       13,2167   00015 0                 TAT
5099  REF  10  LAST  512       13,2170   25517 0          STOVL  TET
5100  REF   5  LAST  508       13,2171   00025 0                 VATT1
5101                          13,2172   77624 1          CALL
5102  REF   1                 13,2173   23435 1                 MINIRECT
5103                          13,2174   77776 1          EXIT
5104  REF  22  LAST  482       13,2175   0 5412 0         TC     PHASCHNG
5105                          13,2176   04024 0          OCT    04024
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5106   REF  19  LAST  511   13,2177  0 5546 0            TC      UPFLAG
5107   REF   1               13,2200   00236 0           ADRES   REINTFLG

5109   REF  55  LAST  511   13,2201  0 6006 1            TC      INTPRET
5110                         13,2202   77624 1           CALL
5111   REF   1               13,2203   26760 1                   ATOPOTH
5116                         13,2204   77531 0           SSP     EXIT
5117   REF   9  LAST  453   13,2205   00053 1                   QPRET
5118   REF   1               13,2206   26211 1                   OUT
5119   REF 100  LAST  511   13,2207  0 4662 1            TC      BANKCALL      PERMIT USE OF ORBITAL INTEGRATION
5120   REF   1               13,2210   27477 0           CADR    INTWAKE1
5121                         13,2211   77776 1  OUT      EXIT
5125   REF 110  LAST  502   13,2212  3 5021 1  ENDP76   CAF     ZERO
5126   REF   1               13,2213  55'126 1           TS      MARKCTR       CLEAR RR TRACKING MARK COUNTER
51265  REF   4  LAST  279   13,2214  55'125 1           TS      VHFCNT

5127   REF  11  LAST  302   13,2215  3 7716 0           CAF     NEGONE
5128   REF   6  LAST  228   13,2216  55'734 1           TS      MRKBUF2       INVALIDATE MARK BUFFER

5129   REF  11  LAST  484   13,2217  1 4106 0           TCF     GOTOPOOH

5130                         13,2220   01524 0  V06N84   NV      0884
5131                         13,2221   01441 1           NV      0633
5132                         13,2222   67214 1  P76SUB1  CLEAR   SLOAD
5133   REF  11  LAST  509   13,2223   00263 0                   MOONFLAG
5134   REF   5  LAST  497   13,2224   00050 1                   X2
5135                         13,2225   43030 0           BHIZ    SET           X2=0...CLEAR MOONFLAG
5136                         13,2226   26230 1                   +2              =2.....SET MOONFLAG
5137   REF  12  LAST  513   13,2227   00063 1                   MOONFLAG
5138                         13,2230   77616 0           RVQ
```

L R30 USER'S PAGE NO. 1 EO S3

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R5200   SUBROUTINE NAME:     V82CALL
R5201   MOD NO:  0                                                    DATE:          16 FEB 67
R5203   MOD BY:  RR BAIRNSFATHER                                      LOG SECTION:   R30
R5205   MOD NO: 1           MOD BY: RR BAIRNSFATHER      DATE: 11 APR 67     SR30.1 CHANGED TO ALLOW MONITOR OPERN
R5208   MOD  NO: 2           MOD  BY ALONSO               DATE : 11 DEC 67    V82 PROGRAM REWRITTEN
R52095  MOD NO: 3           MOD  BY ALONSO               DATE: 26 MAR 68     PROG MOD TO HANDLE DIF EARTH/MOON SCALE
R5210    NEW FUNCTIONAL DESCRIPTION:    CALLED BY VERB 82 ENTER.  PRIORITY 10
R5211     USED THROUGHOUT.              CALCULATE AND DISPLAY ORBITAL PARAMETERS

R5212   1. IF AVERAGE G IS OFF:
R5213            FLASH DISPLAY V04N06. R2 INDICATES WHICH SHIP'S STATE VECTOR IS
R5214             TO BE UPDATED. INITIAL CHOICE IS THIS SHIP (R2=1). ASTRONAUT
R5215             CAN CHANGE TO OTHER SHIP BY V22EXE. WHERE X NOT EQ 1.
R5216            SELECTED STATE VECTOR UPDATED BY THISPREC (OTHPREC).
R5217            CALLS SR30.1 (WHICH CALLS TFFCONMU + TFFRP/RA) TO CALCULATE
R5218             RPER (PERIGEE RADIUS), RAPO (APOGEE RADIUS), HPER (PERIGEE
R5219             HEIGHT ABOVE LAUNCH PAD OR LUNAR LANDING SITE), HAPO (APOGEE
R5220             HEIGHT AS ABOVE), TPER (TIME TO PERIGEE), TFF (TIME TO
R5221             INTERSECT 300 KFT ABOVE PAD OR 35KFT ABOVE LANDING SITE).
R5222            FLASH MONITOR V16N44 (HAPO, HPER, TFF).TFF IS -59M59S IF IT WAS
R5223             NOT COMPUTABLE, OTHERWISE IT INCREMENTS ONCE PER SECOND.
R5224             ASTRONAUT HAS OPTION TO MONITOR TPER BY KEYING IN N 32 E.
R5225             DISPLAY IS IN HMS, IS NEGATIVE (AS WAS TFF), AND INCREMENTS
R5226             ONCE PER SECOND ONLY IF TFF DISPLAY WAS -59M59S.

R5227   2. IF AVERAGE G IS ON:
R5228            CALLS SR30.1 APPROX EVERY TWO SECS.  STATE VECTOR IS ALWAYS
R5229             FOR THIS VEHICLE. V82 DOES NOT DISTURB STATE VECTOR.  RESULTS
R5230             OF SR30.1 ARE RAPO, RPER, HAPO, HPER, TPER, TFF.
R5231            FLASH MONITOR V16N44 (HAPO, HPER, TFF).
R5232            IF MODE IS P11, THEN CALL DELRSPL SO ASTRONAUT CAN MONITOR
R5233             RESULTS BY N50E. SPLASH COMPUTATION DONE ONCE PER TWO SECS.

R52331  ADDENDUM: HAPO AND HPER SHOULD BE CHANGED TO READ HAPOX AND HPERX IN THE
R52332            ABOVE REMARKS.

R5234   CALLING SEQUENCE:  VERB 82 ENTER.

R5235   SUBROUTINES CALLED:  SR30.1, GOXDSPF
R5236                        MAYBE - THISPREC , OTHPREC, LOADTIME, DELRSPL
R5237   NORMAL EXIT MODES:  TC ENDEXT

R5238   ALARMS:  NONE

R5239   OUTPUT:  HAPOX    (-29) M
R5240            HPERX    (-29) M
R5241            RAPO     (-29) M EARTH
R52411                    (-27) M MOON
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R5242           RPER     (-29) M EARTH
R52421                   (-27) M MOON
R5243           TFF      (-28) CS       CONTAINS NEGATIVE QUANTITY
R5244           -TPER    (-28) CS       CONTAINS NEGATIVE QUANTITY
R5245           RSP-RREC (-29) M        IF DELRSPL CALLED

R5246   ERASABLE INITIALIZATION REQUIRED: STATE VECTOR.

R5247   DEBRIS: QPRET, RONE, VONE,TFF/RTMU, HPERMIN, RPADTEM, V82EMFLG.
R5248           MAYBE: TSTART82, V82FLAGS, TDEC1.


 5249   REF   4  LAST  279   E4,1751                          EBANK= HAPOX
 5250                        31,2332                          BANK   31
 5251   REF   1              23,2000                          SETLOC R30LOC
 5252                        23,2332                          BANK
 5253   REF   1                                               COUNT* $$/R30

 5254   REF  56  LAST  513   23,2332  0 6006 1  V82CALL  TC     INTPRET
 5255                        23,2333   52014 0             BON    GOTO
 5256   REF   1              23,2334   00716 1                    AVEGFLAG
 5257   REF   1              23,2335   46566 0                    V82GON          IF AVERAGE G ON
 5258   REF   1              23,2336   46337 1                    V92GOFF         IF AVERAGE G OFF

 5259                        23,2337   77776 1  V82GOFF  EXIT                     ALLOW ASTRONAUT TO SELECT VEHICLE
 5260   REF  30  LAST  502   23,2340  3 5016 0           CAF    TWO              DESIRED FOR ORBITAL PARAMETERS
 5261   REF   4  LAST  502   23,2341  55'051 0           TS     OPTIONX
 5262   REF  63  LAST  502   23,2342  3 5017 1           CAF    ONE
 5263   REF   5  LAST  515   23,2343  55'052 0           TS     OPTIONX +1
 5264   REF   1              23,2344  3 2406 1           CAF    OPTIONVN         V 04 N 06
 5265   REF 101  LAST  513   23,2345  0 4662 1           TC     BANKCALL
 5266   REF  10  LAST  502   23,2346   20561 1           CADR   GOXDSPF
 5267   REF  24  LAST  506   23,2347  0 5534 0           TC     ENDEXT           TERMINATE
 5268                        23,2350  0 2352 1           TC     +2               PROCEED
 5269                        23,2351  0 2344 0           TC     -5               DATA IN.  OPTIONX +1 = 1 FOR THIS VEHIC.
A5270                                                                                UNEQ 1 FOR OTHER VEHICLE.
 5271   REF  22  LAST  505   23,2352  3 5014 1           CAF    BIT4             80 MS
 5272   REF  18  LAST  416   23,2353  0 5245 1           TC     WAITLIST
 5273   REF   4  LAST  280   E4,1743                     EBANK= TFF
 5274   REF   1              23,2354   02531 1           2CADR  TICKTEST
 5274   REF   1              23,2355   46064 1
 5275                        23,2356  0 0003 1           RELINT
 5276   REF   1              23,2357  3 2410 0  V82GOFLP CAF    TFFBANK          MAJOR RECYCLE LOOP ENTRY
 5277   REF  20  LAST  441   23,2360  54 003 0           TS     EBANK
 5278   REF 111  LAST  513   23,2361  3 5021 1           CAF    ZERO
 5279   REF   3  LAST   91   23,2362  55'742 0           TS     V82FLAGS         ZERO FLAGS FOR TICKTEST. INHIBITS
A5280                                                                            DECREMENTING OF TFF AND -TPER.
 5281   REF   5  LAST  267   23,2363  3 5063 1           CAF    PRIO7
 5282   REF  17  LAST  505   23,2364  0 5147 0           TC     FINDVAC          V82GOFF1 WILL EXECUTE STATE VECTOR
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5283  REF   5  LAST  515   E4,1743                          EBANK= TFF          UPDATE AND ORBIT CALCULATIONS FOR
5284  REF   1              23,2365   02411 1               2CADR  V82GOFF1     SELECTED VEHICLE ABOUT PROPER BODY.
5284  REF   1              23,2366   46064 1
5285                       23,2367  0 0003 1               RELINT
5286  REF  15  LAST  391   23,2370  3 6214 0  V82STALL     CAF    THREE        STALL IN THIS LOOP AND WITHOLD V 16 N 44
5287  REF   4  LAST  515   23,2371  7 1742 0               MASK   V82FLAGS     UNTIL STATE VECTOR UPDATE SETS ONE OF
5288  REF 140  LAST  453   23,2372  10 000 0               CCS    A            OUR FLAG BITS.
5289  REF   1              23,2373  0 2400 1               TC     FLAGGON      EXIT FROM STALL LOOP.
5290  REF   8  LAST  505   23,2374  3 5041 1               CAF    1SEC
5291  REF 102  LAST  515   23,2375  0 4662 1               TC     BANKCALL
5292  REF   4  LAST  505   23,2376   01732 0               CADR   DELAYJOB
5293  REF   1              23,2377  0 2370 1               TC     V82STALL

5294  REF   1              23,2400  3 2407 0  FLAGGON      CAF    V16N44       MONITOR HAPO,HPER,TFF.
5295  REF 103  LAST  516   23,2401  0 4662 1               TC     BANKCALL
5296  REF  11  LAST  515   23,2402   20561 1               CADR   GOXDSPF
5297  REF   3  LAST  505   23,2403  0 5625 0               TC     B5OFF        TERM  THIS TELLS TICKTEST TO KILL ITSELF
5298  REF   4  LAST  516   23,2404  0 5625 0               TC     B5OFF        PROCEED  DITTO
5299  REF   1              23,2405  0 2357 1               TC     V82GOFLP     RECYCLE  RECOMPUTE STATE VECT + DISPLAY

5300                       23,2406   01014 0  OPTIONVN     VN     0412
5301                       23,2407   04054 1  V16N44       VN     1644
5302  REF   6  LAST  516   23,2410   02343 1  TFFBANK      ECADR  TFF

5303  REF  57  LAST  515   23,2411  0 6006 1  V82GOFF1     TC     INTPRET
5304                       23,2412   77634 0               RTB
5305  REF   7  LAST  508   23,2413   45510 1                      LOADTIME
5306  REF  17  LAST  512   23,2414   00041 1               STORE  TDEC1        TIME FOR STATE VECTOR UPDATE.
5307  REF   1              23,2415   02325 1               STORE  TSTART82     TIME FOR INTERNAL USE.
5308                       23,2416   77776 1               EXIT
5309  REF   6  LAST  515   23,2417  4 1052 0               CS     OPTIONX +1   1 FOR THIS VEHICLE, NOT 1 FOR OTHER
5310  REF  64  LAST  515   23,2420  6 5017 1               AD     ONE
5311                       23,2421  0 0006 1               EXTEND
5312  REF   1              23,2422  1 2446 1               BZF    THISSHIP
5313  REF  58  LAST  516   23,2423  0 6006 1  OTHSHIP      TC     INTPRET
5314                       23,2424   77624 1               CALL                CALL STATE VECTOR UPDATE FOR OTHER SHIP.
5315  REF   4  LAST  511   23,2425   27105 0                      OTHPREC
5316                       23,2426   77775 1  BOTHSHIP     VLOAD               MOVE RESULTS INTO TFFCONIC STORAGE AREAS
5317  REF  13  LAST  512   23,2427   00001 0                      RATT          TO BE CALLED BY SR30.1.
5318  REF  10  LAST  510   23,2430   26327 0               STOVL  RONE         RATT AT (-29)M FOR EARTH OR MOON
5321  REF  11  LAST  512   23,2431   00007 0                      VATT
5322  REF   7  LAST  510   23,2432   02335 0               STORE  VONE          VATT AT (-7)M/CS FOR EARTH OR MOON
5323                       23,2433   77743 1               DLOAD*
5324  REF   1              23,2434   71321 1                      1/RTMUF,2     X2 IS 0 FOR EARTH CENTERED STATE VEC
5325  REF   1              23,2435   00037 0               STORE  TFF/RTMU      X2 IS 2 FOR MOON
5326                       23,2436   77743 1               DLOAD*              AS LEFT BY THISPREC OR OTHPREC.
5327  REF   1              23,2437   71315 0                      MINPERE,2
5328  REF   2  LAST   90   23,2440   02321 0               STORE  HPERMIN        TFFRTMU, HPERMIN AND RPADTEM ARE ALL
5329                       23,2441   46135 1               SLOAD  BHIZ         EARTH/MOON PARAMETERS AS SET HERE.
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 5330   REF   6  LAST  513   23,2442   00050 1                    X2
 5331   REF   1              23,2443   46463 1                    EARTHPAD
 5332                        23,2444   77650 1           GOTO
 5333   REF   1              23,2445   46467 0                    MOONPAD

 5334   REF  59  LAST  516   23,2446  0 6006 1  THISSHIP TC       INTPRET
 5335                        23,2447   77624 1           CALL                    CALL STATE VECTOR UPDATE FOR THIS SHIP.
 5336   REF   3  LAST  503   23,2450   27071 1                    THISPREC
 5337                        23,2451   77650 1           GOTO
 5338   REF   1              23,2452   46426 0                    BOTHSHIP

R5339   THE FOLLOWING CONSTANTS ARE PAIRWISE INDEXED. DO NOT SEPARATE PAIRS.

 5340                        23,2453   27533 1  1/RTMUM  2DEC*   .45162595 E-4 B14*
 5340                        23,2454   07571 0
 5341                        23,2455   25004 1  1/RTMUE  2DEC*   .50087529 E-5 B17*
 5341                        23,2456   06702 1
 5342                        23,2457   00001 0  MINPERM  2DEC    10668 B-27       35 KFT MIN PERIGEE HEIGHT FOR MOON(-27)M
 5342                        23,2460   11530 1
 5343                        23,2461   00002 0  MINPERE  2DEC    91440 B-29       300 KFT (-29)M FOR EARTH
 5343                        23,2462   31230 1

 5344                        23,2463   43145 0  EARTHPAD DLOAD   CLRGO             PAD 37-B RADIUS.  SCALED AT (-29)M.
 5345   REF   2  LAST  497   23,2464   05152 1                    RPAD
 53455  REF   1              23,2465   04622 0                    V82EMFLG          INDICATE EARTH SCALING FOR SR30.1
 5346   REF   1              23,2466   46473 0                    BOTHPAD

 5347                        23,2467   51575 1  MOONPAD  VLOAD   ABVAL             COMPUTE MOON PAD RADIUS FROM RLS VECTOR.
 5348   REF   3  LAST  497   23,2470   02026 1                    RLS               SCALED AT (-27)M.
 5349                        23,2471   77614 1           SET
 53491  REF   2  LAST  517   23,2472   04462 0                    V82EMFLG          INDICATE MOON  SCALING FOR SR30.1
 5350   REF   2  LAST   90   23,2473   36323 0  BOTHPAD  STCALL   RPADTEM
 5352   REF   1              23,2474   46667 1                    SR30.1            CALCULATE ORBITAL PARAMETERS
 53521                       23,2475   77776 1           EXIT
 53522  REF  10  LAST  484   23,2476  3 1011 0           CA       MODREG            ARE WE IN POO
 53523                       23,2477  0 0006 1           EXTEND
 53524  REF   1              23,2500  1 2645 0           BZF      CANDEL            YES, DO DELRSPL
 53525  REF  60  LAST  517   23,2501  0 6006 1  SPLRET1  TC       INTPRET
 5353                        23,2502   45234 0           RTB      DSU
 5354   REF   8  LAST  516   23,2503   45510 1                    LOADTIME
 5356   REF   2  LAST  516   23,2504   02325 1                    TSTART82          PRESENT TIME - TIME V82GOFF1 BEGAN
 5357   REF   3  LAST  517   23,2505   02325 1           STORE    TSTART82                      SAVE IT
 5358                        23,2506   53145 1           DLOAD    BZE               SR30.1 SETS -TPER=0 IF HPER L/
 5359   REF   3  LAST  272   23,2507   02346 1                    -TPER              HPERMIN (300 OR 35) KFT.
 5360   REF   1              23,2510   46521 0                    TICKTFF           (-TPER = 0)
 5361                        23,2511   43345 1  TICKTPER DLOAD   DAD               (-TPER NON ZERO)  TFF WAS NOT COMPUTED,
 5362   REF   4  LAST  517   23,2512   02346 1                    -TPER             BUT WAS SET TO 59M59S.DONT TICK TFF, DO
 5363   REF   4  LAST  517   23,2513   02325 1                    TSTART82          TICK -TPER. DISPLAY BOTH.
 5364   REF   5  LAST  517   23,2514   02346 1           STORE    -TPER             -TPER CORRECTED FOR TIME SINCE V82GOFF1
 5365                        23,2515   77776 1           EXIT                       BEGAN.
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5366   REF  31  LAST  449   23,2516  3 5017 1          CAF     BIT1
5367   REF   5  LAST  516   23,2517  55'742 0          TS      V82FLAGS      INFORMS TICKTEST TO INCREMENT ONLY -TPER
5368   REF  57  LAST  451   23,2520  0 5217 0          TC      ENDOFJOB

5369                        23,2521   43345 1 TICKTFF  DLOAD   DAD           (-TPER=0)  TFF WAS COMPUTED.TICK TFF.
5370   REF   7  LAST  516   23,2522   02344 0          DAD     TFF           DO NOT TICK -TPER.DISPLAY TFF, BUT NOT
5371   REF   5  LAST  517   23,2523   02325 1          DAD     TSTART82      -TPER.
5372   REF   8  LAST  518   23,2524   02344 0          STORE   TFF           TFF CORRECTED FOR TIME SINCE V82GOFF1
5373                        23,2525   77776 1          EXIT                  BEGAN.
5374   REF  23  LAST  457   23,2526  3 5016 0          CAF     BIT2
5375   REF   6  LAST  518   23,2527  55'742 0          TS      V82FLAGS      INFORMS TICKTEST TO INCREMENT ONLY TFF.
5376   REF  58  LAST  518   23,2530  0 5217 0          TC      ENDOFJOB


5377   REF  23  LAST  506   23,2531  3 5013 0 TICKTEST CAF     BIT5          THIS WAITLIST PROGRAM PERPETUATES ITSELF
5378   REF  13  LAST  507   23,2532  7 1044 1          MASK    EXTVBACT      ONCE A SEC UNTIL BIT 5 OF EXTVBACT =0.
5379   REF 141  LAST  516   23,2533  10 000 0          CCS     A
5380   REF   1               23,2534  0 2542 0          TC      DOTICK
5381   REF   2  LAST  190   23,2535  3 7662 1          CAF     PRIO25
5382   REF  15  LAST  386   23,2536  0 5134 1          TC      NOVAC         TERMINATE V 82.CANT CALL ENDEXT IN RUPT.
5383   REF  14  LAST  518      1044                    EBANK=  EXTVBACT
5384   REF  25  LAST  515   23,2537   05534 0          2CADR   ENDEXT
5384                        23,2540   04062 1
5385   REF  21  LAST  437   23,2541  0 5324 1          TC      TASKOVER
5386   REF   9  LAST  516   23,2542  3 5041 1 DOTICK   CAF     1SEC          RE-REQUEST TICKTEST.
5387   REF  19  LAST  515   23,2543  0 5245 1          TC      WAITLIST
5388   REF   9  LAST  518   E4,1743                    EBANK=  TFF
5389   REF   2  LAST  515   23,2544   02531 1          2CADR   TICKTEST
5389                        23,2545   46064 1
5390   REF  16  LAST  516   23,2546  3 6214 0          CAF     THREE
5391   REF   7  LAST  518   23,2547  7 1742 0          MASK    V82FLAGS
5392   REF 142  LAST  518   23,2550  50 000 1          INDEX   A
5393                        23,2551  0 2552 1          TC      +1
5394   REF  22  LAST  518   23,2552  0 5324 1          TC      TASKOVER      IF NO FLAGBITS SET DONT CHANGE TFF OR
A5395                                                                       -TPER, BUT CONTINUE LOOP.
5396   REF   1               23,2553  0 2561 1          TC      TPERTICK      ONLY BIT 1 SET. INCR -TPER BY 1 SEC.
5397   REF  10  LAST  518   23,2554  3 5041 1 TFFTICK  CAF     1SEC          ONLY BIT 2 SET. INCR TFF BY 1 SEC.
5398   REF  59  LAST  504   23,2555  54 001 1          TS      L
5399   REF 112  LAST  515   23,2556  3 5021 1          CAF     ZERO
5400   REF  10  LAST  518   23,2557  21'744 0          DAS     TFF
5401   REF  23  LAST  518   23,2560  0 5324 1          TC      TASKOVER
5402   REF  11  LAST  518   23,2561  3 5041 1 TPERTICK CAF     1SEC
5403   REF  60  LAST  518   23,2562  54 001 1          TS      L
5404   REF 113  LAST  518   23,2563  3 5021 1          CAF     ZERO
5405   REF   6  LAST  517   23,2564  21'746 1          DAS     -TPER
5406   REF  24  LAST  518   23,2565  0 5324 1          TC      TASKOVER
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 5407                          23,2566   77776 1  V82GON   EXIT                    AVERAGE G ON. USE CURRENT STATE VECTOR
A5408                                                                             FOR ORBITAL PARAMETER CALCULATIONS.
 5409  REF   6  LAST  515      23,2567  3 5063 1           CAF     PRIO7           LESS THAN LAMBERT
 5410  REF  18  LAST  515      23,2570  0 5147 0           TC      FINDVAC         V82GON1 WILL PERFORM ORBIT CALCULATIONS
 5411  REF  11  LAST  518      E4,1743                     EBANK=  TFF             ABOUT PROPER BODY APPROX ONCE PER SEC.
 5412  REF   1                23,2571   02604 1           2CADR   V82GON1
 5412  REF   1                23,2572   46064 1
 5413                          23,2573  0 0003 1           RELINT
 5414  REF   4  LAST  428      23,2574  10 067 1           CCS     NEWJOB          WITHOLD V16 N44 UNTIL FIRST ORBIT CALC
 5415  REF   2  LAST  428      23,2575  0 5164 1           TC      CHANGI          IS DONE. NOTE: V82GON1 (PRIO7, FINDVAC
A5416                                                                             JOB) IS COMPLETED BEFORE V82GON (PRIO7,
A54161                                                                            NOVAC JOB).
 5417  REF   2  LAST  516      23,2576  3 2407 0  V82REDSP CAF     V16N44          MONITOR HAPO, HPER, TFF
 5418  REF 104  LAST  516      23,2577  0 4662 1           TC      BANKCALL
 5419  REF  12  LAST  516      23,2600   20561 1           CADR    GOXDSPF
 5420  REF   5  LAST  516      23,2601  0 5625 0           TC      B5OFF           TERM THIS TELLS V82GON1 TO KILL ITSELF.
 5421  REF   6  LAST  519      23,2602  0 5625 0           TC      B5OFF           PROC DITTO.
 5422  REF   1                23,2603  0 2576 1           TC      V82REDSP        RECYCLE

 5423  REF  61  LAST  517      23,2604  0 6006 1  V82GON1  TC      INTPRET         THIS EXEC PROGRAM PERPETUATES ITSELF
A5424                                                                             ONCE A SEC UNTIL BIT 5 OF EXTVBACT =0.
 5425                          23,2605   52175 0           VLOAD   GOTO            HOLDS OFF CCS NEWJOB BETWEEN RN AND
 5426  REF   6  LAST  510      23,2606   01171 1                   RN              VN FETCH SO RN , VN ARE FROM SAME
 5427  REF   1                23,2607   46610 1                   NEXTLINE        STATE VECTOR UPDATE.
 5428  REF  11  LAST  516      23,2610   26327 0  NEXTLINE STOVL   RONE            RN AT (-29)M FOR EARTH OR MOON
 5429  REF   6  LAST  510      23,2611   01177 1                   VN
 5430  REF   8  LAST  516      23,2612   02335 0           STORE   VONE            VN AT (-7)M/CS FOR EARTH OR MOON
 5431                          23,2613   52014 0           BON     GOTO
 5432  REF   1                23,2614   00315 0                   AMOONFLG        FLAG INDICATES BODY ABOUT WHICH ORBITAL
 5433  REF   1                23,2615   46617 0                   MOONGON           CALCULATIONS ARE TO BE PERFORMED.
 5434  REF   1                23,2616   46630 0                   EARTHGON        IF SET - MOON , IF RESET - EARTH.

 5435                          23,2617   71214 0  MOONGON  SET     DLOAD
 5436  REF   3  LAST  517      23,2620   04462 0                   V82EMFLG        INDICATE MOON SCALING FOR SR30.1
 5436I REF   1                23,2621   06454 1                   1/RTMUM         LUNAR PARAMETERS LOADED HERE FOR SR30.1
 5437  REF   2  LAST  516      23,2622   14037 0           STODL   TFF/RTMU
 5438  REF   1                23,2623   06460 0                   MINPERM
 5439  REF   3  LAST  516      23,2624   26321 0           STOVL   HPERMIN
 5441  REF   4  LAST  517      23,2625   02026 1                   RLS             SCALED AT (-27)M.
 5443                          23,2626   52046 1           ABVAL   GOTO
 5444  REF   1                23,2627   46637 1                   V82GON2
 5445                          23,2630   71214 0  EARTHGON CLEAR   DLOAD
 5446  REF   4  LAST  519      23,2631   04462 1                   V82EMFLG        INDICATE EARTH SCALING FOR SR30.1
 5446I REF   2  LAST  516      23,2632   06456 0                   1/RTMUF         EARTH PARAMETERS LOADED HERE FOR SR30.1
 5447  REF   3  LAST  519      23,2633   14037 0           STODL   TFF/RTMU
 5448  REF   2  LAST  516      23,2634   06462 1                   MINPERF
 5449  REF   4  LAST  519      23,2635   16321 0           STODL   HPERMIN
 5450  REF   3  LAST  517      23,2636   05152 1                   RPAD
 5451  REF   3  LAST  517      23,2637   36323 0  V82GON2  STCALL  RPADTEM         COMMON CODE FOR EARTH & MOON.
 5453  REF   2  LAST  517      23,2640   46667 1                   SR30.1
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 5454                                 23,2641   77776 1           EXIT
 5455   REF   9  LAST  424            23,2642  0 5364 0           TC      CHECKMM
 5456                                 23,2643   00013 0           DEC     11
 5457   REF   1                      23,2644  0 2657 1           TC      V82GON3          NOT IN MODE 11.
 5458   REF  62  LAST  519            23,2645  0 6006 1  CANDEL   TC      INTPRET          IN MODE 11 OR 00
54581                                 23,2646   77624 1           CALL
54582   REF  14  LAST  512            23,2647   27442 0                   INTSTALL         DELRSPL DOES INTWAKE
 5459                                 23,2650   45145 0           DLOAD   CALL
 5460   REF  12  LAST  519            23,2651   02344 0                   TFF
 5461   REF   1                      23,2652   54017 0                   DELRSPL          RETURN IS TO NEXT LINE ( SPLRET ).
 5462                                 23,2653   77776 1  SPLRET   EXIT

54621   REF  11  LAST  517            23,2654  3 1011 0           CA      MODREG
54622                                 23,2655  0 0006 1           EXTEND
54623   REF   1                      23,2656  1 2501 0           BZF     SPLRET1
 5463   REF  24  LAST  518            23,2657  3 5013 0  V82GON3  CAF     BIT5
 5464   REF  15  LAST  518            23,2660  7 1044 1           MASK    EXTVBACT         SEE IF ASTRONAUT HAS SIGNALLED TERMINATE
 5465                                 23,2661  0 0006 1           EXTEND
 5466   REF  26  LAST  518            23,2662  1 5534 1           BZF     ENDEXT           YES, TERMINATE VB 82 LOOP
 5468   REF  12  LAST  518            23,2663  3 5041 1           CAF     1SEC
 5469   REF 105  LAST  519            23,2664  0 4662 1           TC      BANKCALL         WAIT ONE SECOND BEFORE REPEATING
 5470   REF   5  LAST  516            23,2665   01732 0           CADR    DELAYJOB           ORBITAL PARAMETER COMPUTATION.
 5471   REF   2  LAST  519            23,2666  0 2604 1           TC      V82GON1
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L R30 USER'S PAGE NO. 8 E4 S3

R5548 SUBROUTINE NAME: SR30.1
R5549 MOD NO: 0 DATE: 16 FEB 67
R5551 MOD BY: RR BAIRNSFATHER LOG SECTION: R32
R5553 MOD NO: 1 MOD BY: RR BAIRNSFATHER DATE: 11 APR 67 SR30.1 CHANGED TO ALLOW MONITOR OPERN
R5555 MOD NO: 2 MOD BY: RR BAIRNSFATHER DATE: 14 APR 67 ADD OVFL CK FOR RAPO
R5557 MOD NO: 3 MOD BY ALONSO DATE: 11 DEC 67 SUBROUTINE REWRITTEN
R55585 MOD NO: 4 MOD BY ALONSO DATE: 26 MAR 68 PROG MOD TO HANDLE DIF EARTH/MOON SCALE
R5559 MOD NO: 5 MOD BY: RR BAIRNSFATHER DATE: 6 AUG 68 OVFL CK FOR HAPO & HPER.VOIDS MOD #2.
R5561

R5562 NEW FUNCTIONAL DESCRIPTION: ORBITAL PARAMETERS DISPLAY FOR NOUNS 32 AND 44.
R5564 SR30.1 CALLS TFFCONMU AND TFFRP/RA TO CALCULATE RPER (PERIGEE RADIUS),
R5565 RAPO (APOGEE RADIUS), HPER (PERIGEE HEIGHT ABOVE LAUNCH PAD OR LUNAR
R5566 LANDING SITE), HAPO (APOGEE HEIGHT AS ABOVE), TPER (TIME TO PERIGEE),
R5567 TFF (TIME TO INTERSECT 300 KFT ABOVE PAD OR 35KFT ABOVE LANDING SITE).
R5568 IF HPER IS GREATER THAN OR EQUAL TO HPERMIN, CALCULATES TPER AND STORES
R5569 NEGATIVE IN -TPER. OTHERWISE STORES +0 IN -TPER. WHENEVER TPER IS
R5570 CALCULATED, TFF IS NOT COMPUTABLE AND DEFAULTS TO -59MIN 59SEC. IF HAPO
R5571 WOULD EXCEED 9999.9 NM, IT IS LIMITED TO THAT VALUE FOR DISPLAY.

R5572 ADDENDUM: HAPO AND HPER SHOULD BE CHANGED TO READ HAPOX AND HPERX IN THE
R5573 ABOVE REMARKS.

R5574 CALLING SEQUENCE: CALL
R5575 SR30.1
R5576 SUBROUTINES CALLED: TFFCONMU, TFFRP/RA, CALCTPER, CALCTFF
R5577 NORMAL EXIT MODE: CALLING LINE +1 (STILL IN INTERPRETIVE MODE)
R5578 ALARMS: NONE
R5579 OUTPUT: RAPO (-29) M EARTH APOGEE RADIUS EARTH CENTERED COORD.
R5580 (-27) M MOON MOON CENTERED COORD.
R5581 RPER (-29) M EARTH PERIGEE RADIUS EARTH CENTERED COORD.
R5582 (-27) M MOON MOON CENTERED COORD.
R5583 HAPOX (-29) M APOGEE ALTITUDE ABOVE PAD OR LAND. SITE MAX VALUE LIMITED TO 9999.9 NM.
R5585 HPERX (-29) M PERIGEE ALT. ABOVE PAD OR LAND. SITE MAX VALUE LIMITED TO 9999.9 NM.
R5587 TFF (-28) CS TIME TO 300KFT OR 35KFT ALTITUDE
R5588 -TPER (-28) CS TIME TO PERIGEE
R5589 ERASABLE INITIALIZATION REQUIRED-
R5590 TFF/RTMU (+17) EARTH RECIPROCAL OF PROPER GRAV CONSTANT FOR
R5591 (+14) MOON EARTH OR MOON = 1/SQRT(MU).
R5592 RONE (-29) M STATE VECTOR
R5593 VONE (-7) M/CS STATE VECTOR
R5594 RPADTEM (-29) M EARTH RADIUS OF LAUNCH PAD OR LUNAR LANDING
R5595 (-27) M MOON SITE.
R5596 HPERMIN (-29) M EARTH (300 OR 35)KFT MINIMUM PERIGEE ALTITUDE
R5597 (-27) M MOON ABOVE LAUNCH PAD OR LUNAR LANDING SITE.
R5598 V82EMFLG (INT SW BIT) RESET FOR EARTH, SET FOR MOON.

R5599 DEBRIS: QPRET, PDL, S2

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L       R30

 5600   REF   1                                          COUNT* $$/SR30S

 5601                        23,2667   44001 0  SR30.1   SETPD  STQ          INITIALIZE PUSHDOWN LIST.
 5602                        23,2670   00001 0                  0
 5603   REF   4  LAST  449   23,2671   00051 0                  S2
A5604                                                         SR30.1 INPUT: RONE AT (-29)M EARTH/MOON
A5605                                                                       VONE AT (-7)M/CS
A5606                                                          TFFCONMU,TFFRP/RA,CALCTPER AND CALCTFF
A5607                                                          CALLS REQUIRE :
A5608                                                          EARTH CENTERED (NO RESCALING REQUIRED)
A5609                                                                        RONE SCALED TO B-29 M
A5610                                                                        VONE SCALED TO B-7 M/CS
A5611                                                          MOON CENTERED  (RESCALING REQUIRED)
A5612                                                                        RONE SCALED TO B-27 M
A5613                                                                        VONE SCALED TO B-5  M/CS
 5614                        23,2672   77214 0           BOFF   VLOAD
 5615   REF   5  LAST  519   23,2673   04742 1                  V82EMFLG     OFF FOR EARTH , ON FOR MOON.
 5616   REF   1               23,2674   46703 1                  TFFCALLS
 5617   REF  12  LAST  519   23,2675   02327 0                  RONE
 5618                        23,2676   77752 1           VSL2
 5619   REF  13  LAST  522   23,2677   26327 0           STOVL  RONE
 5620   REF   9  LAST  519   23,2700   02335 0                  VONE
 5621                        23,2701   77752 1           VSL2
 5622   REF  10  LAST  522   23,2702   02335 0           STORE  VONE
 5623                        23,2703   77624 1  TFFCALLS CALL
 5624   REF   1               23,2704   56760 0                  TFFCONMU
 5625                        23,2705   77624 1           CALL
 5626   REF   1               23,2706   57026 1                  TFFRP/RA     TFFRP/RA COMPUTES RAPO,RPER.
A5627                                                                        RETURNS WITH RAPO IN D(MPAC).
 5628                        23,2707   77625 0           DSU
 5629   REF   4  LAST  519   23,2710   02323 1                  RPADTEM
 5630                        23,2711   64414 1           BOFF   SR2R         NEED HAPO AT (-29)M FOR DISPLAY.
A5631                                                                       IF MOON CENTERED, RESCALE FROM (-27)M.
A5632                                                                        IF EARTH CENTERED ALREADY AT (-29)M.
 5633   REF   6  LAST  522   23,2712   04742 1                  V82EMFLG     OFF FOR EARTH , ON FOR MOON.
 5634                        23,2713   46714 1                  +1
 5635                        23,2714   77624 1           CALL                IF HAPO > MAXNM, SET HAPO =9999.9 NM.
 5636   REF   1               23,2715   46754 0                  MAXCHK      OTHERWISE STORE (RAPO-RPADTEM) IN HAPO.
 5637   REF   5  LAST  515   23,2716   16352 1  STORHAPO STODL  HAPOX
 5638   REF   1               23,2717   00017 1                  RPER
 5639                        23,2720   77625 0           DSU
 5640   REF   5  LAST  522   23,2721   02323 1                  RPADTEM      GIVES HPER AT (-29)M EARTH, (-27)M MOON.
 5641   REF 240  LAST  502   23,2722   00161 1           STORE  MPAC +4      SAVE THIS FOR COMPARISON TO HPERMIN.
 5642                        23,2723   64414 1           BOFF   SR2R         NEED HPER AT (-29)M FOR DISPLAY.
A5643                                                                       IF MOON CENTERED, RESCALE FROM (-27)M.
A5644                                                                       IF EARTH CENTERED ALREADY AT (-29)M.
 5645   REF   7  LAST  522   23,2724   04742 1                  V82EMFLG     OFF FOR EARTH,  ON FOR MOON.
 5646                        23,2725   46726 0                  +1
 5647                        23,2726   77624 1           CALL                IF HPER > MAXNM, SET HPER = 9999.9 NM.
 5648   REF   2  LAST  522   23,2727   46754 0                  MAXCHK
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5649  REF   4  LAST  280   23,2730  16354 1  STORHPER STODL  HPERX          STORE (RPER - RPADTEM) INTO HPERX.
5650  REF 241  LAST  522   23,2731  00161 1                   MPAC +4
5651                       23,2732  51025 1           DSU     BPL          HPERMIN AT (-29)M FOR EARTH, (-27)M MOON
5652  REF   5  LAST  519   23,2733  02321 0                   HPERMIN      IF HPER L/   HPERMIN (300 OR 35)KFT,
5653  REF   1              23,2734  46740 0                   DOTPER        THEN ZERO INTO -TPER.
5654                       23,2735  52145 0           DLOAD   GOTO          OTHERWISE CALCULATE TPER.
5655  REF   1              23,2736  15335 0                   HI6ZEROS
5656  REF   1              23,2737  46744 1                   SKIPTPER
5657                       23,2740  45145 0  DOTPER   DLOAD   CALL
5658  REF   2  LAST  522   23,2741  00017 1                   RPER
5659  REF   1              23,2742  57064 1                   CALCTPER
5660                       23,2743  77676 0           DCOMP                TPER IS PUT NEG INTO -TPER.
5661  REF   7  LAST  518   23,2744  16346 1  SKIPTPER STODL  -TPER
5662  REF   6  LAST  523   23,2745  02321 0                   HPERMIN      HPERMIN AT (-29)M FOR EARTH, (-27)M MOON
5663                       23,2746  45015 1           DAD     CALL
5664  REF   6  LAST  522   23,2747  02323 1                   RPADTEM      RPADTEM AT (-29)M FOR EARTH, (-27)M MOON
5665  REF   1              23,2750  57067 1                   CALCTFF      GIVES 59M59S FOR TFF IF RPER G/
5666                       23,2751  77676 0           DCOMP                 HPERMIN + RPADTEM. (TPER WAS NON ZERO)
5667  REF  13  LAST  520   23,2752  36344 1           STCALL  TFF          OTHERWISE COMPUTES TFF.       (GOTO)
5668  REF   5  LAST  522   23,2753  00051 0                   S2

5669                       23,2754  51025 1  MAXCHK   DSU     BPL          IF C(MPAC) > 9999.9 NM, MPAC = 9999.9 NM
5670  REF   1              23,2755  06764 1                   MAXNM
5671                       23,2756  46761 0                   +3           OTHERWISE C(MPAC) = B(MPAC).
5672                       23,2757  43415 0           DAD     RVQ
5673  REF   2  LAST  523   23,2760  06764 1                   MAXNM
5674                       23,2761  43545 1  +3       DLOAD   RVQ          (USED BY P30 - P37 ALSO)
5675  REF   3  LAST  523   23,2762  06764 1                   MAXNM

5676                       23,2763  01065 0  MAXNM    2OCT    01065 05603
5676                       23,2764  05603 1
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L   R30   USER'S PAGE NO. 11   E4 S3

L STABLE ORBIT - P38-P39 USER'S PAGE NO. 1 EO S3

R0001 STABLE ORBIT RENDEZVOUS PROGRAMS (P38 AND P78)

R0002 MOD NO -1 LOG SECTION - STABLE ORBIT - P38-P39
R0003 MOD BY RUDNICKI.S DATE 25JAN68

R0004 FUNCTIONAL DESCRIPTION

R0005 P38 AND P78 CALCULATE THE REQUIRED DELTA V AND OTHER INITIAL
R0006 CONDITIONS REQUIRED BY THE AGC TO (1) PUT THE ACTIVE VEHICLE
R0007 ON A TRANSFER TRAJECTORY THAT INTERCEPTS THE PASSIVE VEHICLE
R0008 ORBIT A GIVEN DISTANCE, DELTA R, EITHER AHEAD OF OR BEHIND THE
R0009 PASSIVE VEHICLE AND (2) ACTUALLY PLACE THE ACTIVE VEHICLE IN THE
R0010 PASSIVE VEHICLE ORBIT WITH A DELTA R SEPARATION BETWEEN THE TWO
R0011 VEHICLES

R0012 CALLING SEQUENCE

R0013 ASTRONAUT REQUEST THRU DSKY

R0014 V37E38E IF THIS VEHICLE IS ACTIVE VEHICLE
R0015 V37E78E IF OTHER VEHICLE IS ACTIVE VEHICLE

R0016 INPUT

R0017 (1) SOI MANEUVER

R0018 (A) TIG TIME OF SOI MANEUVER
R0019 (B) CENTANG ORBITAL CENTRAL ANGLE OF THE PASSIVE VEHICLE
R0020 DURING TRANSFER FROM TIG TO TIME OF INTERCEPT
R0021 (C) DELTAR THE DESIRED SEPARATION OF THE TWO VEHICLES
R0022 SPECIFIED AS A DISTANCE ALONG THE PASSIVE VEHICLE
R0023 ORBIT
R0024 (D) OPTION EQUALS 1 FOR SOI

R0025 (2) SOR MANEUVER

R0026 (A) TIG TIME OF SOR MANEUVER
R0027 (B) CENTANG AN OPTIONAL RESPECIFICATION OF 1 (B) ABOVE
R0028 (C) OPTION EQUALS 2 FOR SOR
R0029 (D) DELTTIME THE TIME REQUIRED TO TRAVERSE DELTA R WHEN
R0030 TRAVELING AT A VELOCITY EQUAL TO THE HORIZONTAL
R0031 VELOCITY OF THE PASSIVE VEHICLE - SAVED FROM
R0032 SOI PHASE
R0033 (E) TINT TIME OF INTERCEPT (SOI) - SAVED FROM SOI PHASE

R0034 OUTPUT

R0035 (1) TRKMKCNT NUMBER OF MARKS
R0036 (2) TTOGO TIME TO GO
R0037 (3) +MGA MIDDLE GIMBAL ANGLE

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R0038          (4) DSPTEMI  TIME OF INTERCEPT OF PASSIVE VEHICLE ORBIT
R0039                       (FOR SOI ONLY)
R0040          (5) POSTTPI  PERIGEE ALTITUDE OF ACTIVE VEHICLE ORBIT AFTER
R0041                       THE SOI (SOR) MANEUVER
R0042          (6) DELVTPI  MAGNITUDE OF DELTA V AT SOI (SOR) TIME
R0043          (7) DELVTPF  MAGNITUDE OF DELTA V AT INTERCEPT TIME
R0044          (8) DELVLVC  DELTA VELOCITY AT SOI (AND SOR) - LOCAL VERTICAL
R0045                       COORDINATES

R0046   SUBROUTINES USED

R0047          AVFLAGA
R0048          AVFLAGP
R0049          VNDSPLY
R0050          BANKCALL
R00502         GOFLASHR
R00504         GOTOPOOH
R00506         BLANKET
R00508         ENDOFJOB
R0051          PREC/TT
R0052          SELECTMU
R0053          INTRPVP
R0054          MAINRTNE

0055                          04,2742                    BANK    04
0056   REF   1                04,2000                    SETLOC  STBLEORB
0057                          04,2742                    BANK

0058   REF  17  LAST  505     E4,1770                    EBANK=  SUBEXIT
0059   REF   1                                           COUNT*  $$/P3879

0060   REF   3  LAST  468     04,2742  0 4627 0  P38     TC      AVFLAGA        THIS VEHICLE ACTIVE
0062                          04,2743  0 2745 0          TC      +2
0063   REF   3  LAST  468     04,2744  0 4642 0  P78     TC      AVFLAGP        OTHER VEHICLE ACTIVE
0064   REF   3  LAST  468     04,2745  0 4647 0          TC      P20FLGON       SET UPDATFLG, TRACKFLG
0065   REF   1                04,2746  3 3274 0          CAF     V06N33SR       DISPLAY TIG
0066   REF   1                04,2747  0 3263 0          TC      VNDSPLY
0067   REF   1                04,2750  3 3275 1          CAF     V06N55SR       DISPLAY CENTANG
0068   REF 106  LAST  520     04,2751  0 4662 1          TCR     BANKCALL
0069   REF   1                04,2752   21057 0          CADR    GOFLASHR
00694  REF  12  LAST  513     04,2753  1 4106 0          TCF     GOTOPOOH       TERMINATE
00696                         04,2754  1 2761 1          TCF     +5             PROCEED
00698                         04,2755  1 2750 0          TCF     -5             RECYCLE
0070   REF  17  LAST  518     04,2756  3 6214 0          CAF     THREE          IMMEDIATE RETURN - BLANK R1, R2
00702  REF   1                04,2757  0 5526 0          TCR     BLANKET
00704  REF  59  LAST  518     04,2760  1 5217 1          TCF     ENDOFJOB
0071   REF   3  LAST  425     04,2761  3 5022 1          CAF     FIVE
0072   REF   2  LAST  271     04,2762  55'131 1          TS      OPTION1
0073   REF  65  LAST  516     04,2763  3 5017 1          CAF     ONE
0074   REF   4  LAST  457     04,2764  55'132 1          TS      OPTION2        OPTION CODE IS SET TO 1
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00742  REF   1              04,2765  3 3276 1          CAF     V04N06SR        DISPLAY OPTION CODE - 1 = SOI, 2 = SOR
00744  REF 107  LAST  526   04,2766  0 4662 1          TCR     BANKCALL
00746  REF   2  LAST  526   04,2767   21057 0          CADR    GOFLASHR
00748  REF  13  LAST  526   04,2770  1 4106 0          TCF     GOTOPOOH        TERMINATE
0075                        04,2771  1 2776 1          TCF     +5              PROCEED
00752                       04,2772  1 2765 0          TCF     -5              RECYCLE
0076   REF  15  LAST  375   04,2773  3 5015 0          CAF     BIT3            IMMEDIATE RETURN - BLANK R3
0077   REF   2  LAST  526   04,2774  0 5526 0          TCR     BLANKET
0078   REF  60  LAST  526   04,2775  1 5217 1          TCF     ENDOFJOB
0079   REF  63  LAST  520   04,2776  0 6006 1          TC      INTPRET
00795                       04,2777   77731 1          SSP
00796  REF   5  LAST  475   04,3000   03766 0                  NN
00797                       04,3001   00002 0                  2
0080                        04,3002   70535 0          SLOAD   SR1
0081   REF   5  LAST  526   04,3003   01133 1                  OPTION2
0082                        04,3004   71230 0          BHIZ    DLOAD
0083   REF   1              04,3005   11013 0                  OPTN1
0084   REF   1              04,3006   03656 1                  TINT
0085   REF   1              04,3007   02611 0          STORE   TINTSOI         STORE FOR SOR PHASE
0086                        04,3010   77614 1          CLRGO
0087   REF   1              04,3011   01230 1                  OPTNSW          OPTNSW; ON = SOI, OFF = SOR
0088   REF   1              04,3012   11042 1                  JUNCTN1
0089                        04,3013   43014 0  OPTN1   SET     CLEAR           SOI
00895  REF   2  LAST  527   04,3014   01070 1                  OPTNSW
0090   REF   4  LAST  482   04,3015   00670 0                  UPDATFLG
00905                       04,3016   77624 1          CALL
0091   REF   1              04,3017   11216 1                  PREC/TT
00915                       04,3020   43214 1          SET     DAD
0092   REF   5  LAST  527   04,3021   00470 1                  UPDATFLG
0093   REF  23  LAST  512   04,3022   03413 1                  TIG
0094   REF   2  LAST  527   04,3023   03656 1          STORE   TINT            TI = TIG + TF
0095   REF  31  LAST  459   04,3024   01046 1          STORE   DSPTEM1         FOR DISPLAY
0096                        04,3025   77776 1          EXIT
00962  REF   1              04,3026  3 3277 0          CAF     V06N57SR        DISPLAY DELTA R
00964  REF 108  LAST  527   04,3027  0 4662 1          TCR     BANKCALL
00966  REF   3  LAST  527   04,3030   21057 0          CADR    GOFLASHR
00968  REF  14  LAST  527   04,3031  1 4106 0          TCF     GOTOPOOH        TERMINATE
0097                        04,3032  1 3037 1          TCF     +5              PROCEED
00972                       04,3033  1 3026 1          TCF     -5              RECYCLE
0098   REF  18  LAST  510   04,3034  3 6211 0          CAF     SIX             IMMEDIATE RETURN - BLANK R2, R3
0099   REF   3  LAST  527   04,3035  0 5526 0          TCR     BLANKET
0100   REF  61  LAST  527   04,3036  1 5217 1          TCF     ENDOFJOB
0101   REF   1              04,3037  3 3300 1          CAF     V06N34SR        DISPLAY TIME OF INTERCEPT
0102   REF   2  LAST  526   04,3040  0 3263 0          TC      VNDSPLY
0103   REF  64  LAST  527   04,3041  0 6006 1          TC      INTPRET
0104                        04,3042   45014 0  JUNCTN1  CLEAR   CALL
0105   REF   1              04,3043   04266 1                  P39/79SW
0106   REF   3  LAST  468   04,3044   10712 1                  SELECTMU        SELECT MU, CLEAR FINALFLG, GO TO VN1645
0107                        04,3045   77624 1  RECYCLE  CALL
0108   REF   2  LAST  527   04,3046   11216 1                  PREC/TT
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0109                                04,3047   71214 0           BOFF   DLOAD
0110   REF   3  LAST  527           04,3050   01350 0                  OPTNSW
0111   REF   1                     04,3051   11071 1                  OPTN2
0112   REF   3  LAST  527           04,3052   03656 1                  TINT
0113   REF  18  LAST  516           04,3053   34041 0           STCALL TDEC1          PRECISION UPDATE PASSIVE VEHICLE TO
0114   REF   1                     04,3054   11247 0                  INTRPVP             INTERCEPT TIME
0115                                04,3055   53575 0           VLOAD  UNIT
0116   REF  14  LAST  516           04,3056   00001 0                  RATT             RP/(RP)
0117                                04,3057   47315 0           PDVL   VXV
0118   REF  12  LAST  516           04,3060   00007 0                  VATT
0119                                04,3061   60246 1           ABVAL  NORM             (VP X RP/(RP))
0120   REF   7  LAST  510           04,3062   00047 1                  X1
0121                                04,3063   56325 0           PDDL   ODV
0122   REF   5  LAST  280           04,3064   02611 0                  DELTAR
0123                                04,3065   77657 0           SL*                     DELTA R / (VP X RP/RP)
0124                                04,3066   20172 1                  0 -7,1
0125   REF   1                     04,3067   36613 0           STCALL DELTTIME         DELTA T = (RP) DELTA R / (VP X RP)
0126   REF   1                     04,3070   11075 0                  JUNCTN2
0127                                04,3071   43345 1  OPTN2    DLOAD  DAD
0128   REF   2  LAST  527           04,3072   02611 0                  TINTSOI
0129   REF   2  LAST  465           04,3073   00037 0                  T
0130   REF   4  LAST  528           04,3074   03656 1           STORE  TINT             TI = TI + TF
0131                                04,3075   45345 1  JUNCTN2  DLOAD  DSU
0132   REF   5  LAST  528           04,3076   03656 1                  TINT
0133   REF   2  LAST  528           04,3077   02613 1                  DELTTIME
0134   REF   1                     04,3100   02615 1           STORE  TARGTIME         TT = TI - DELTA T
R0135  .... MAINRTNE ....
R0136  SUBROUTINES USED

R0137          S3435.25
R0138          PERIAPO1
R0139          SHIFTR1
R0140          VNDSPLY
R0141          BANKCALL
R0142          GOFLASH
R0143          GOTOPOOH
R0145          VN1645

0146   REF  19  LAST  528           04,3101   34041 0  MAINRTNE STCALL TDEC1          PRECISION UPDATE PASSIVE VEHICLE TO
0147   REF   2  LAST  528           04,3102   11247 0                  INTRPVP             TARGET TIME
0148                                04,3103   77745 1           DLOAD
0149   REF  24  LAST  527           04,3104   03413 1                  TIG
0150   REF   7  LAST  490           04,3105   03503 1           STORE  INTIME
0151                                04,3106   77331 0           SSP    VLOAD
0152   REF  18  LAST  526           04,3107   02371 0                  SUBEXIT
0153   REF   1                     04,3110   11114 0                  TEST3979
0154   REF  15  LAST  528           04,3111   00001 0                  RATT
0155                                04,3112   77624 1           CALL
0156   REF   1                     04,3113   72546 0                  S3435.25
0157                                04,3114   43014 0  TEST3979 BOFF   BON
```

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 0158   REF   2  LAST  527   04,3115   04346 1                  P39/79SW
 0159   REF   1              04,3116   11125 1                  MAINRTN1
 0160   REF   5  LAST  494   04,3117   01311 0                  FINALFLG
 0161   REF   1              04,3120   11123 1                  P39P79
 0162                        04,3121   77614 1          SET
 0163   REF   6  LAST  527   04,3122   00470 1                  UPDATFLG
 0164                        04,3123   77776 1  P39P79  EXIT
01645   REF   1              04,3124   0 3152 1         TC      DSPLY81        FOR P39 AND P79
 0165                        04,3125   51575 1  MAINRTN1 VLOAD   ABVAL
 0166   REF  11  LAST  491   04,3126   03646 0                  DELVEET3
 0167   REF   5  LAST  465   04,3127   26635 0          STOVL   DELVTPI        DELTA V
 0168   REF   4  LAST  475   04,3130   03640 0                  VPASS4
 0169                        04,3131   51451 0          VSU     ABVAL
 0170   REF   7  LAST  491   04,3132   03620 0                  VTPRIME
 0171   REF   5  LAST  465   04,3133   26637 1          STOVL   DELVTPF        DELTA V (FINAL) = V'T - VT
 0172   REF  16  LAST  498   04,3134   03540 0                  RACT3
 0173                        04,3135   45115 0          PDVL    CALL
 0174   REF   9  LAST  491   04,3136   03612 1                  VIPRIME
 0175   REF   2  LAST  465   04,3137   45153 1                  PERIAPO1       GET PERIGEE ALTITUDE
 0176                        04,3140   77624 1          CALL
 0177   REF   2  LAST  465   04,3141   45263 1                  SHIFTR1
 0178   REF   3  LAST  465   04,3142   02641 0          STORE   POSTTPI
 0179                        04,3143   43014 0          BON     SET
 0180   REF   6  LAST  529   04,3144   01311 0                  FINALFLG
 0181   REF   1              04,3145   11147 0                  DSPLY58
 0182   REF   7  LAST  529   04,3146   00470 1                  UPDATFLG
 0183                        04,3147   77776 1  DSPLY58 EXIT
 0184   REF   1              04,3150   3 3301 0         CAF     V06N58SR       DISPLAY HP, DELTA V, DELTA V (FINAL)
 0185   REF   3  LAST  527   04,3151   0 3263 0         TC      VNDSPLY
 0186   REF   1              04,3152   3 3302 0 DSPLY81 CAF     V06N81SR       DISPLAY DELTA V (LV)
 0187   REF   4  LAST  529   04,3153   0 3263 0         TC      VNDSPLY
 0188   REF  65  LAST  527   04,3154   0 6006 1         TC      INTPRET
 0189                        04,3155   77214 0          CLEAR   VLOAD
 0204   REF   2  LAST  480   04,3156   01267 0                  XDELVFLG
 0205   REF  12  LAST  529   04,3157   03646 0                  DELVEET3
 0206   REF   5  LAST  481   04,3160   37646 1          STCALL  DELVSIN
 0207   REF   4  LAST  494   04,3161   73002 1                  VN1645         DISPLAY TRKMKCNT, TTOGO, +MGA
 0208                        04,3162   52014 0          BON     GOTO
 0209   REF   3  LAST  529   04,3163   04306 0                  P39/79SW
 0210   REF   1              04,3164   11203 0                  P39/P79B
 0211   REF   1              04,3165   11045 0                  RECYCLE
R0212   STABLE ORBIT MIDCOURSE PROGRAM (P39 AND P79)

R0213   MOD NO -1          LOG SECTION - STABLE ORBIT - P38-P39
R0214   MOD BY RUDNICKI.S  DATE 25JAN68

R0215   FUNCTIONAL DESCRIPTION

R0216         P39 AND P79 CALCULATE THE REQUIRED DELTA V AND OTHER INITIAL
R0217         CONDITIONS REQUIRED BY THE AGC TO MAKE A MIDCOURSE CORRECTION
```

L STABLE ORBIT - P38-P39 USER'S PAGE NO. 6 E4 S3

R0218 MANEUVER AFTER COMPLETING THE SOI MANEUVER BUT BEFORE MAKING
R0219 THE SOR MANEUVER

R0220 CALLING SEQUENCE

R0221 ASTRONAUT REQUEST THRU DSKY

R0222 V37E39E IF THIS VEHICLE IS ACTIVE VEHICLE
R0223 V37E79E IF OTHER VEHICLE IS ACTIVE VEHICLE

R0224 INPUT

R0225 (1) TPASS4 TIME OF INTERCEPT - SAVED FROM P38/P78
R0226 (2) TARGTIME TIME THAT PASSIVE VEHICLE IS AT INTERCEPT POINT -
R0227 SAVED FROM P38/P78

R0228 OUTPUT

R0229 (1) TRKMKCNT NUMBER OF MARKS
R0230 (2) TTOGO TIME TO GO
R0231 (3) +MGA MIDDLE GIMBAL ANGLE
R0232 (4) DELVLVC DELTA VELOCITY AT MID - LOCAL VERTICAL COORDINATES

R0233 SUBROUTINES USED

R0234 AVFLAGA
R0235 AVFLAGP
R0236 LOADTIME
R0237 SELECTMU
R0238 PRECSET
R0239 S34/35.1
R0240 MAINRTNE

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 0241  REF   4  LAST  526   04,3166  0 4627 0  P39       TC      AVFLAGA        THIS VEHICLE ACTIVE
 0243                       04,3167  0 0006 1            EXTEND
 0244  REF   2  LAST  468   04,3170  3 1422 1            DCA     ATTIGINC
 0245  REF   1              04,3171  0 3175 1            TC      P39/P79A
 0246  REF   4  LAST  526   04,3172  0 4642 0  P79       TC      AVFLAGP        OTHER VEHICLE ACTIVE
 0248                       04,3173  0 0006 1            EXTEND
 0249  REF   2  LAST  468   04,3174  3 1424 1            DCA     PTIGINC
 0250  REF   9  LAST  468   04,3175  53'764 1 P39/P79A   DXCH    KT             TIME TO PREPARE FOR BURN
 02505 REF   4  LAST  526   04,3176  0 4647 0            TC      P20FLGON       SET UPDATFLG, TRACKFLG
 0251  REF  66  LAST  529   04,3177  0 6006 1            TC      INTPRET
 0255                       04,3200   45014 0           SET     CALL
 02555 REF   4  LAST  529   04,3201   04066 0                   P39/79SW
 0256  REF   4  LAST  527   04,3202   10712 1                   SELECTMU       SELECT MU, CLEAR FINALFLG, GO TO VN1645
 0257                       04,3203   43234 0  P39/P79B RTB     DAD
 0258  REF   9  LAST  517   04,3204   45510 1                   LOADTIME
 0259  REF  10  LAST  530   04,3205   02364 1                   KT
 02595 REF  25  LAST  528   04,3206   03413 1           STORE   TIG            TIG = T (PRESENT) + PREPARATION TIME
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L STABLE ORBIT - P38-P39 USER'S PAGE NO. 7 E4 S3

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 0260   REF  20  LAST  528   04,3207   34041 0          STCALL TDEC1          PRECISION UPDATE ACTIVE AND PASSIVE
 0261   REF   3  LAST  468   04,3210   45215 0                 PRECSET          VEHICLES TO TIG
 0262                        04,3211   77624 1          CALL
 0263   REF   3  LAST  469   04,3212   74000 1                 S34/35.1         GET UNIT NORMAL
 0264                        04,3213   52145 0          DLOAD  GOTO
 0265   REF   2  LAST  528   04,3214   02615 1                 TARGTIME
 0266   REF   1               04,3215   11101 1                 MAINRTNE         CALCULATE DELTA V AND DELTA V (LV)
R0272   .... PREC/TT ....
R0273   SUBROUTINES USED

R0274          PRECSET
R0275          TIMETHET
R0276          S34/35.1

 0277                        04,3216   71220 1  PREC/TT STQ    DLOAD
 0278   REF   6  LAST  484   04,3217   02367 1                 RTRN
 0279   REF  26  LAST  530   04,3220   03413 1                 TIG
 0280   REF  21  LAST  531   04,3221   34041 0          STCALL TDEC1          PRECISION UPDATE ACTIVE AND PASSIVE
 0281   REF   4  LAST  531   04,3222   45215 0                 PRECSET          VEHICLES TO TIG
 0282                        04,3223   53775 1          VLOAD  VSR*
 0283   REF   8  LAST  498   04,3224   03554 0                 RPASS3
 0284                        04,3225   57176 0                 0,2
 0285   REF   3  LAST  496   04,3226   16657 1          STODL  RVEC
 0286   REF   6  LAST  464   04,3227   03754 1                 CENTANG
 0287                        04,3230   71406 0          PUSH   COS
 0288   REF   3  LAST  464   04,3231   16734 0          STODL  CSTH
 0289                        04,3232   43156 1          SIN    SET
 0290   REF   2  LAST  464   04,3233   03466 0                 RVSW
 0291   REF   3  LAST  464   04,3234   26732 0          STOVL  SNTH
 0292   REF   8  LAST  498   04,3235   03562 0                 VPASS3
 0293                        04,3236   77657 0          VSR*
 0294                        04,3237   57176 0                 0,2
 0295   REF   5  LAST  496   04,3240   36746 1          STCALL VVEC           GET TRANSFER TIME BASED ON CENTANG OF
 0296   REF   2  LAST  465   04,3241   24744 0                 TIMETHET         PASSIVE VEHICLE
 0297                        04,3242   77624 1          CALL
 0298   REF   4  LAST  531   04,3243   74000 1                 S34/35.1         GET UNIT NORMAL
 0299                        04,3244   52145 0          DLOAD  GOTO
 0300   REF   3  LAST  528   04,3245   00037 0                 T
 0301   REF   7  LAST  531   04,3246   02367 1                 RTRN
R0302   .... INTRPVP ....
R0303   SUBROUTINES USED

R0304          CSMPREC
R0305          LEMPREC

 0306                        04,3247   43020 1  INTRPVP STQ    BOFF             PRECISION UPDATE PASSIVE VEHICLE TO
 0307   REF   8  LAST  531   04,3250   02367 1                 RTRN                TDEC1
 0308   REF   4  LAST  498   04,3251   01352 1                 AVFLAG
 0309   REF   1               04,3252   11257 1                 OTHERV
 0310                        04,3253   77624 1          CALL
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 0311   REF   4  LAST  508   04,3254   27071 1                    CSMPREC
 0312                       04,3255   77650 1           GOTO
 0313   REF   9  LAST  531   04,3256   02367 1                    RTRN
 0314                       04,3257   77624 1  OTHERV   CALL
 0315   REF   5  LAST  510   04,3260   27105 0                    LEMPREC
 0316                       04,3261   77650 1           GOTO
 0317   REF  10  LAST  532   04,3262   02367 1                    RTRN
R0318   .... VNDSPLY ....
R0319   SUBROUTINES USED

R0320          BANKCALL
R0321          GOFLASH
R0322          GOTOPOOH

 0323                       04,3263   0 0006 1  VNDSPLY  EXTEND                    FLASH DISPLAY
 0324   REF  11  LAST  532   04,3264   23'767 0           QXCH     RTRN
 0325   REF   4  LAST  484   04,3265   55'765 0           TS       VERBNOUN
 0326   REF   5  LAST  532   04,3266   3 1765 1           CA       VERBNOUN
 0327   REF 109  LAST  527   04,3267   0 4662 1           TCR      BANKCALL
 0328   REF  16  LAST  511   04,3270    20720 0           CADR     GOFLASH
 0329   REF  15  LAST  527   04,3271   1 4106 0           TCF      GOTOPOOH       TERMINATE
 0330   REF  12  LAST  532   04,3272   0 1767 0           TC       RTRN           PROCEED
 0331                       04,3273   1 3266 1           TCF      -5             RECYCLE
 0351                       04,3274   01441 1  VD6N33SR  VN       0633
 0352                       04,3275   01467 0  VD6N55SR  VN       0655
 0353                       04,3276   01006 0  VD4N06SR  VN       0406
 0354                       04,3277   01471 1  VD6N57SR  VN       0657
 0355                       04,3300   01442 1  VD6N34SR  VN       0634
 0356                       04,3301   01472 1  VD6N58SR  VN       0658
 0357                       04,3302   01521 0  VD6N81SR  VN       0681
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*** END OF COMEKISS.020 ***

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P0001   EARTH ORBIT INSERTION MONITOR PROGRAM
R0002   ************************************

R0003   PROGRAM DESCRIPTION -P11-

R0004        MOD NO. 1
R0005        MOD BY ELIASSEN

R0006   FUNCTIONAL DESCRIPTION

R0007        P11 IS INITIATED BY

R0008             A) GYROCOMPASS PRG P02 WHEN LIFTOFF DISCRETE IS RECEIVED OR
R0009             B) BACKUP THRU VERB 75 ENTER

R0010        PROGRAM WILL
R0011            1. ZERO CMC CLOCK AT LIFTOFF (OR UPON RECEIPT OF BACKUP)
R0012            2. UPDATE TEPHEM TO TIME CMC CLOCK WAS ZEROED
R0013            3. INITIATE SERVICER AT PREREAD1
R0014            4. CHANGE MAJOR MODE TO 11
R0015            5. CLEAR DSKY IN CASE OF V 75
R0016            6. STORE LIFTOFF IMU-CDU ANGLES FOR ATT. ERROR DISPLAY
R0017            7. TERMINATE GYROCOMPASSING -   -
R0018            8. COMPUTE INITIAL VECTORS  RN, VN                - - -
R0019            9. COMPUTE REFSMMAT FOR PRELAUNCH ALIGNMENT WHERE U ,U ,U  ARE
R0020                 -         -                                   X  Y  Z
R0021                U =UNIT(-R) LOCAL VERTICAL AT TIME OF LIFTOFF
R0022                 Z
R0023                -         -   -
R0024                U =UNIT (A), A=HOR VECTOR AT LAUNCH AZIMUTH
R0025                 X
R0026                -  -    -
R0027                U =U * U
R0028                 U  Z  X

R0029           10. SET REFSMMAT KNOWN FLAG
R0030           11. SET AVGEXIT IN SERVICER TO VHHDOT TO
R0031               COMPUTE AND DISPLAY NOUN 62 EVERY 2 SECONDS

R0032                R1  V1  - INTERTIAL VELOCITY MAGNITUDE IN FPS
R0033                R2  HDOT - RATE OF CHANGE OF VEHICLE VEL IN FPS
R0034                R3  H    - VEHICLE ALTITUDE ABOVE PAD IN NM

R0035           12. DISPLAY BODY AXES ATT. ERRORS ON FDAI NEEDLES

R0036                A) FROM L.O. TO RPSTART (APPROX. 0 TO +10SECS AFTER L.O.)
R0037                   DESIRED ATTITUDE IS AS STORED AT L.O.
R0038                B) FROM RPSTART TO POLYSTOP(APPROX.+10 TO +133SECS AFTER LO)
R0039                   DESIRED ATTITUDE IS SPECIFIED BY CMC PITCH AND ROLL
R0040                   POLYNOMIALS  DURING SATURN ROLLOUT AND PITCHOVER
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R0041               THE DISPLAY IS RUN AS LOW PRIORITY JOB APPROX.
R0042               EVERY 1/2 SEC OR LESS AND IS DISABLED UPON OVFLO OF TIME1

R0057   SUBROUTINES CALLED

R0058           2PHSCHNG  BANKCALL  CALCGRA   CDUTRIG   CLEANDSP  DANZIG
R00581          DELAYJOB  EARTHR    ENDOFJOB  FINOVAC   IBNKCALL
R00582          INTPRET   LALOTORV  NEEDLER   NEWMODEX  PHASCHNG
R0059           POSTJUMP  POWRSERS  PREREAD1  REGODSPR  S11.1
R00591          SERVEXIT  TASKOVER  TCDANZIG  VIST02S   WAITLIST

R0060   ASTRONAUT REQUESTS (IF ALTITUDE ABOVE 300,000 FT)

R0061       DSKY -
R0062           MONITOR DISPLAY OF TIME TO PERIGEE R1 HOURS
R0063                                             R2 MINUTES

R0064       DSKY -
R0065           MONITOR DISPLAY OF R1 APOGEE ALTITUDE IN NAUTICAL MILES
R0066                              R2 PERIGEE ALTITUDE IN NAUTICAL MILES
R0067                              R3 TFF IN MINUTES/SECS

R0068       IF ASTRONAUT HAS REQUESTED ANY OF THESE DISPLAYS HE MUST
R0069   HIT PROCEED TO RETURN TO NORMAL NOUN 62 DISPLAY
R0070   NORMAL EXIT MODE

R0071       ASTRONAUT  VERB 37 ENTER 00 ENTER

R0072   ALARM MODES - NONE

R00721  ABORT EXIT MODES -

R0073   OUTPUT

R0074       TLIFTOFF (DP)  TEPHEM (TP)
R0075       REFSMMAT
R0076       DSKY DISPLAY
R0077       FDAI DISPLAY

R0078   ERASABLE INITIALIZATION

R0079       AZO, AXO, -AYO
R0080       LATITUDE
R0081       PADLONG
R0082       TEPHEM
R0083       PGNCSALT
R0084       POLYNUM THRU POLYNUM +14D)
R00841      RPSTART
R00842      POLYSTOP
R0085   FLAGS SET OR RESET
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R0086       SET REFSMFLG
R0087       SET OVMON IDLE FLAG
R0088       CLEAR ERADFLAG

R0089   DEBRIS

R0090       LIFTTEMP
R0091       POLYNUM THRU POLYNUM +7
R0092       SPOLYARG
R0093       BODY1, BODY2, BODY3
R0094       VMAG2, ALTI, HDOT
R0095       CENTRALS, CORE SET AND VAC AREAS
 0096   REF   1                                          COUNT   34/P11

 0097   REF   1                5035          BITS5-6    =       SUPER011
 0098                       42,3606                     BANK    42
 0099   REF   1            34,2000                     SETLOC  P11ONE
 0100                      34,2002                     BANK

 0101   REF   6  LAST  219  E3,1706                     EBANK=  TEPHEM
 0102   REF   3  LAST  204  34,2002  3 5051 0  P11      CA      EBANK3
 0103   REF  21  LAST  515  34,2003  54 003 0           TS      EBANK

 0104                      34,2004  0 0006 1           EXTEND
 0105   REF   1            34,2005  3 2277 1           DCA     REP11S          DIRECT RESTARTS TO REP11
 0106   REF   2  LAST  185  34,2006  52 757 0           DXCH    -PHASE3
 01061  REF 114  LAST  518  34,2007  4 5021 0           CS      ZERO
 01062                     34,2010  22 007 0           ZL
 0107   REF   2  LAST   80  34,2011  55'265 0           TS      LIFTTEMP
 0108   REF   2  LAST  185  34,2012  52 763 1           DXCH    -PHASE5         INACTIVE GROUP 5, PRELAUNCH PROTECTION
 0111                      34,2013  0 0006 1  P11+7    EXTEND
 0112   REF   1            34,2014  3 2301 1           DCA     REP11SA
 0113   REF   1            34,2015  53'337 0           DXCH    TLIFTOFF

 0114                      34,2016  0 0006 1           EXTEND
 0115   REF  13  LAST  416  34,2017  3 0025 0           DCA     TIME2
 0116   REF   3  LAST  535  34,2020  53'266 0           DXCH    LIFTTEMP        FOR RESTARTS

 0117   REF 115  LAST  535  34,2021  3 5021 1           CA      ZERO
 0118                      34,2022  22 007 0           ZL
 0119   REF  14  LAST  535  34,2023  52 025 1           DXCH    TIME2
 0120   REF   2  LAST  535  34,2024  53'337 0  REP11A-2 DXCH    TLIFTOFF
 0121   REF   3  LAST  535  34,2025  52 757 0  REP11A-1 DXCH    -PHASE3         RESET PHASE


 0122                      34,2026  0 0004 0  REP11A   INHINT
 0123                      34,2027  0 0006 1           EXTEND
 0124   REF   7  LAST  535  34,2030  3 1710 0           DCA     TEPHEM  +1
 0125   REF   2  LAST   80  34,2031  53'271 0           DXCH    TEPHEM1 +1
 0126   REF   8  LAST  535  34,2032  3 1706 1           CA      TEPHEM
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0127   REF   3  LAST  535   34,2033  57'267 0          XCH    TEPHEM1

0128                       34,2034  0 0006 1          EXTEND
0129   REF   3  LAST  535   34,2035  3 1337 1          DCA    TLIFTOFF
0130   REF   4  LAST  536   34,2036  21'271 0          DAS    TEPHEM1 +1
0131   REF   5  LAST  536   34,2037  27'267 1          ADS    TEPHEM1        CORRECTOFOR OVERFLOW

0132   REF  23  LAST  512   34,2040  0 5412 0          TC     PHASCHNG
0133                       34,2041   05023 0          OCT    05023
0134                       34,2042   22000 1          OCT    22000

0135                       34,2043  0 0004 0          INHINT
0136                       34,2044  0 0006 1          EXTEND
0137   REF   6  LAST  536   34,2045  3 1270 0          DCA    TEPHEM1
0138   REF   9  LAST  535   34,2046  53'707 1          DXCH   TEPHEM
0139   REF   7  LAST  536   34,2047  3 1271 1          CA     TEPHEM1 +2
0140   REF  10  LAST  536   34,2050  57'710 0          XCH    TEPHEM  +2

0141   REF   1              34,2051  3 2000 0          CAF    EBDVCNT
0142   REF  22  LAST  535   34,2052  54 003 0          TS     EBANK
01421  REF   9  LAST  218   E7,1431                    EBANK= DVCNTR
0143   REF  19  LAST  418   34,2053  0 4740 0          TC     IBNKCALL
0144   REF   1              34,2054   76722 1          CADR   PREREAD1       ZERO PIPS AND INITIALIZE AVERAGEG

0145   REF  24  LAST  536   34,2055  0 5412 0          TC     PHASCHNG
0146                       34,2056   05023 0          OCT    05023          CONTINUE HERE ON RESTART
0147                       34,2057   22000 1          OCT    22000

0148   REF   4  LAST  447   34,2060  3 5036 1          CAF    .5SEC          START ATT ERROR DISPLAY
0150   REF  20  LAST  518   34,2061  0 5245 1          TC     WAITLIST       IN .5 SEC
0151   REF   3  LAST  216   E6,1704                    EBANK= BODY3
0152   REF   2  LAST  216   34,2062   02320 1          2CADR  ATERTASK
0152                       34,2063   70066 0

0153   REF   6  LAST  451   34,2064  0 5354 0          TC     NEWMODEX       DISPLAY MM 11
0154                       34,2065   00013 0          MM     11

01541  REF  20  LAST  513   34,2066  0 5546 0          TC     UPFLAG
01542  REF   1              34,2067   00022 1          ADRES  NODOP01

01543  REF   1              34,2070  3 6214 0          CA     POWDNCOD       SWITCH TO POWERED FLIGHT DOWNLIST
01545  REF   4  LAST  200   34,2071  54 332 1          TS     DNLSTCOD

0155   REF 110  LAST  532   34,2072  0 4662 1          TC     BANKCALL
0156   REF   3  LAST  454   34,2073   20703 1          CADR   CLEANDSP       CLEAR DSKY IN CASE OF V75

0157   REF   3  LAST  434   34,2074  0 5372 1          TC     2PHSCHNG
0158                       34,2075   40514 0          OCT    40514          PROTECT ATERTASK
0159                       34,2076   00073 0          OCT    00073
0160   REF   1              34,2077  3 2001 1          CAF    EBOPLACE
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0161   REF  23  LAST  536   34,2100  54 003 0          TS      EBANK

01611  REF   5  LAST  430   E5,1426                    EBANK=  QPLACES
016111 REF   1              34,2101  3 2302 1          CA      P11XIT          SET EXIT FROM PROUT IN EARTHR
016112 REF   6  LAST  537   34,2102  55'426 1          TS      QPLACES
0162   REF  67  LAST  530   34,2103  0 6006 1          TC      INTPRET
0163                        34,2104   64375 1          VLOAD   MXV
0164   REF   2  LAST   99   34,2105   02467 0                  THETAN
0165   REF  30  LAST  450   34,2106   02672 0                  XSM
0166                        34,2107   53372 1          VSL1    VAD
0167   REF   3  LAST  447   34,2110   02650 0                  ERCOMP
0168   REF   4  LAST  537   34,2111   16650 0          STODL   ERCOMP
0169   REF   4  LAST  536   34,2112   01337 1                  TLIFTOFF
0170                        34,2113   52131 0          SSP     GOTO
0171   REF   6  LAST  523   34,2114   00052 0                  S2
0172   REF   1              34,2115   66424 0          CADR    PROUT           RETURN FROM EARTHR
0173   REF   2  LAST  430   34,2116   66373 0                  EARTHR +3
01731                       34,2117  22 007 0  MATRXJOB ZL                      STORE DP GIMBAL ANGLES FOR ATTITUDE
01732  REF  10  LAST  441   34,2120  3 0032 0          CA      CDUX                  ERROR DISPLAY AFTER LIFTOFF
01733  REF  12  LAST  451   34,2121  53'760 0          DXCH    OGC
01734                       34,2122  22 007 0          ZL
01735  REF   3  LAST  419   34,2123  3 0033 1          CA      CDUY
01736  REF   2  LAST   95   34,2124  53'762 1          DXCH    IGC
01737                       34,2125  22 007 0          ZL
01738  REF   7  LAST  419   34,2126  3 0034 0          CA      CDUZ
01739  REF   2  LAST   95   34,2127  53'764 1          DXCH    MGC
0174   REF  68  LAST  537   34,2130  0 6006 1          TC      INTPRET                 -
017403                      34,2131   74575 0          VLOAD   VSR1            SCALE OGC  B-1
017405 REF  13  LAST  537   34,2132   02760 1                  OGC
017407 REF  14  LAST  537   34,2133   02760 1          STORE   OGC
01741                       34,2134   77731 1          SSP                     ZERO RTX2
01742  REF  10  LAST  500   34,2135   03747 0                  RTX2            FOR
01743                       34,2136   00000 1                  0               EARTH
0175                        34,2137   65345 0          DLOAD   PDDL
0176   REF   1              34,2140   01273 0                  PGNCSALT        ALTITUDE OF PGNCS
0177   REF   2  LAST   80   34,2141   01264 0                  PADLONG         LONGITUDE
0178                        34,2142   55525 0          PDDL    VDEF
0179   REF   6  LAST  452   34,2143   02403 1                  LATITUDE        GEODETIC LATITUDE
0180   REF   6  LAST  281   34,2144   15104 0          STODL   LAT             LAT,LONG,ALT ARE CONSECUTIVE
0181   REF   2  LAST  523   34,2145   15335 0                  HI6ZEROS        TIME = 0
0182                        34,2146   45014 0          CLEAR   CALL
0183   REF   2  LAST  458   34,2147   00562 0                  ERADFLAG
0184   REF   1              34,2150   26441 1                  LALOTORV        CONVERT TO POSITION VECTOR IN REF.COORDS

0185   REF   4  LAST   79   34,2151   35232 1          STCALL  RN1                     -
01851  REF   1              34,2152   70334 1                  GETDOWN         RETURN WITH VECTOR FOR DOWN DIRECTION
01852                       34,2153   53476 1          VCOMP   UNIT
01853  REF   5  LAST  506   34,2154   25752 0          STOVL   REFSMMAT +12D   UNITZ = UNIT(GRAV)
01854  REF   5  LAST  537   34,2155   01232 0                  RN1
0186                        34,2156   74235 0          VXV     VXSC
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0187   REF   5  LAST  294   34,2157   01714 1                UNITW          SCALED AT 1
0188   REF   1              34,2160   30304 0                -ERTHRAT       V = EARTHRATE X R
0189                        34,2161   77712 0       VSL4                    SCALE TO 2(7) M/CS
0190   REF   2  LAST   79   34,2162   25240 0       STOVL    VN1
0191   REF   6  LAST  537   34,2163   01752 0                REFSMMAT +12D
0209                        34,2164   53435 0       VXV      UNIT
0210   REF   6  LAST  538   34,2165   01714 1                UNITW          (REF3 X UNITW) = EAST
0211                        34,2166   47206 0       PUSH     VXV
0212   REF   7  LAST  538   34,2167   01752 0                REFSMMAT +12D   (EAST X REF3) = -SOUTH
0213                        34,2170   65256 0       UNIT     PDDL
0214   REF   5  LAST  454   34,2171   02634 1                LAUNCHAZ        COS(AZ)*SOUTH
0215                        34,2172   74346 0       COS      VXSC
0216                        34,2173   77626 0       STADR
0217   REF   8  LAST  538   34,2174   62041 0       STODL    REFSMMAT       TEMPORARY STORAGE
0218   REF   6  LAST  538   34,2175   02634 1                LAUNCHAZ
0219                        34,2176   74356 1       SIN      VXSC            SIN(AZ)*EAST
0220                        34,2177   53455 0       VAD      UNIT            SIN(AZ)*EAST - COS(AZ)*SOUTH = REF1
0221   REF   9  LAST  538   34,2200   01736 1                REFSMMAT
0222   REF  10  LAST  538   34,2201   01736 1       STORE    REFSMMAT

0223                        34,2202   53435 0       VXV      UNIT           (REF1 X REF3) = -REF3
0224   REF  11  LAST  538   34,2203   01752 0                REFSMMAT +12D
0225                        34,2204   77676 0       VCOMP
0226   REF  12  LAST  538   34,2205   01744 1       STORE    REFSMMAT +6
02261                       34,2206   45345 1       DLOAD    DSU
02262  REF  11  LAST  471   34,2207   15333 0                DPHALF         1/2 REV
02263  REF   7  LAST  538   34,2210   02634 1                LAUNCHAZ
02264                       34,2211   65215 1       DAD      PDDL
02265  REF   5  LAST  452   34,2212   02401 0                AZIMUTH
02266  REF   2  LAST  115   34,2213   03301 0                SATRLRT        SET  SATRLRT = -SATRLRT IF
02267                       34,2214   45565 0       SIGN     STADR          (1/2REV -LAVNCHAZ +AZIMUTH) IS NEGATIVE
02268  REF   3  LAST  538   34,2215   74476 1       STORE    SATRLRT        FOR ROLL CALC IN FDAI ATT. ERROR DISPLAY
0227                        34,2216   77414 0       SET      EXIT
0228   REF   2  LAST  481   34,2217   01462 0                REFSMFLG       SET REFSMMAT KNOWN FLAG

0229   REF  25  LAST  536   34,2220   0 5412 0      TC       PHASCHNG
0230                        34,2221    04023 1      OCT      04023

0231                        34,2222   0 0006 1      EXTEND
0232   REF   1              34,2223   3 2306 0      DCA      P11SCADR
0233   REF   1              34,2224   53'223 1      DXCH     AVGEXIT        SET AVGEXIT

0234   REF   2  LAST  306   34,2225   3 7665 0      CA       PRIO31         2 SECONDS AT 2(+8)
0235   REF   9  LAST  443   34,2226   55'074 1      TS       I/PIPADT

0236   REF   5  LAST  418   E6,1501               EBANK=   RCSFLAGS
0237   REF   8  LAST  259   34,2227   3 5057 0      CA       EBANK6
0238   REF  24  LAST  537   34,2230   54 003 0      TS       EBANK

0239                        34,2231   0 0004 0      INHINT
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0246   REF 116  LAST  535   34,2232  4 5021 0          CS     ZERO
0247   REF   3  LAST  484   34,2233  55'063 1          TS     TBASE5        RESTART READACCS 2 SECONDS AFTER LIFTOFF

0248   REF  10  LAST  437   34,2234  4 0025 1          CS     TIME1
0249   REF   1               34,2235  6 5042 1          AD     2SECS         DO READACCS 2 SECONDS AFTER LIFTOFF

0250   REF 143  LAST  518   34,2236  10 000 0          CCS    A             CHECK TO INSURE DT IS POSITIVE
0251                         34,2237  1 2242 0          TCF    +3            TIME POSITIVE
0252                         34,2240  1 2242 0          TCF    +2            CANNOT GET HERE
0253   REF 117  LAST  539   34,2241  3 5021 1          CA     ZERO          TIME NEGATIVE - SET TO 1
0254   REF  66  LAST  526   34,2242  6 5017 1          AD     ONE           RESTORE TIME  -  OR MAKE POSITIVE

0255   REF  21  LAST  536   34,2243  0 5245 1          TC     WAITLIST
0256   REF  14  LAST  218   E6,1661                    EBANK= AOG
0257   REF   1               34,2244   02744 1         2CADR  READACCS
0257   REF   1               34,2245   76066 0
0258   REF   4  LAST  536   34,2246  0 5372 1          TC     2PHSCHNG
0259                         34,2247   00003 1         OCT    00003         TURN OFF GROUP 3
0260                         34,2250   00025 0         OCT    00025         PROTECT NORMLIZE AND READACCS

0261   REF  40  LAST  502   34,2251  0 4701 0          TC     POSTJUMP
0262   REF   2  LAST  217   34,2252   77236 0         CADR   NORMLIZE      DO NORMLIZE AND ENDOFJOB

0263   REF  11  LAST  536   E3,1706                    EBANK= TEPHEM
0264                         34,2253  0 0004 0  REP11   INHINT
0265   REF   1               34,2254  10 763 1          CCS    PHASE5
0266   REF  62  LAST  527   34,2255  0 5217 0          TC     ENDOFJOB

0267   REF   4  LAST  535   34,2256  11'265 0          CCS    LIFTTEMP
0268                         34,2257  1 2263 0          TCF    +4
0269                         34,2260  1 2263 0          TCF    +3
0270                         34,2261  1 2263 0          TCF    +2
0271   REF   1               34,2262  1 2013 0          TCF    P11+7

0272   REF   5  LAST  537   34,2263  4 1336 1          CS     TLIFTOFF
0273                         34,2264  0 0006 1          EXTEND
0274   REF   1               34,2265  6 2273 0          BZMF   ENDREP11

0275   REF  15  LAST  535   34,2266  10 024 0          CCS    TIME2         **TIME2 MUST BE NON-ZERO AT LIFTOFF**
0276   REF   2  LAST  213   34,2267  1 2021 1          TCF    REP11A -5     T2,T1 NOT YET ZEROED, GO AND DO IT

0277                         34,2270  0 0006 1          EXTEND               T2,T1 ZEROED, SET TLIFTOFF
0279   REF   5  LAST  539   34,2271  3 1266 1          DCA    LIFTTEMP
0280   REF   1               34,2272  1 2024 1          TCF    REP11A-2

0281                         34,2273  0 0006 1  ENDREP11 EXTEND
0282   REF   2  LAST  535   34,2274  3 2301 1          DCA    REP11SA
0283   REF   1               34,2275  1 2025 0          TCF    REP11A-1
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 0284                          34,2276   77766 0  REP11S   2OCT   77766 00011
 0284                          34,2277   00011 1
 0285                          34,2300   77764 1  REP11SA  2OCT   77764 00013
 0285                          34,2301   00013 0

 02851  REF   1                34,2302   02451 0  P11XIT   GENADR P11OUT
 0286                          34,2303   71704 1  -ERTHRAT 2DEC*  -7.292115138 E-7 B18*   - EARTH RATE AT 2(18)
 0286                          34,2304   41735 0
 0288   REF   4  LAST  536     E6,1704                           EBANK= BODY3
 0289   REF   1                34,2305   02307 1  P11SCADR 2CADR  VHHDOT
 0289   REF   1                34,2306   70066 0
 02891  REF  18  LAST  526        6214             POWDNCOD EQUALS THREE

 0290   REF   5  LAST  540     E6,1704                           EBANK= BODY3
R0295   VHHDOT IS EXECUTED EVERY 2 SECONDS TO DISPLAY ON DSKY
R0296                        VI INERTIAL VELOCITY MAGNITUDE
R0297                        HDOT  RATE OF CHANGE OF ALT ABOVE L PAD RADIUS
R0298                        H   ALTITUDE ABOVE L PAD RADIUS

 0299   REF  69  LAST  537     34,2307  0 6006 1  VHHDOT   TC     INTPRET
 0300                          34,2310   77624 1           CALL                LOAD VMAGI, ALTI,
 0301   REF   1                34,2311   70542 0                    S11.1      HDOT FOR DISPLAY
 0302                          34,2312   77776 1           EXIT
 03021  REF  26  LAST  538     34,2313  0 5412 0           TC     PHASCHNG
 03022                         34,2314   00035 1           OCT    00035

 0303   REF   1                34,2315  3 2622 0           CAF    V06N62      DISPLAY IN R1   R2    R3
 0304   REF 111  LAST  536     34,2316  0 4662 1           TC     BANKCALL                    VI   HDOT  H
 0305   REF   1                34,2317   20707 0           CADR   REGOODSP

 0308   REF   1                34,2320  3 5006 1  ATERTASK CAF    PRIO1       ESTABLISH JOB TO DISPLAY ATT ERRORS
 0309   REF  19  LAST  519     34,2321  0 5147 0           TC     FINDVAC     COMES HERE AT L.O. + .33 SEC
 0310   REF   6  LAST  540     E6,1704                     EBANK= BODY3
 0311   REF   1                34,2322   02345 1           2CADR  ATERJOB
 0311   REF   1                34,2323   70066 0
 03111  REF   6  LAST  538     34,2324  4 1501 0           CS     RCSFLAGS    SET BIT3 FOR
 03112  REF  16  LAST  527     34,2325  7 5015 1           MASK   BIT3        NEEDLER
 03113  REF   7  LAST  540     34,2326  27'501 0           ADS    RCSFLAGS    INITIALIZATION PASS
 03114  REF  20  LAST  536     34,2327  0 4740 0           TC     IBNKCALL    AND GO
 03115  REF   1                34,2330   42420 1           CADR   NEEDLER     DO IT
 03116  REF  32  LAST  518     34,2331  3 5017 1           CA     BIT1        SET SW
 03117  REF   2  LAST  115     34,2332  55'725 1           TS     SATSW       FOR DISPLAY
 0312   REF  25  LAST  518     34,2333  0 5324 1           TC     TASKOVER
 03121                         34,2334   40220 0  GETDOWN  STQ    SETPD
 03122  REF   1                34,2335   02242 1                  INCRPEX
 03123                         34,2336   00001 0                  DD
 03124                         34,2337   77745 1           DLOAD
 03125  REF   3  LAST  537     34,2340   15335 0                  HI6ZEROS
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 03125                          34,2341   14007 0          STODL  6D
 03127  REF  12  LAST  538      34,2342   15333 0                 DPHALF
 03128                          34,2343   34011 0          STCALL 8D
 03129  REF   2  LAST  537      34,2344   26446 0                 LALOTORV +5
R0313   THIS SECTION PROVIDES ATTITUDE ERROR DISPLAYS TO THE FDAI DURING SONE BOOST

A0315                                   COMPUTE DESIRED PITCH W.R.T. PAD LOCAL VERTICAL AT LIFTOFF
A0316                                                    2    3    4    5    6
A03161                                  PITCH= A0+A1T+A2T +A3T +A4T +A5T +A6T
A0317                                         SCALED TO 32 REVS.                    -14
A0318                                   IF TL = TIME IN SECS FROM L.O., THEN   T = 100(TL-RPSTART)2
A0319                                   WHERE    TL GE RPSTART
A0320                                             TL LE (-POLYSTOP + RPSTART)
A0321                                   COMPUTE DESIRED ROLL WHERE ROLL EQUALS ANGLE FROM
A0322                                   LAUNCHAZ TO -Z(S/C) AS SEEN FROM X(S/C).
A0323                                   ROLL = LAUNCHAZ-AZIMUTH-.5 +SATRLRT*T      IN REV
A0324                                   SATRLRT = RATE OF ROLL IN REV/CENTI-SEC
A0325                                   T,IN CENTI-SEC,IS DEFINED AS ABOVE,INCLUSIVE OF TIME RESTRICTIONS

A0326                                   FOR SIMPLICITY, LET   P = 2*PI*PITCH
A0327                                                         R = 2*PI*ROLL

A0328                                   CONSTRUCT THE TRANSFORMATION MATRIX, TSMV, GIVING DESIRED S/C AXES IN
A0329                                   TERMS OF SM COORDINATES. LET THE RESULTING ROWS EQUAL THE VECTORS XDC,
A0330                                   YDC,AND ZDC.

A0331                                    *     (    SIN(P)          0          -COS(P)     )   (XDC)
A0332                                   TSMV = (-SIN(R)*COS(P)   -COS(R)   -SIN(R)*SIN(P)) = (YDC)
A0333                                          (-COS(R)*COS(P)    SIN(R)   -COS(R)*SIN(P))   (ZDC)

A0334                                   XDC,YDC,ZDC ARE USED AS INPUT TO CALCGTA FOR THE EXTRACTION OF THE
A0335                                   EULER SET OF ANGLES WHICH WILL BRING THE SM INTO THE DESIRED
A0336                                   ORIENTATION. THIS EULER SET, OGC, IGC, AND MGC, MAY BE IDENTIFIED
A0337                                   AS THE DESIRED CDU ANGLES.

A0338                                   (XDC)                    (OGC)
A0339                                   (YDC) ---) CALCGTA ---) (IGC)
A0340                                   (ZDC)                    (MGC)

A0341                                                  -
A0342                                   DEFINE THE VECTOR DELTACDU.

A0343                                    -         (OGC)   (CDUX)
A0344                                   DELTACDU = (IGC) - (CDUY)
A0345                                              (MGC)   (CDUZ)

A0346                                                          -         -    *    -
A0347                                   COMPUTE ATTITUDE ERRORS, A, WHERE   A = TGSC*DELTACDU

A0348                                    *     (1        SIN(CDUZ)           0     )   THE GIMBAL ANGLES
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A0349                                   TGSC = (0   COS(CDUX)*COS(CDUZ)   SIN(CDUX)) = TO SPACECRAFT AXES
A0350                                          (0  -SIN(CDUX)*COS(CDUZ)   COS(CDUX))   CONVERSION MATRIX

A0351                                          -
A0352                                   THE ATTITUDE ERRORS, A, ARE STORED ONE HALF SINGLE PRECISION IN
A0353                                   THE REGISTERS AK, AK1, AK2 AS INPUT TO NEEDLER, THE FDAI ATTITUDE
A0354                                   ERROR DISPLAY ROUTINE.

 0355   REF  10  LAST  261   34,2345  30 102 1  ATERJOB  CAE    FLAGWRD6        CHECK FLAGWRD6
 03551  REF   8  LAST  261   34,2346  7 4105 0           MASK   OCT50000        BITS 14, 15
 03552                       34,2347  0 0006 1           EXTEND
 03553                       34,2350  1 2352 0           BZF    +2              OK - CONTINUE
 03554  REF  63  LAST  539   34,2351  0 5217 0           TC     ENDOFJOB        SATURN STICK ON - KILL JOB
 0356   REF  26  LAST  425   34,2352  3 5006 1           CAF    BIT10           CHECK IF S/C CONTROL
 03561                       34,2353  0 0006 1           EXTEND                 OF SATURN PANEL
 03562  REF   6  LAST  446   34,2354  02 030 0           RAND   CHAN30          SWITCH IS ON
 0357                        34,2355  0 0006 1           EXTEND
 0358   REF   1              34,2356  1 2510 0           BZF    STRSAT          IT IS - GO STEER
 0360   REF   3  LAST  540   34,2357  11'725 1           CCS    SATSW           IT IS NOT - WAS IT ON LAST CYCLE
 0361   REF   1              34,2360  0 2363 0           TC     ATTDISP         NO - CONTINUE
 0362   REF   1              34,2361  0 2513 1           TC     ATRESET         YES - REINITIALIZE NEEDLER
 0363   REF   2  LAST  542   34,2362  0 2513 1           TC     ATRESET         YES - REINITIALIZE NEEDLER
 0364   REF   2  LAST  115   34,2363  4 1702 1  ATTDISP  CS     RPSTART         PITCH/ROLL START TIME
 0365   REF  11  LAST  539   34,2364  6 0025 0           AD     TIME1
 03651                       34,2365  0 0006 1           EXTEND
 03652  REF   1              34,2366  6 2615 1           BZMF   NOPOLY          IF MINUS THEN ATTITUDE HOLD
 0366   REF 242  LAST  523   34,2367  54 154 0           TS     MPAC            MPAC=TIME1-RPSTART
 03661  REF   2  LAST  115   34,2370  55'707 1           TS     SPOLYARG        SAVE FOR USE IN ROLL CALUCLATION
 03662  REF   2  LAST  115   34,2371  6 1703 1           AD     POLYSTOP        NEG PITCHOVER TIME IN CSECS
 03663                       34,2372  0 0006 1           EXTEND
 0367                        34,2373  6 2375 1           BZMF   +2
 0368   REF   2  LAST  542   34,2374  0 2615 1           TC     NOPOLY          GO TO ATTITUDE HOLD
 0369   REF  16  LAST  539   34,2375  3 0024 1           CA     TIME2
 0370                        34,2376  0 0006 1           EXTEND
 0371                        34,2377  6 2401 0           BZMF   +2
 03711  REF   3  LAST  542   34,2400  0 2615 1           TC     NOPOLY          GO TO ATTITUDE HOLD
 0372   REF   3  LAST  114   34,2401  31'661 1           CAE    POLYNUM
 0373   REF  61  LAST  518   34,2402  54 001 1           TS     L
 0374   REF   1              34,2403  3 2621 0           CAF    COEFPOLY        EVALUATE PITCH POLYNOMIAL
 0375   REF   1              34,2404  0 7164 0           TC     POWRSERS        SCALED TO 32 REVOLUTIONS

 0387   REF 118  LAST  539   34,2405  3 5021 1           CA     ZERO            RETURN WITH PITCH(32REV)
 0388   REF   3  LAST  301   34,2406  54 163 1           TS     MODE            STORED IN MPAC, MPAC +1
 0389   REF  70  LAST  540   34,2407  0 6006 1           TC     INTPRET
 0390                        34,2410   54201 0  SETPD    SL     0               32(PITCH(32REV))=PITCH(REV)
 0391                        34,2411   00001 0           0
 0392                        34,2412   20206 1           5
 0393                        34,2413   77606 1  PUSH                     LET P(RAD)=2.PI.PITCH(REV)
 0394                        34,2414   77650 1  GOTO
 0395   REF   1              34,2415   76155 1           ATTDISP1        AROUND SETLOC
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A0396                                                    *
A0397                                CONSTRUCT SM TO S/C MATRIX, TSMV

 0398   REF   1                37,2000                    SETLOC P11TWO
 0399                          37,2155                    BANK                  36 IN COL., 34 IN DISK

 0400   REF   1                                           COUNT  36/P11

 0401                          37,2155   57546 1  ATTDISP1 COS    DCOMP
 0402                          37,2156   14017 1           STODL  14D           -.5*COS(P)
 0403                          37,2157   77756 0           SIN
 0404                          37,2160   14013 0           STODL  10D           .5*SIN(P)
 0405   REF   6  LAST  479     37,2161   15335 0                  ZEROVECS
 0406                          37,2162   00015 0           STORE  12D           0

A0407                                EVALUATE ROLL = LAUNCHAZ-AZIMUTH-.5+SATRLRT*T
 0409                          37,2163   41335 1           SLOAD  DMP
 0410   REF   3  LAST  542     37,2164   03310 0                  SPOLYARG      TIME1 - RPSTART ,CSECS B-14.
 0411   REF   4  LAST  538     37,2165   03301 0                  SATRLRT
 0412                          37,2166   45261 0           SL     DSU
 0413                          37,2167   20217 1                  14D
 0414   REF  13  LAST  541     37,2170   15333 0                  DPHALF
 0415                          37,2171   45215 0           DAD    DSU           ASSUMING X(SM) ALONG LAUNCH AZIMUTH.
 0416   REF   8  LAST  538     37,2172   02634 1                  LAUNCHAZ      LAUNCHAZ = ANGLE FROM NORTH TO X(SM).
 0417   REF   6  LAST  538     37,2173   02401 0                  AZIMUTH       AZIMUTH = -ANGLE FROM NORTH TO Z(S/C)
 0418                          37,2174   77634 0           RTB                  DETERMINE IF ROLLOUT
 0419   REF   1                37,2175   70604 1                  RLTST         IS COMPLETED
 0421                          37,2176   71406 0  ATTDISPR PUSH   COS           CONTINUE COMPUTING TSMV
 0422                          37,2177   77606 1           PUSH                 LET  R(RAD) = 2*PI*ROLL(REV)
 0423                          37,2200   72405 0           DMP    SL1
 0424                          37,2201   00017 1                  14D
 0425                          37,2202   14027 1           STODL  22D           -.5*COS(R)*COS(P)
 0426                          37,2203   77676 0           DCOMP
 0427                          37,2204   00023 0           STORE  18D           -.5*COS(R)
 0428                          37,2205   72405 0           DMP    SL1
 0429                          37,2206   00013 0                  10D
 0430                          37,2207   14033 1           STODL  26D           -.5*COS(R)*SIN(P)
 0431                          37,2210   41556 1           SIN    PUSH
 0432                          37,2211   00031 0           STORE  24D           .5*SIN(R)
 0433                          37,2212   72405 0           DMP    SL1
 0434                          37,2213   00017 1                  14D
 0435                          37,2214   14021 1           STODL  16D           -.5*SIN(R)*COS(P)
 0436                          37,2215   77676 0           DCOMP
 0437                          37,2216   72405 0           DMP    SL1
 0438                          37,2217   00013 0                  10D
 0439                          37,2220   24025 0           STOVL  20D           -.5*SIN(R)*SIN(P)
 0440                          37,2221   00013 0                  10D

A0441                                FROM TSMV FIND THE HALF UNIT VECTORS  XDC,YDC,ZDC = INPUT TO CALCGTA
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```
0442                          37,2222  77656 1          UNIT
0443  REF  3 LAST  95         37,2223  26714 1          STOVL  XDC              XDC = .5*UNIT(SIN(P),0,-COS(P))
0444                          37,2224  00021 1                 16D
0445                          37,2225  77656 1          UNIT
0446  REF  3 LAST  95         37,2226  26722 1          STOVL  YDC              YDC = .5*UNIT(-SIN(R)*COS(P),-COS(R),
0447                          37,2227  00027 1                 22D                                    -SIN(R)*SIN(P))
0448                          37,2230  77656 1          UNIT
0449  REF  3 LAST  95         37,2231  36730 0          STCALL ZDC              ZDC = .5*UNIT(-COS(R)*COS(P),SIN(R),
0450  REF  2 LAST 451         37,2232  47205 0                 CALCGTA                                -COS(R)*SIN(P))

A0451                                  CALL CALCGTA TO COMPUTE DESIRED SM ORIENTATION  OGC,IGC,AND MGC
A0452                                                        -      -   -
A0453                                  FIND DIFFERENCE VECTOR   DELTACDU = OGC-CDUX

A0453I                                 ENTER HERE IF ATTITUDE HOLD

0454                          37,2233  41575 0  NOPOLYM VLOAD  PUSH                 OGC      IGC
0455  REF 15 LAST 537         37,2234  02760 1                 OGC              CHANGE IGC  TO  MGC FOR COMPATIBILITY
0456                          37,2235  45006 0          PUSH   CALL                MGC      OGC
0457  REF  2 LAST 506         37,2236  47477 0                 COUTRIG          WITH Y,Z,X ORDER OF CDUSPOT
0458                          37,2237  47175 1          VLOAD  RTB                -        DPHI     OGC-CDUX ,PD4
0459                          37,2240  00003 1                 2                DELTACDU = DTHETA = IGC-CDUY ,   0
0460  REF  3 LAST 414         37,2241  45552 1                 V1STO2S                   DPSI     MGC-CDUZ ,   2
0461  REF  2 LAST 115         37,2242  27317 1          STOVL  BODSTEMP
0462  REF  7 LAST 543         37,2243  15335 0                 ZEROVECS
0463                          37,2244  24001 0          STOVL  0
0464  REF  5 LAST 454         37,2245  00767 1                 CDUSPOT
0465                          37,2246  47034 0          RTB    RTB
0466  REF  4 LAST 544         37,2247  45552 1                 V1STO2S
0467  REF  1                  37,2250  70564 1                 DELSTOR
0468                          37,2251  14013 0          STODL  10D
0469  REF  1                  37,2252  00741 0                 SINCDUZ
0470                          37,2253  72405 0          DMP    SL1
0471                          37,2254  00001 0                 0
0472                          37,2255  60415 1          DAD    SR2              CHANGE SCALE OF AK TO 2REVS
0473                          37,2256  00005 1                 4
0474                          37,2257  77650 1          GOTO
0475  REF  1                  37,2260  70416 0                 ATTDISP2

0476  REF  2 LAST 535         34,2000                   SETLOC P11ONE
0477                          34,2416                   BANK
0478  REF  2 LAST 535 TO 543:   268   268*              COUNT  34/P11

0479                          34,2416  14021 1  ATTDISP2 STODL  16D              16D,  .5(DPHI + DTHETA*SIN(CDUZ))
0480  REF  1                  34,2417  00747 0                 COSCDUZ
0481                          34,2420  41405 0          DMP    PUSH
0482                          34,2421  00001 0                 0
0483                          34,2422  72405 0          DMP    SL1
0484  REF  1                  34,2423  00751 1                 COSCDUX
0485                          34,2424  41325 0          PODL   DMP
```

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0486   REF   1              34,2425   00743 1                SINCDUX
0487                        34,2426   00003 1                2
0488                        34,2427   72415 1          DAD   SL1
0489                        34,2430   77626 0          STADR
0490                        34,2431   63755 0          STODL 17D          17D,  .5(DTHETA*COS(CDUX)*COS(CDUZ)
0491                        34,2432   72405 0          DMP   SL1                      +DPSI*SIN(CDUX))
0492   REF   2  LAST  545   34,2433   00743 1                SINCDUX
0493                        34,2434   41325 0          PDDL  DMP
0494   REF   2  LAST  544   34,2435   00751 1                COSCDUX
0495                        34,2436   00003 1                2
0496                        34,2437   72425 1          DSU   SL1
0497                        34,2440   77626 0          STADR
0498                        34,2441   77754 1          STORE 18D          18D,  .5(-DTHETA*SIN(CDUX)*COS(CDUZ)
0499                        34,2442   77751 1          TLOAD                    +DPSI*COS(CDUX))
0500                        34,2443   00021 1                16D
0501   REF   9  LAST  250   34,2444   03077 1          STORE AK           STORE ATTITUDE ERRORS IN AK,AK1,AK2
0502                        34,2445   77776 1          EXIT

050201 REF   4  LAST  542   34,2446   3 1725 0         CA    SATSW
050202 REF 144  LAST  539   34,2447   10 000 0         CCS   A            CHK TAKEOVER STATUS
050203 REF   1              34,2450   0 2471 1         TC    SATOUT       POS - DISPLAY ONLY
050204 REF   1              34,2451   0 2477 1         TC    AKLOAD       0     STORE BIAS
05021  REF  71  LAST  542   34,2452   0 6006 1  STEERSAT TC    INTPRET      NEG   STEER L/V
050211                      34,2453   76351 1          TLOAD TAD
050212 REF   2  LAST  115   34,2454   03327 1                BIASAK
050213 REF  10  LAST  545   34,2455   03077 1                AK
050214 REF  11  LAST  545   34,2456   03077 1          STORE AK           AKS = AKS - STORED BIAS
050215                      34,2457   77776 1          EXIT
05022  REF  12  LAST  545   34,2460   3 1476 0         CA    AK
050221 REF   1              34,2461   0 2623 1         TC    RESCALES
050222 REF  13  LAST  545   34,2462   55'476 1         TS    AK
050223 REF   1              34,2463   3 1477 1         CA    AK1
050224 REF   2  LAST  545   34,2464   0 2623 1         TC    RESCALES
050225 REF   2  LAST  545   34,2465   55'477 0         TS    AK1
050226 REF   1              34,2466   3 1500 0         CA    AK2
050227 REF   3  LAST  545   34,2467   0 2623 1         TC    RESCALES
050228 REF   2  LAST  545   34,2470   55'500 1         TS    AK2
A0503                                DISPLAY ATTITUDE ERRORS ON FDAI VIA NEEDLER

0504   REF 112  LAST  540   34,2471   0 4662 1  SATOUT TC    BANKCALL
0505   REF   2  LAST  540   34,2472    42420 1         CADR  NEEDLER
0506   REF   3  LAST  436   34,2473   3 4113 0  ATERSET CAF   OCT31          DELAY .25 SEC
0507   REF 113  LAST  545   34,2474   0 4662 1         TC    BANKCALL       EXECUTION + DELAY =.56SEC APPROX
0508   REF   6  LAST  520   34,2475    01732 0         CADR  DELAYJOB
0509   REF   2  LAST  540   34,2476   0 2345 1         TC    ATERJOB        END OF ATT ERROR DISPLAY CYCLE

0510   REF  14  LAST  545   34,2477   4 1476 1  AKLOAD CS    AK             STORE AKS
0511   REF   3  LAST  545   34,2500   55'726 1         TS    BIASAK         INTO BIAS
0512   REF   3  LAST  545   34,2501   4 1477 0         CS    AK1            COMPLEMENTED
0513   REF   4  LAST  545   34,2502   55'727 0         TS    BIASAK +1
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 0514   REF   3  LAST  545   34,2503  4 1500 1          CS     AK2
 05141  REF   5  LAST  545   34,2504  55'730 0          TS     BIASAK +2
 05142  REF  33  LAST  540   34,2505  4 5017 0          CS     BIT1          SET SW
 05143  REF   5  LAST  545   34,2506  55'725 1          TS     SATSW         TO STEER
 05144  REF   1               34,2507  0 2452 0          TC     STEERSAT      GO STEER
 0515   REF   6  LAST  546   34,2510  3 1725 0  STRSAT  CA     SATSW         CHECK IF NEEDLER
 05151                        34,2511  0 0006 1          EXTEND               HAS BEEN INITIALIZED
 051511 REF   2  LAST  542   34,2512  6 2363 0          BZMF   ATTDISP       YES - CONTINUE
 051512 REF   8  LAST  540   34,2513  4 1501 0  ATRESET CS     RCSFLAGS      NO - SET
 051513 REF  17  LAST  540   34,2514  7 5015 1          MASK   BIT3          INITIALIZATION SW
 05152  REF   9  LAST  546   34,2515  27'501 0          ADS    RCSFLAGS      FOR NEEDLER
 051521 REF 114  LAST  545   34,2516  0 4662 1          TC     BANKCALL      AND GO
 051522 REF   3  LAST  545   34,2517   42420 1          CADR   NEEDLER       DO IT
 051523 REF   1               34,2520  3 6211 0          CAF    REVCNT        OCT 6
 051524 REF 115  LAST  546   34,2521  0 4662 1          TC     BANKCALL      DELAY JOB
 051525 REF   7  LAST  545   34,2522   01732 0          CADR   DELAYJOB      60 MS -WAIT TILL IMUERRCNTR ZEROED
 051527 REF   7  LAST  546   34,2523  11'725 1          CCS    SATSW         CHECK SW STATUS
 051528 REF   1               34,2524  0 2534 1          TC     TAKEON        POS   STEER INIT.
 051529                       34,2525  0 2526 1          TC     +1            0     RETURN TO DISPLAY
 05153  REF  34  LAST  546   34,2526  3 5017 1          CA     BIT1          NEG   RETURN TO DISPLAY
 051531 REF   8  LAST  546   34,2527  55'725 1          TS     SATSW         SW = DISPLAY ONLY
 051532 REF  17  LAST  224   34,2530  4 5007 1          CS     BIT9          DISABLE
 051533                       34,2531  0 0006 1          EXTEND               SIVB
 051534 REF  24  LAST  386   34,2532  03 012 1          WAND   CHAN12        TAKEOVER
 051535 REF   2  LAST  545   34,2533  0 2471 1          TC     SATOUT        DISPLAY
 051536 REF  18  LAST  546   34,2534  3 5007 0  TAKEON  CAF    BIT9          ENABLE
 051537                       34,2535  0 0006 1          EXTEND               SIVB
 051538 REF  25  LAST  546   34,2536  05 012 1          WOR    CHAN12        TAKEOVER
 05154  REF 119  LAST  542   34,2537  3 5021 1          CA     ZERO          INDICATE NEEDLER
 051541 REF   9  LAST  546   34,2540  55'725 1          TS     SATSW         WAS INITIALIZED
 051542 REF   3  LAST  546   34,2541  0 2471 1          TC     SATOUT
 0516                         34,2542   51575 1  S11.1   VLOAD  ABVAL
 0517   REF   7  LAST  519   34,2543   01177 1          VN
 0518   REF   6  LAST  281   34,2544   27723 1          STOVL  VMAGI         VI     SCALED  2(7)  IN METERS/CSEC
 0519   REF   7  LAST  519   34,2545   01171 1          RN
 0524                         34,2546   50256 0          UNIT   DOT
 0525   REF   8  LAST  546   34,2547   01177 1          VN
 0526                         34,2550   77752 1          SL1
 0527   REF   2  LAST  281   34,2551   17737 1          STODL  HOOT
 05271  REF   4  LAST  519   34,2552   05152 1          RPAD
 05272                        34,2553   77214 0          BOF    VLOAD
 05273  REF   2  LAST  519   34,2554   00355 1          AMOONFLG
 05274  REF   1               34,2555   70560 0          EARTHALT
 05275  REF   5  LAST  519   34,2556   02026 1          RLS
 05276                        34,2557   60446 1          ABVAL  SR2
 05277                        34,2560   77621 1  EARTHALT BDSU
 05278                        34,2561   00045 0          360
 05279  REF   3  LAST  281   34,2562   03755 0          STORE  ALTI
 0528                         34,2563   77615 0          RVQ
 0529   REF   3  LAST  544   34,2564  3 1716 0  DELSTOR CA     BOOSTEMP
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0530                                  34,2565  0 0006 1           EXTEND                  STORE DELTACDU INTO PDL 0,2,4
0531   REF 243  LAST  542             34,2566  20 154 0           MSU     MPAC
0532   REF   5  LAST  510             34,2567  50 120 1           INDEX   FIXLOC
0533                                  34,2570  54 000 0           TS      0
0534   REF   4  LAST  546             34,2571  3 1717 1           CA      BOOSTEMP +1
0535                                  34,2572  0 0006 1           EXTEND
0536   REF 244  LAST  547             34,2573  20 155 1           MSU     MPAC +1
0537   REF   7  LAST  547             34,2574  50 120 1           INDEX   FIXLOC
0538                                  34,2575  54 002 1           TS      2
0539   REF   5  LAST  547             34,2576  3 1720 0           CA      BOOSTEMP +2
0540                                  34,2577  0 0006 1           EXTEND
0541   REF 245  LAST  547             34,2600  20 156 1           MSU     MPAC +2
0542   REF   8  LAST  547             34,2601  50 120 1           INDEX   FIXLOC
0543                                  34,2602  54 004 1           TS      4
0544   REF   2  LAST  285             34,2603  1 6030 0           TCF     DANZIG
0545   REF 246  LAST  547             34,2604  3 0154 1  RLTST    CA      MPAC            DETERMINE IF ROLLOUT
05451                                 34,2605  0 0006 1           EXTEND                  IS COMPLETED
05452  REF   5  LAST  543             34,2606  7 1701 1           MP      SATRLRT +1
05453                                 34,2607  0 0006 1           EXTEND
05454  REF   3  LAST  547             34,2610  6 6030 1           BZMF    DANZIG          UNLIKE SIGNS  STILL ROLLING
0546                                  34,2611  0 0006 1           EXTEND                  ROLLOUT COMPLETED
05461  REF   1                        34,2612  3 3672 1           DCA     MBDYTCTL +2     ZERO OUT ROLL CONTRIBUTION
05462  REF 247  LAST  547             34,2613  52 155 1           DXCH    MPAC
05463  REF   4  LAST  547             34,2614  0 6030 1           TC      DANZIG
05464  REF  72  LAST  545             34,2615  0 6006 1  NOPOLY   TC      INTPRET         COMES HERE IF
05465                                 34,2616   52001 1           SETPD   GOTO            ATTITUDE HOLD
05466                                 34,2617   00001 0           0
05467  REF   1                        34,2620   76233 1                   NOPOLYM
0547   REF   1                        34,2621   01673 1  COEFPOLY ADRES   POLYLOC
0548                                  34,2622   01476 0  V06N62   VN      0662
0549                                  34,2623  0 0006 1  RESCALES EXTEND                  RESCALE AK S FOR
05491  REF   1                        34,2624  7 1731 1           MP      SATSCALE        NEW HARDWARE
05492                                 34,2625  20 001 1           DDOUBL                  SCALING FOR
05493                                 34,2626  20 001 1           DDOUBL                  STEERING
05494  REF 153  LAST  484             34,2627  0 0002 0           TC      Q               SATURN
R0552  SATURN TAKEOVER FUNCTION
R0553  ************************

R0554  PROGRAM DESCRIPTION

R0555       MOD NUMBER 1
R0556       MOD BY ELIASSEN

R0557  FUNCTIONAL DESCRIPTION

R0558       DURING THE COASTING PHASE OF SIVB ATTACHED, THE
R0559       ASTRONAUT MAY REQUEST SATURN TAKEOVER THROUGH
R0560       EXTENDED VERB 46 (BITS 13,14 OF DAPDATR1 SET ).
R0561       THE CMC REGARDS RHC COMMANDS AS BODY-AXES RATE
R0562       COMMANDS AND IT TRANSMITS THESE TO SATURN AS DC
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R0563       VOLTAGES. THE VALUE OF THE CONSTANT RATE COMMAND
R0564       IS 0.5 DEG/SEC. AN ABSENCE OF RHC ACTIVITY RE-
R0565       SULTS IN A ZERO RATE COMMAND.

R0566       THE FDAI ERROR NEEDLES WILL INDICATE THE VALUE
R0567       OF THE RATE COMMAND.

R0568   CALLING SEQUENCE

R0569       DAPFIG +9D  TC      POSTJUMP
R0570                   CADR    SATSTKON

R0571   SUBROUTINES CALLED

R0572       ENDEXT
R0573       IBNKCALL
R0574       STICKCHK
R0575       NEEDLER
R0576       T5RUPT
R0577       RESUME

R0578   ASTRONAUT REQUESTS

R0579       ENTRY -  VERB 46 ENTER
R0580                (CONDITION - BITS 13, 14 OF DAPDATR1 SET)

R0581       EXIT  -  VERB 48 ENTER  (FLASH V06N46)
R0582                VERB 21 ENTER  AXXXX ENTER WHERE  A=0 OR 1
R0583                VERB 34 ENTER
R0584                VERB 46 ENTER

R0585   NORMAL EXIT MODE

R0586                VERB 46 ENTER  (SEE ASTRONAUT ABOVE)

R0587   ALARM OR ABORT EXIT MODES

R0588       NONE

R0589   OUTPUT

R0590       SATURN RATES IN  CDUXCMD, CDUYCMD, CDUZCMD

R0591   ERASABLE INITIALIZATION

R0592       DAPDATR1  (BITS 13,14 MUST BE SET)

R0593   DEBRIS

R0594       CENTRALS
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*0595        CDUXCMD, CDUYCMD, CDUZCMD

 0596                                43,3215                          BANK   43
 0597   REF   3  LAST  254          43,2000                          SETLOC EXTVERBS
 0598                                43,3215                          BANK

 0599   REF   1                                                       COUNT  23/STTKE
 0600                                43,3215  0 0006 1  SATSTKON     EXTEND
 06001  REF   1                     43,3216  3 3233 0               DCA    2REDOSAT
 06002                               43,3217  0 0004 0               INHINT
 06003  REF   5  LAST  261          43,3220  53'313 0               DXCH   TSLOC
 06004  REF  12  LAST  431          43,3221  3 4777 1               CAF    POSMAX
 0601   REF   3  LAST  190          43,3222  54 030 0               TS     TIMES
 06011  REF  11  LAST  542          43,3223  4 0102 0               CS     FLAGWRD6        TURN ON BITS 15,14 OF
 06012  REF   2  LAST  134          43,3224  7 4105 0               MASK   RELTABIT        FLAGWRD6
 06013  REF  12  LAST  549          43,3225  26 102 0               ADS    FLAGWRD6            SATSTICK CONTROL OF T5
 060132 REF  21  LAST  540          43,3226  0 4740 0               TC     IBNKCALL        ZERO JET CHANNELS IN 14 MS AND THEN
 060134 REF   1                     43,3227   42632 0               CADR   ZEROJET         LEAVE THE T6 CLOCK DISABLED
 06014                               43,3230  0 0003 1               RELINT
 06015  REF  27  LAST  267          43,3231  0 2121 1               TC     GOPIN           EXIT THUS BECAUSE WE CAME VIA V46

 060151 REF   7  LAST  540          E6,1704                          EBANK= BODY3
 06016  REF   2  LAST  192          43,3232   02765 1  2REDOSAT     2CADR  REDOSAT
                                    43,3233   46106 1

 060161 REF   7  LAST  504          30,2000                          SBANK= LOWSUPER
 060162                             32,2017                          BANK   32
 060164 REF   1                     23,2000                          SETLOC P11FOUR
 060166                             23,2765                          BANK

 0602   REF   3  LAST  225          23,2765  22 016 0  REDOSAT     LXCH   BANKRUPT        ALSO COMES HERE FOR RESTARTS
 06021                              23,2766  0 0006 1               EXTEND
 06022  REF   3  LAST  225          23,2767  22 012 1               QXCH   QRUPT
 06023  REF  10  LAST  546          23,2770  4 1501 0               CS     RCSFLAGS        TURN ON BIT3 OF RCSFLAGX
 06024  REF  18  LAST  546          23,2771  7 5015 1               MASK   BIT3            FOR
 06025  REF  11  LAST  549          23,2772  27'501 0               ADS    RCSFLAGS        NEEDLER INITIALIZATION
 0603   REF  22  LAST  549          23,2773  0 4740 0               TC     IBNKCALL
 0604   REF   4  LAST  546          23,2774   42420 1               CADR   NEEDLER         DISABLE IMU ERR COUNTERS ETC.
 0605   REF  19  LAST  546          23,2775  3 5007 0               CAF    BIT9            S1VB
 0606                              23,2776  0 0006 1               EXTEND                 TAKEOVER
 0607   REF  26  LAST  546          23,2777  05 012 1               WOR    CHAN12          ENABLE
 0608                              23,3000  0 0006 1               EXTEND                 SET UP T5 CYCLE
 0609   REF   1                     23,3001  3 3042 1               DCA    2SATSTCK
 0610   REF   6  LAST  549          23,3002  53'313 0               DXCH   TSLOC
 0611   REF   1                     23,3003  3 3040 0               CAF    100MST5         IN 100 MSECS
 0612   REF   4  LAST  549          23,3004  54 030 0               TS     TIMES
 0613   REF  25  LAST  234          23,3005  1 5333 0               TCF    RESUME          END OF SATURN STICK INITIALIZATION

A0614                                        THIS SECTION IS EXECUTED EVERY 100 MSECS
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0615   REF   4  LAST  549   23,3006  22 016 0  SATSTICK LXCH   BANKRUPT
0616                       23,3007  0 0006 1           EXTEND
0617   REF   4  LAST  549   23,3010  22 012 1           QXCH   QRUPT

0618   REF   2  LAST  549   23,3011  3 3041 1           CAF    2SATSTCK      SET UP RUPT
0619   REF   7  LAST  549   23,3012  55'312 1           TS     T5LOC         LO ORDER LOC SET
0620   REF   2  LAST  549   23,3013  3 3040 0           CAF    100MST5       100 MSECS
0621   REF   5  LAST  549   23,3014  54 030 0           TS     TIME5
0622   REF   1              23,3015  3 3037 0           CAF    STIKBITS
0623                       23,3016  0 0006 1           EXTEND
0624   REF   2  LAST  391   23,3017  06 031 0           RXOR   CHAN31        CHECK IF MAN ROT BITS SAME
0625   REF   2  LAST  550   23,3020  7 3037 1           MASK   STIKBITS
0626   REF  23  LAST  549   23,3021  0 4740 0           TC     IBNKCALL      SET RATE INDICES
0627   REF   1              23,3022   43130 1           CADR   STICKCHK      FOR PITCH YAW AND ROLL

0628   REF   2  LAST  110   23,3023  51'656 0           INDEX  RMANNDX       SET SATURN RATES
0629   REF   2  LAST  115   23,3024  3 1721 1           CA     SATRATE
0630   REF  15  LAST  545   23,3025  55'476 1           TS     AK                                ROLL
0631   REF   2  LAST  110   23,3026  51'657 1           INDEX  PMANNDX
0632   REF   3  LAST  550   23,3027  3 1721 1           CA     SATRATE
0633   REF   4  LAST  545   23,3030  55'477 0           TS     AK1                               PITCH
0634   REF   2  LAST  114   23,3031  51'660 0           INDEX  YMANNDX
0635   REF   4  LAST  550   23,3032  3 1721 1           CA     SATRATE
0636   REF   4  LAST  546   23,3033  55'500 1           TS     AK2                               YAW

0637   REF  24  LAST  550   23,3034  0 4740 0           TC     IBNKCALL      FOR SATURN INTERFACE AND FDAI DISPLAY
0638   REF   5  LAST  549   23,3035   42420 1           CADR   NEEDLER
0639   REF  26  LAST  549   23,3036  1 5333 0           TCF    RESUME        END OF SATURN STICK CONTROL


0644                       23,3037   00077 1  STIKBITS OCT    00077
0645                       23,3040   37766 1  100MST5  DEC    16374
0646   REF   8  LAST  549   E6,1704                     EBANK= BODY3
0647   REF   1              23,3041   03006 1  2SATSTCK 2CADR  SATSTICK
0647   REF   1              23,3042   46066 0
```

R2000 PROGRAM DESCRIPTION S17.1 AND S17.2

R2001 FUNCTIONAL DESCRIPTION

R2002 THE TPI SEARCH ROUTINE DETERMINES THE MINIMUM TOTAL VELOCITY TRANSFER TRAJECTORY FROM A GIVEN TPI
R2004 MANEUVER TIME WITHIN THE CONSTRAINT OF A SAFE PERICENTER. THIS VELOCITY IS THE SUM OF THE IMPULSIVE VELOCITIES
R2006 FOR THE TPI AND TPF MANEUVERS.
R2007 THE S17.1 ROUTINE EXTRAPOLATES THE STATE VECTORS OF BOTH VEHICLES TO THE TPI TIME AND COMPUTES THE
R2009 RELATIVE PHASE ANGLE BETWEEN THE VEHICLES, THE ALTITUDE DIFFERENCE(I.E. THE MAGNITUDE DIFFERENCE OF THE
R2011 POSITION VECTORS) AND SELECTS A SEARCH SECTOR BASED ON THE SIGN OF THE ALTITUDE DIFFERENCE.
R2013 THE S17.2 ROUTINE FURTHER DEFINES THE SEARCH SECTOR BY COMPUTING ANGULAR LIMITS AND USES THE TIME THETA
R2015 SUBROUTINE TO COMPUTE THE SEARCH START AND END TIMES. THE SEARCH IS THEN MADE IN AN ITERATIVE LOOP USING THE
R2017 LAMBERT SUBROUTINE TO COMPUTE THE VELOCITIES REQUIRED AT TPI TIME AND AT TPF TIME. EXIT FROM THE SEARCH LOOP
R2019 IS MADE WHEN SOLUTION CRITERIA ARE MET (NORMAL EXIT) OR AS SOON AS IT IS EVIDENT THAT NO SOLUTION EXISTS IN
R2021 THE SECTOR SEARCHED.

R2022 CALLING SEQUENCE

R2023 BOTH ROUTINES ARE CALLED IN INTERPRETIVE CODE AND RETURN VIA QPRET. S17.1 HAS ONLY A NORMAL EXIT.
R2025 S17.2 RETURNS VIA QPRET FOR NORMAL EXIT AND TO ALARUMS FOR ERROR EXIT.
R2028 SUBROUTINES CALLED

R2029 CSMCONIC
R2030 LEMCONIC
R2031 TIMETHET
R2032 INITVEL

```
 2033                          36,2012                          BANK   36
 2034   REF   1                35,2000                          SETLOC P17S1
 2035                          35,3123                          BANK

 2036   REF   1                                                 COUNT  36/TPI

 2037   REF  17  LAST  529     E7,1537                          EBANK= RACT3
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R2038 **** TEMPORARY ****

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 2039                          35,3123   00004 0  HPE      2DEC   157420.0 B-29   EARTH'S MIN. PERICENTER ALTITUDE 85 N.M.
 2039                          35,3124   31566 0

 2040                          35,3125   00000 1  HPL      2DEC   10668.0213 B-29 MOON:S MIN. PERICENTER ALTITUDE 35000FT
 2040                          35,3126   12326 0
 2041                          35,3127   00002 0  CDSEC    2DEC   40000
 2041                          35,3130   16100 1
 2042                          35,3131   00000 1  CLSEC    2DEC   15000
 2042                          35,3132   35230 0
 2043                          35,3133   12137 1  PIINVERS 2DEC   .3183098862
 2043                          35,3134   06033 1
 2044                          35,3135   06161 1  SECITHET 2DEC   .1944444444
 2044                          35,3136   30707 1
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2045                          35,3137  35252 1  SEC2THET 2DEC   .9166666667
2045                          35,3140  25253 1
2046                          35,3141  67777 1  MANYFEET 2DEC   -1.0 B-2
2046                          35,3142  77777 0
2047                          35,3143  00000 1  LIMVEL   2DEC   .6096 E-2 B-7   2FPS
2047                          35,3144  30760 0
2048                          35,3145  00000 1  DFTMOON  2DEC   .1524 E3 B-29   500 FEET
2048                          35,3146  00114 0
2049                          35,3147  00040 0  DP-.002  2DEC   0.002
2049                          35,3150  30447 0
20491 REF   1                 36,2000                   SETLOC  P17S
20492                         36,2012                   BANK
2050                          36,2012  71220 1  S17.1    STQ     DLOAD
2051  REF  17 LAST  498       36,2013  01340 1                   NORMEX
2052  REF  10 LAST  472       36,2014  03663 1                   TTPI
2053  REF  22 LAST  531       36,2015  34041 0           STCALL  TDEC1          ADVANCE PASSIVE VEHICLE  TO TPI
2054  REF   1                 36,2016  27126 1                   LEMCONIC
2055                          36,2017  77624 1           CALL
2056  REF   2 LAST  498       36,2020  45233 1                   LEMSTORE
2057                          36,2021  77745 1           DLOAD
2058  REF  11 LAST  552       36,2022  03663 1                   TTPI
2059  REF  23 LAST  552       36,2023  34041 0           STCALL  TDEC1          ADVANCE  ACTIVE VEHICLE TO TPI
2060  REF   1                 36,2024  27114 0                   CSMCONIC
2061                          36,2025  77624 1           CALL
2062  REF   2 LAST  498       36,2026  45243 0                   CSMSTORE
2063                          36,2027  77775 1           VLOAD
2064  REF  18 LAST  551       36,2030  03540 0                   RACT3
2065                          36,2031  63246 1           ABVAL   PDVL           /RA/ OD                  PL  2D
2066  REF   9 LAST  531       36,2032  03554 0                   RPASS3
2067                          36,2033  65256 0           UNIT    PDDL           UNIT RP OD               PL  6D
2068                          36,2034  43021 0           BDSU    SET
2069                          36,2035  00045 0                   36D            /RP/ -/RA/
2070  REF   1                 36,2036  00076 0                   KFLAG          OFF = +
2071                          36,2037  43040 1           BMN     CLEAR
2072                          36,2040  74042 1                   +2
2073  REF   2 LAST  552       36,2041  00276 1                   KFLAG          ON  = -
2074  REF   2 LAST  281       36,2042  27754 1           STOVL   DELHITE
2075                          36,2043  00001 0                   OD
2076                          36,2044  53435 0           VXV     UNIT
2077  REF   9 LAST  531       36,2045  03562 0                   VPASS3
2078  REF   1                 36,2046  27646 0           STOVL   E2             ALMOST IT SAVE FOR 17.2
2079  REF  19 LAST  552       36,2047  03540 0                   RACT3
2080                          36,2050  46206 1           PUSH    VPROJ
2081  REF   2 LAST  552       36,2051  03646 0                   E2
2082                          36,2052  51352 1           VSL2    BVSU           RPA
2083                          36,2053  50256 0           UNIT    DOT
2084                          36,2054  00001 0                   OD
2085                          36,2055  65552 0           SL1     ACOS
2086                          36,2056  77715 1           PDVL
2087                          36,2057  50235 0           VXV     DOT
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 2088   REF  20  LAST  552   36,2060   03540 0                  RACT3
 2089   REF   3  LAST  552   36,2061   03645 0                  E2
 2090                        36,2062   75325 1          PDDL    SIGN
 2091                        36,2063   77626 0          STADR
 2092   REF   3  LAST  281   36,2064   61160 1          STODL   THETZERO        CENTRAL ANGLE
 2093   REF   8  LAST  528   36,2065   00047 1                  X1
 2094   REF   2  LAST  126   36,2066   37746 0          STCALL  XRS             SAVE INDICES FOR FURTHER USE
 2095   REF  18  LAST  552   36,2067   01340 1                  NORMEX           += ACTIVE AHEAD   -= ACTIVE BEHIND
 2096                        36,2070   77220 1  S17.2   STQ     VLOAD           COMPUTE SEARCH SECTOR LIMITS
 2097   REF   2  LAST  123   36,2071   03657 0                  QTEMP
 2098   REF  21  LAST  553   36,2072   03540 0                  RACT3
 2099                        36,2073   50256 0          UNIT    DOT
 2100   REF   4  LAST  553   36,2074   03645 0                  E2
 2101                        36,2075   75446 0          ABS     SQRT
 2102                        36,2076   43352 1          SL1     DAD
 2103   REF   1              36,2077   33150 0                  DP-.002         ADD .002 RADIANS TO IT
 2104                        36,2100   57414 1          BON     DCOMP           GIVES CORRECT SINE, COSINE MUST BE
 2105   REF   3  LAST  552   36,2101   00316 0                  KFLAG           COMP. ADD .5 FOR ANGLE
 2106                        36,2102   74103 0                  +1
R2107   PHI(0)=180-(-(THETAZERO +K5IT)), PHI(I)=180-(-(THETAZERO+K2IT))
R2108   SIN(180-ALPHA)=SIN(ALPHA) ETC
 2109                        36,2103   40205 1          DMP     SETPD
 210905 REF   1              36,2104   33134 1                  PIINVERS        REVOLUTIONARY HERES TWO IT
 2110                        36,2105   00001 0                  0D
 2111                        36,2106   45206 1          PUSH    DSU
 2112   REF   4  LAST  553   36,2107   02617 0                  THETZERO
 2113   REF   2  LAST   94   36,2110   02611 0          STORE   IT              PHI(I) , -(THETZERO + K2IT)
 2114                        36,2111   41525 0          PDDL    PUSH
 2115                        36,2112   43342 0          SR1     DAD
 2116                        36,2113   41415 1          DAD     PUSH            PHI(0) , -(THETZERO + K5IT)
 2117                        36,2114   43156 1          SIN     SET
 2118   REF   3  LAST  531   36,2115   03486 0                  RVSW
 2119   REF   4  LAST  531   36,2116   16732 0          STODL   SNTH
 2120                        36,2117   50146 1          COS     BMN
 212005                      36,2120   74122 0                  +2
 21201                       36,2121   77676 0          DCOMP
 2121   REF   4  LAST  531   36,2122   16734 0          STODL   CSTH
 212105 REF   3  LAST  553   36,2123   03746 1                  XRS
 21211  REF   9  LAST  553   36,2124   24047 1          STOVL   X1
 2122   REF  10  LAST  552   36,2125   03554 0                  RPASS3
 2123                        36,2126   77657 0          VSR*
 2124                        36,2127   57176 0                  0,2
 2125   REF   4  LAST  531   36,2130   26657 1          STOVL   RVEC
 2126   REF  10  LAST  552   36,2131   03562 0                  VPASS3
 2127                        36,2132   77657 0          VSR*
 2128                        36,2133   57176 0                  0,2
 2129   REF   6  LAST  531   36,2134   36746 1          STCALL  VVEC
 2130   REF   3  LAST  531   36,2135   24744 0                  TIMETHET
 2131                        36,2136   77745 1          DLOAD                   SAVE START TIME AND GET END TIME
 2132   REF   4  LAST  531   36,2137   00037 0                  T
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 2133   REF   2  LAST  126   36,2140   03752 1          STORE  TF
 2134   REF   2  LAST   94   36,2141   16627 0          STODL  TFO
 2135   REF   3  LAST  553   36,2142   02611 0                 IT
 2136                       36,2143   73406 1          PUSH   SIN
 2137   REF   5  LAST  553   36,2144   16732 0          STODL  SNTH
 2138                       36,2145   50146 1          COS    BMN
 213305                     36,2146   74150 0                 +2
 21381                      36,2147   77676 0          DCOMP
 2139   REF   5  LAST  553   36,2150   02734 0          STORE  CSTH
 2140                       36,2151   45150 1          LXA,1  CALL
 2141   REF   4  LAST  553   36,2152   03745 1                 XRS
 2142   REF   4  LAST  553   36,2153   24744 0                 TIMETHET
R2143   INITIALIZE LOOP
 2144                       36,2154   43145 0          DLOAD  CLEAR
 2145   REF   5  LAST  553   36,2155   00037 0                 T
 2146   REF   5  LAST  469   36,2156   03661 0                 ITSWICH
 2147   REF   2  LAST   94   36,2157   16621 0          STODL  TFI              SAVE TIME FOR LOOP TEST
 2148   REF   7  LAST  506   36,2160   15343 1                 DPPOSMAX
 2149   REF   2  LAST   94   36,2161   16623 1          STODL  DELVEE
 2150   REF   1              36,2162   33142 0                 MANYFEET
 2151   REF   2  LAST   94   36,2163   16625 1          STODL  HP
 2152   REF   1              36,2164   33136 0                 SECITHET        70 DEGREES
 2153                       36,2165   71214 0          BON    DLOAD
 2154   REF   4  LAST  553   36,2166   00316 0                 KFLAG
 2155                       36,2167   74171 0                 +2
 2156   REF   1              36,2170   33140 1                 SEC2THET        330 DEGREES
 2157   REF   2  LAST  126   36,2171   37750 1          STCALL THETL
 2158   REF   1              36,2172   74214 0                 CONCAUL
 2159                       36,2173   70545 1  BIS     DLOAD  SR1
 2160   REF   6  LAST  554   36,2174   02734 0                 CSTH
 2161   REF   2  LAST  287   36,2175   14021 1          STODL  COSTH
 2162   REF   6  LAST  554   36,2176   02732 0                 SNTH
 2163                       36,2177   77742 0          SR1
 2164   REF   2  LAST  287   36,2200   34023 1          STCALL SINTH            GET 4 QUADRANT THETA
 2165   REF   2  LAST  287   36,2201   47256 0                 ARCTRIG
 2166                       36,2202   43244 1          BPL    DAD
 2167                       36,2203   74205 0                 +2
 2168   REF   8  LAST  554   36,2204   15343 1                 DPPOSMAX        PUT THETA BETWEEN 0,1
 2169                       36,2205   65221 0          BDSU   PDDL
 2170   REF   3  LAST  554   36,2206   03750 0                 THETL
 2171   REF   3  LAST  554   36,2207   03752 1                 TF
 2172                       36,2210   75225 0          DSU    SIGN            FAST TIMES
 2173   REF   3  LAST  554   36,2211   02621 0                 TFI
 2174                       36,2212   77640 0          BMN
 2175   REF   1              36,2213   74416 1                 RNGETEST        TIME MUST HAVE A STOP
R2176   ADVANCE PASSIVE FOR TARGET VECTOR
 2177                       36,2214   77745 1  CONCAUL DLOAD
 2178   REF  12  LAST  552   36,2215   03663 1                 TTPI
 2179                       36,2216   43015 1          DAD    BON
 2180   REF   4  LAST  554   36,2217   03752 1                 TF
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 2181   REF   5  LAST  531   36,2220   01312 0                    AVFLAG
 2182   REF   1              36,2221   74226 1                    ADVCSM
 2183   REF  24  LAST  552   36,2222   34041 0           STCALL   TDEC1
 2184   REF   2  LAST  552   36,2223   27126 1                    LEMCONIC
 2185                        36,2224   77650 1           GOTO
 2186   REF   1              36,2225   74230 0                    JUNCT3
 2187   REF  25  LAST  555   36,2226   34041 0  ADVCSM   STCALL   TDEC1
 2188   REF   2  LAST  552   36,2227   27114 0                    CSMCONIC
R2189   SAVE BACK VALUES OF HP AND DELVEE
 2190                        36,2230   77775 1  JUNCT3   VLOAD
 2191   REF  13  LAST  528   36,2231   00007 0                    VATT
 2192   REF   5  LAST  529   36,2232   27640 0           STOVL    VPASS4
 2193   REF  16  LAST  528   36,2233   00001 0                    RATT
 2194   REF   2  LAST  123   36,2234   03632 0           STORE    RPASS4
 219405 REF   9  LAST  491   36,2235   17415 1           STODL    RTARG
 2195   REF   5  LAST  554   36,2236   03752 1                    TF
 2196   REF   7  LAST  490   36,2237   17423 1           STODL    DELLT4
 2197   REF   3  LAST  554   36,2240   02625 1                    HP
 2198   REF   2  LAST   94   36,2241   16631 1           STODL    HPD
 2199   REF   3  LAST  554   36,2242   02623 1                    DELVEE
 2200   REF   2  LAST   94   36,2243   16633 0           STODL    DELVED
R2201   PREPARE FOR LAMBERT
 2202   REF  13  LAST  554   36,2244   03663 1                    TTPI
 2203   REF   8  LAST  528   36,2245   17503 1           STODL    INTIME
 220305 REF   5  LAST  554   36,2246   03746 1                    XRS
 22031  REF   8  LAST  499   36,2247   17746 1           STODL    RTX1
 220313 REF   4  LAST  540   36,2250   15335 0                    HI6ZEROS
 220315                      36,2251   65201 1           SETPD    PDDL
 22032                       36,2252   00001 0                    OD
 220325 REF   2  LAST  475   36,2253   33122 0                    EPSFOUR
 22033                       36,2254   77715 1           PDVL
 220335 REF  22  LAST  553   36,2255   03540 0                    RACT3
 22034  REF  10  LAST  493   36,2256   27570 0           STOVL    RINIT
 220345 REF   9  LAST  498   36,2257   03546 0                    VACT3
 22035  REF   9  LAST  493   36,2260   37576 1           STCALL   VINIT
 2207   REF   2  LAST  476   36,2261   22000 1                    INITVEL
R2208   COMPUTE H ET CETERA
 2209                        36,2262   52375 1           VLOAD    VSU
 2210   REF   8  LAST  529   36,2263   03620 0                    VTPRIME
 2211   REF   6  LAST  555   36,2264   03640 0                    VPASS4
 2212                        36,2265   41446 1           ABVAL    PUSH
 2213   REF   2  LAST   94   36,2266   26637 1           STOVL    RELDELV        /V2-VP(TPI+TF)/
 2214   REF  13  LAST  529   36,2267   03646 0                    DELVFET3       V1-VA
 2215                        36,2270   77646 0           ABVAL                   /V1-VA/
 2216   REF   2  LAST   94   36,2271   02635 0           STORE    MAGVTPI
 2217                        36,2272   45415 0           DAD      STADR
 2218   REF   4  LAST  555   36,2273   61154 0           STODL    DELVEE
 2219   REF   6  LAST  555   36,2274   03746 1                    XRS
 2220   REF  10  LAST  553   36,2275   24047 1           STOVL    X1
 2221   REF  10  LAST  529   36,2276   03612 1                    V1PRIME
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 2222                          36,2277   77657 0           VSR*
 2223                          36,2300   57176 0                 0,2
 2224  REF   7  LAST  553      36,2301   26746 0           STOVL VVEC
 2225  REF  23  LAST  555      36,2302   03540 0                  RACT3
 2226                          36,2303   77657 0           VSR*
 2227                          36,2304   57176 0                 0,2
 2228  REF   5  LAST  553      36,2305   36657 0           STCALL RVEC
 2229  REF   1                 36,2306   45163 1                 PERIAPO
 2230                          36,2307   71354 0           LXA,2 DLOAD
 2231  REF   7  LAST  555      36,2310   03746 1                 XRS +1
 2232                          36,2311   77657 0           SL*
 2233                          36,2312   57576 1                 0,2
 2234  REF   4  LAST  555      36,2313   02625 1           STORE HP
R2235  ITSWICH DENOTES INTERPOLATION--SOLUTION ACCEPTANCE IS FORCED
 2236                          36,2314   71214 0           BON   DLOAD
 2237  REF   6  LAST  554      36,2315   03701 1                 ITSWICH
 2238  REF   1                 36,2316   74427 0                 ENDEN
 2239  REF   7  LAST  523      36,2317   02321 0                 HPERMIN
 2240                          36,2320   50025 0           DSU   BMN
 2241  REF   5  LAST  556      36,2321   02625 1                 HP
 2242  REF   1                 36,2322   74365 1                 HALFSAFE
 2243                          36,2323   45325 1           PDDL  DSU             WAS PERICENTER ALT SAFE
 2244  REF   8  LAST  556      36,2324   02321 0                 HPERMIN
 2245  REF   3  LAST  555      36,2325   02631 1                 HPD
 2246                          36,2326   45240 0           BMN   DSU             (HPLIM-HPD)-(HPLIM-HP)=HP-HPD
 2247  REF   1                 36,2327   74344 1                 INTERP          SOLUTION AT HAND
 2248                          36,2330   71240 1           BMN   DLOAD
 2249  REF   1                 36,2331   73254 0                 ALARUMS         ITS GETTING WORSE - SOUND THE ALARM
 2250  REF   1                 36,2332   33130 0                 CDSEC
 2251                          36,2333   57414 1 JUNCT1    BOFF  DCOMP           OFF IS PLUS ON IS MINUS
 2252  REF   5  LAST  554      36,2334   00356 1                 KFLAG
 2253                          36,2335   74336 1                 +1
 2254  REF   2  LAST  126      36,2336   03744 0           STORE DELTEE
 2255                          36,2337   43345 1 JUNCT2    DLOAD DAD
 2256  REF   3  LAST  556      36,2340   03744 0                 DELTEE
 2257  REF   6  LAST  555      36,2341   03752 1                 TF
 2258  REF   7  LAST  556      36,2342   37752 0           STCALL TF
 2259  REF   1                 36,2343   74173 1                 BIS             RECYCLE
 2260                          36,2344   45214 1 INTERP    SET   DSU             HP=HPD
 2261  REF   7  LAST  556      36,2345   03461 1                 ITSWICH
 2262                          36,2346   65301 0           NORM  PDDL
 2263  REF  11  LAST  555      36,2347   00047 1                 X1
 2264  REF   1                 36,2350   33146 1                 DFTMOON
 2265                          36,2351   45215 0           DAD   DSU
 2266  REF   9  LAST  556      36,2352   02321 0                 HPERMIN
 2267  REF   6  LAST  556      36,2353   02625 1                 HP
 2268                          36,2354   70501 1           NORM  SR1
 2269  REF   7  LAST  517      36,2355   00050 1                 X2
 2270                          36,2356   56264 1           XSU,2 DDV
 2271  REF  12  LAST  556      36,2357   00046 0                 X1
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 2272                          36,2360   53605 1           DMP     SR*
 2273   REF   4  LAST  556     36,2361   03744 0                   DELTEE
 2274                          36,2362   57177 1                   0 -1,2
 2275   REF   5  LAST  557     36,2363   37744 1           STCALL  DELTEE
 2276   REF   1                36,2364   74337 0                   JUNCT2
 2277                          36,2365   45325 1  HALFSAFE PDDL    DSU             SAVE HP-HPLIM FOR POSSIBLE
 2278   REF   5  LAST  555     36,2366   02623 1                   DELVEE
 2279   REF   3  LAST  555     36,2367   02633 0                   DELVEO          SAVE THIS TOO
 2280                          36,2370   51406 1           PUSH    ABS
 2281                          36,2371   50025 0           DSU     BMN
 2282   REF   1                36,2372   33144 0                   LIMVEL          2 FT PS
 2283   REF   2  LAST  556     36,2373   74427 0                   ENDEN
 2284                          36,2374   45345 1           DLOAD   DSU
 2285   REF  10  LAST  556     36,2375   02321 0                   HPERMIN
 2286   REF   4  LAST  556     36,2376   02631 1                   HPD
 2287                          36,2377   77725 1           PDDL
 2288                          36,2400   71240 1           BMN     DLOAD
 2289   REF   1                36,2401   74410 1                   LRGRDVO
 2290                          36,2402   71244 0           BPL     DLOAD
 2291   REF   2  LAST  556     36,2403   74344 1                   INTERP
 2292   REF   6  LAST  557     36,2404   03744 0                   DELTEE
 2293                          36,2405   57542 0           SR1     DCOMP
 2294   REF   7  LAST  557     36,2406   37744 1           STCALL  DELTEE
 2295   REF   2  LAST  557     36,2407   74337 0                   JUNCT2
 2296                          36,2410   77745 1  LRGRDVO  DLOAD
 2297                          36,2411   71240 1           BMN     DLOAD
 2298   REF   3  LAST  557     36,2412   74337 0                   JUNCT2
 2299   REF   1                36,2413   33132 1                   CLSEC
 2300                          36,2414   77650 1           GOTO
 2301   REF   1                36,2415   74333 1                   JUNCT1
R2302   TIME RAN OUT ASSUME SOLUTION IF SAFE PERICENTER
 2303                          36,2416   45345 1  RNGETEST DLOAD   DSU
 2304   REF   7  LAST  556     36,2417   02625 1                   HP
 2305   REF  11  LAST  557     36,2420   02321 0                   HPERMIN
 2306                          36,2421   71240 1           BMN     DLOAD
 2307   REF   2  LAST  556     36,2422   73254 0                   ALARUMS
 2308   REF   8  LAST  556     36,2423   03752 1                   TF
 2309                          36,2424   77625 0           DSU
 2310   REF   8  LAST  557     36,2425   03744 0                   DELTEE
 2311   REF   9  LAST  557     36,2426   03752 1           STORE   TF              TIME OF SOLUTION
 2312                          36,2427   77775 1  ENDEN    VLOAD
 2313   REF   9  LAST  555     36,2430   03620 0                   VTPRIME
 2314                          36,2431   65241 0           DOT     PDDL            SG2 WITH MAGNITUDE
 2315   REF   3  LAST  555     36,2432   03632 0                   RPASS4
 2316   REF   3  LAST  555     36,2433   02637 1                   RELDELV
 2317                          36,2434   45565 0           SIGN    STADR           NOW SIGN(RELDELV)=SIGN(SG2)
 2318   REF   4  LAST  557     36,2435   41140 1           STCALL  RELDELV
 23180  REF   1                36,2436   16441 1                   TRANSANG        COMPUTE OMEGA T , CENTRAL ANGLE
 23181                         36,2437   50375 0           VLOAD   DOT
 2319   REF  24  LAST  556     36,2440   03540 0                   RACT3
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 2320   REF  11  LAST  555   36,2441   03612 1                VIPRIME         SG1
 2321                        36,2442   51165 1          SIGN  BPL             IF POSITIVE THEN SG1 = SG2 OTHERWISE
 2322   REF   5  LAST  557   36,2443   02637 1                RELDELV
 2323   REF   1              36,2444   74454 1                USEKAY          SIGN(SG2-SG1)=SIGN(SG2)=SIGN(RELDELV)
 2324                        36,2445   57535 0          SLOAD DCOMP
 2325   REF   1              36,2446   33117 0                DECTWO
 2326                        36,2447   51165 1          SIGN  BPL
 2327   REF   6  LAST  558   36,2450   02637 1                RELDELV
 2328   REF   1              36,2451   74462 1                NEXUS
 232805                      36,2452   52076 1          DCOMP GOTO
 23281  REF   2  LAST  558   36,2453   74460 0                USEKAY +4
 2329                        36,2454   43135 1  USEKAY  SLOAD BON
 2330   REF   2  LAST  558   36,2455   33117 0                DECTWO
 2331   REF   6  LAST  556   36,2456   00316 0                KFLAG
 2332   REF   2  LAST  558   36,2457   74462 1                NEXUS
 2333                        36,2460   77625 0          DSU
 2334   REF   1              36,2461   36150 0                P21ONENN
 2335   REF   2  LAST  280   36,2462   17766 0  NEXUS   STODL NN1
 233505 REF   8  LAST  557   36,2463   02625 1                HP
 2336   REF   4  LAST  529   36,2464   36641 1          STCALL POSTTPI
 2337   REF   3  LAST  553   36,2465   03657 0                QTEMP
 23371                       07,2441                    BANK  07
 23372  REF   1              07,2000                    SETLOC XANG
 23373                       07,2441                    BANK
 23374  REF   1                                         COUNT 07/XANG

R2338   CENTRAL ANGLE SUBROUTINE
R2339         THIS SUBROUTINE COMPUTES THE CENTRAL ANGLE OF TRAVEL OF THE
R2340   PASSIVE VEHICLE DURING THE TRANSFER.

 2341                        07,2441   40220 0  TRANSANG STQ   SETPD
 2342   REF  19  LAST  528   07,2442   02370 1                SUBEXIT
 2343                        07,2443   00001 0                0
 2344                        07,2444   73150 1          LXA,1 LXA,2
 2345   REF   8  LAST  556   07,2445   03745 1                XRS
 2346   REF   9  LAST  558   07,2446   03746 1                XRS +1
 2347                        07,2447   53775 1          VLOAD VSR*
 2348   REF   7  LAST  555   07,2450   03640 0                VPASS4
 2349                        07,2451   57176 0                0,2
 2350   REF   8  LAST  556   07,2452   22746 1          STODL* VVEC
 2351   REF   3  LAST  494   07,2453   11742 0                 MUTABLE +2,1
 2352                        07,2454   53715 1          PDVL  VSR*            SQRT MU  (+18 OR +15)          00D
 2353   REF   4  LAST  557   07,2455   03632 0                RPASS4
 2354                        07,2456   57176 0                0,2
 2355                        07,2457   64646 1          ABVAL PDDL*           MAGNITUDE OF R  (+29 OR +27)   02D
 2356   REF   4  LAST  558   07,2460   11740 1                 MUTABLE,1
 2357                        07,2461   47515 0          PDVL  VSD             1/MU  (+34 OR +28)             04D
 2358   REF   9  LAST  559   07,2462   02746 0                VVEC
 2359                        07,2463   57301 1          NORM  DMPR            PUSH LIST AT 02D
 2360   REF  13  LAST  556   07,2464   00047 1                X1
```

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2361                          07,2465   53605 1          DMP     SRR*
2362                          07,2466   00003 1                  02D
2363                          07,2467   21576 0                  0 -3,1
2364                          07,2470   77621 1          BDSU                    R V**/MU  (+6)
2365   REF   1                07,2471   11616 0                  01/32
2366                          07,2472   65301 0          NORM    PDDL
2367   REF  14  LAST  558     07,2473   00047 1                  X1              (2 - R V**/MU)     (+6-N)
2368                          07,2474   56362 0          SR1R    DDV             MAGNITUDE OF R     (+30 OR +28)
2369                          07,2475   41457 1          SL*     PUSH            R/(2 - R V**/MU)   (+29 OR +27)02D
2370                          07,2476   20174 1                  0 -5,1
2371                          07,2477   75542 0          SR1     SQRT
2372                          07,2500   77605 1          DMP
2373                          07,2501   65301 0          NORM    PDDL            ASUBP***                      00D
2374   REF  15  LAST  559     07,2502   00047 1                  X1
2375                          07,2503   56342 1          SR1     DDV
2376                          07,2504   53605 1          DMP     SL*
2377   REF  10  LAST  557     07,2505   03752 1                  TF
2378                          07,2506   20201 0                  0,1
237805                        07,2507   60325 0          PDDL    NORM
23781  REF   1                07,2510   11630 1                  2PISC
237815 REF  16  LAST  559     07,2511   00047 1                  X1
23782                         07,2512   56325 0          PDDL    DDV
237825                        07,2513   77657 0          SL*
23783                         07,2514   20176 0                  0 -3,1          CENTANG = (SQRT(MU/ASUP***)TF)
2379   REF   7  LAST  531     07,2515   37754 0          STCALL  CENTANG         IN REVOLUTIONS B-0
2380   REF  20  LAST  558     07,2516   02370 1                  SUBEXIT
2381                          35,3151                    BANK    35
2382   REF   2  LAST  551     35,2000                    SETLOC  P17S1
2383                          35,3151                    BANK
23835  REF   1                                          COUNT   35/P17

R2384  TPI SEARCH DISPLAY ROUTINE

2385   REF   5  LAST  530     35,3151  0 4627 0  P17     TC      AVFLAGA         AVFLAG = CSM , SET TRACK + UPDATE FLAGS
2386   REF   1                35,3152  0 3154 1  P17.1   TC      P17.1
2387   REF   5  LAST  530     35,3153  0 4642 0  P77     TC      AVFLAGP         AVFLAG = LEM , SET TRACK + UPDATE FLAGS
2388   REF   5  LAST  530     35,3154  0 4647 0  P17.1   TC      P20FLGON         SET UPDATE FLAG
238805 REF   3  LAST  464     35,3155  3 4614 0           CAF     V06N37           DISPLAY TTPI TIME
2389   REF   6  LAST  480     35,3156  0 4575 1           TC      VNPOOH
2390   REF  73  LAST  547     35,3157  0 6006 1           TC      INTPRET
2391                          35,3160   45014 0           CLEAR   CALL
2392   REF   8  LAST  529     35,3161   00670 0                   UPDATFLG
2393   REF   1                35,3162   74012 1                   S17.1           UPDATE STATE VECTORS TO TTPI
2394                          35,3163   76014 0           SET     AXT,1
2395   REF   9  LAST  559     35,3164   00470 1                   UPDATFLG
2396                          35,3165   00002 0           DEC     2               DELTA H = 2  K POSITIVE , KFLAG OFF
2397                          35,3166   76014 0           BOFF    AXT,1
2398   REF   7  LAST  558     35,3167   00356 1                   KFLAG
2399                          35,3170   73172 1                   +2
2400                          35,3171   00001 0           DEC     1               DELTA H = 1  K NEGATIVE , KFLAG ON
```

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2401                                35,3172   77530 1            SXA,1  EXIT
2402   REF   6  LAST  527           35,3173   01132 0                   OPTION2
2403   REF   1                      35,3174  3 3263 0            CAF    V06N72          DISPLAY PHI , DELTA H , SEARCH OPTION K
2404   REF   1                      35,3175  0 3237 1            TC     VNCOMP17
2405   REF  74  LAST  559           35,3176  0 6006 1            TC     INTPRET
2406                                35,3177   43014 0            CLEAR  SET
2407   REF  10  LAST  559           35,3200   00670 0                   UPDATFLG
2408   REF   8  LAST  559           35,3201   00076 0                   KFLAG
2409                                35,3202   45335 0            SLOAD  DSU
2410   REF   7  LAST  560           35,3203   01133 1                   OPTION2         RESET KFLAG ON FOR OPTION =1
2411   REF   2  LAST  558           35,3204   36150 0                   P21ONENN                    OFF FOR OPTION =2
2412                                35,3205   43030 0            BHIZ   CLEAR
2413                                35,3206   73210 0                   +2
2414   REF   9  LAST  560           35,3207   00276 1                   KFLAG
2415                                35,3210   46135 1            SLOAD  BHIZ
2416   REF  10  LAST  558           35,3211   03747 0                   X*S +1
2417                                35,3212   73216 0                   +4
2418                                35,3213   52145 0            DLOAD  GOTO
2419   REF   1                      35,3214   33126 1                   HPL
2420   REF   1                      35,3215   73220 0                   P17.2
2421                                35,3216   77745 1            DLOAD
2422   REF   1                      35,3217   33124 0                   HPE
2423   REF  12  LAST  557           35,3220   38321 1  P17.2     STCALL HPERMIN
2424   REF   1                      35,3221   74070 0                   S17.2
2425                                35,3222   77414 0            SET    EXIT
2426   REF  11  LAST  560           35,3223   00470 1                   UPDATFLG
2427   REF   2  LAST  465           35,3224  3 4616 1  P17.3     CAF    V06N58          DISPLAY DELTA VTPI , DELTA VTPF , AND H
2428   REF   2  LAST  560           35,3225  0 3237 1            TC     VNCOMP17
2429   REF   2  LAST  483           35,3226  3 4615 1            CAF    V06N55          DISPLAY PERICENTER CODE AND CENTRAL ANG.
2430   REF 116  LAST  546           35,3227  0 4662 1            TC     BANKCALL
2431   REF   4  LAST  527           35,3230   21057 0            CADR   GOFLASHR
2432   REF  16  LAST  532           35,3231  0 4106 1            TC     GOTOPOOH        TERMINATE PROGRAM
2433   REF  17  LAST  560           35,3232  0 4106 1            TC     GOTOPOOH        END PROGRAM
2434   REF   2  LAST  559           35,3233  0 3154 1            TC     P17.1           RECYCLE WITH NEW TTPI OR SEARCH OPTION
2435   REF  31  LAST  515           35,3234  3 5016 0            CAF    TWO             BLANK R2
2436   REF   4  LAST  527           35,3235  0 5526 0            TC     BLANKET
2437   REF  64  LAST  542           35,3236  1 5217 1            TCF    ENDOFJOB
24375  REF  13  LAST  532           E4,1767                      EBANK= RTRN

2438                                35,3237  0 0006 1  VNCOMP17 EXTEND
2439   REF   4  LAST  482           35,3240  23'766 1            QXCH   QSAVED
2440   REF   6  LAST  532           35,3241  55'765 0            TS     VERBNOUN
2441   REF   7  LAST  560           35,3242  3 1765 1            CA     VERBNOUN
2442   REF 117  LAST  560           35,3243  0 4662 1            TCR    BANKCALL
2443   REF  17  LAST  532           35,3244   20720 0            CADR   GOFLASH
2444                                35,3245  0 3242 0            TC     -3              TERMINATE ILLEGAL REDISPLAY
2445   REF   5  LAST  560           35,3246  0 1765 1            TC     QSAVED          PROCEED
2446   REF 248  LAST  547           35,3247  4 0154 0            CS     MPAC            RECYCLE WITH NEW TPI TIME
244605 REF  30  LAST  492           35,3250  6 5012 1            AD     BIT6            OR PROCEED WITH NEW SEARCH OPTION
24461                               35,3251  0 0006 1            EXTEND
```

L TPI SEARCH USER'S PAGE NO. 11 E4 S3

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244615 REF   3  LAST  560   35,3252  1 3154 0           BZF    P17.1
24462  REF   3  LAST  560   35,3253  0 3242 0           TC     VNCOMP17 +3
2447                       35,3254   77414 0  ALARUMS  SET    EXIT
2448   REF  12  LAST  560   35,3255   00470 1           UPDATFLG
2449   REF  25  LAST  464   35,3256  0 5650 1           TC     ALARM
2450                       35,3257   00124 0           OCT    00124          NO SAFE PERCENTER IN THIS SECTOR
2451   REF   2  LAST  464   35,3260  3 5050 1           CAF    V05N09
2452   REF   4  LAST  561   35,3261  0 3237 1           TC     VNCOMP17
2453   REF  18  LAST  560   35,3262  0 4106 1           TC     GOTOPOOH       PROCEED ILLEGAL TERMINATE PROGRAM
2454                       35,3263   01510 1  V06N72   VN     0672
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P0001   RENDEZVOUS NAVIGATION PROGRAM 20
R0002   PROGRAM DESCRIPTION
R0003   MOD NO -1
R0004   MOD BY - N.BRODEUR
R0005   FUNCTIONAL DESCRIPTION
R0006
R0007   TO CONTROL THE CSM ATTITUDE AND OPTICS TO ACQUIRE THE LEM IN THE S+T
R0008   FIELD AND TO POINT THE CSM TRANSPONDER AT THE LEM. TO UPDATE EITHER THE
R0009   LEM OR CSM STATE VECTOR (AS SPECIFIED BY THE ASTRONAUT BY THE DSKY
R0010   ENTRY) ON THE BASIS OF OPTICAL TRACKING DATA (REQUESTED BY DSKY)
R0011   CALLING SEQUENCE -
R0012
R0013   ASTRONAUT REQUEST THROUGH DSKY V37E20E
R0014   SUBROUTINES CALLED-
R0015     R02BOTH (IMU STATUS CHECK)              BANKCALL
R0016     FLAGUP              2PHSCHNG            LOADTIME
R0017     R61CSM  (PREFERRED TRACKING ATTITUDE)   FLAGDOWN
R0018     R52     (AUTO OPTICS POSITIONING ROUT)  SETINTG
R00181    R22     (REND TRACK DATA PROC ROUT)     PRIOCHNG
R0019     ENDOFJOB            INTEGRV             GRP2PC
R0020     INTPRET             MKRLEES             FINDVAC
R0021   NORMAL EXIT MODES-
R0022     P20 MAY BE TERMINATED IN TWO WAYS-ASTRONAUT SELECTION OF IDLING
R0023   PROGRAM (P00) BY KEYING V37E00E OR BY KEYING IN V56E
R0024   ALARM OR ABORT EXIT MODES-
R0025     NONE DIRECTLY FROM P20
R0026   OUTPUT
R0027     TRKMKCNT = NO OF RENDEZVOUS TRACKING MARKS TAKEN (COUNTER)
R0028     VHFCNT = NO OF VHF RANGING MARKS INCORPORATED (COUNTER)
R0029   FLAGS SET + RESET
R0030     RNDVZFLG,VEHUPFLG,UPDATFLG,TRACKFLG,TARG1FLG
R0031     HOLDFLAG,WBODY,WBODY1,WBODY2,DELCDUX,DELCDUY,DELCDUZ
R0032     STIKFLAG,PRFTRKAT,VINTFLAG,DIMOFLAG,R60FLAG,R61CNTR
 0033                        33,3776                 BANK   33
 0034   REF   2  LAST  457   37,2000                 SETLOC P20S
 0035                        37,2261                 BANK

 0036   REF   4  LAST  212   E6,1413                 EBANK= ESTROKER
 0037   REF   1                                     COUNT* $$/P20

 0038   REF 118  LAST  560   37,2261  0 4662 1  PROG20   TC     BANKCALL
 0039   REF   1              37,2262   17653 1           CADR   R02BOTH      IMU STATUS CHECK
A0040                                                                       BLOCKING OF UPLINK IS DONE BY UPLINK PRG
 0041   REF 120  LAST  546   37,2263  3 5021 1          CAF    ZERO
 0042   REF   3  LAST  184   37,2264  55'126 1          TS     TRKMKCNT     ZERO REND TRACKING MARK COUNTER
 0043   REF   5  LAST  513   37,2265  55'125 1          TS     VHFCNT       ZERO REND VHF RNG MRK COUNTER
 0044   REF  21  LAST  536   37,2266  0 5546 0          TC     UPFLAG       SET PREF TRACK ATT FLAG
 0045   REF   3  LAST  263   37,2267   00120 1          ADRES  PRFTRKAT     BIT 10  FLAG 5
 0046   REF  24  LAST  451   37,2270  0 5560 1          TC     DOWNFLAG     LEM TO BE UPDATED.  VEHUPFLG RESET.
 0047   REF   3  LAST  260   37,2271   00026 0          ADRES  VEHUPFLG     BIT 8  FLAG 1
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0050   REF  22  LAST  562   37,2272  0 5546 0          TC      UPFLAG          SET TRACKFLAG
0051   REF   3  LAST  511   37,2273   00031 0          ADRES   TRACKFLG        BIT 5  FLAG 1
0052   REF  23  LAST  563   37,2274  0 5546 0          TC      UPFLAG          SET UPDATFLG
0053   REF  13  LAST  561   37,2275   00027 1          ADRES   UPDATFLG        BIT 7  FLAG 1
0054   REF  24  LAST  563   37,2276  0 5546 0          TC      UPFLAG          SET RNDVZFLG
0055   REF   2  LAST  259   37,2277   00010 0          ADRES   RNDVZFLG        BIT 7  FLAG 0
0056   REF   5  LAST  539   37,2300  0 5372 1          TC      2PHSCHNG
0057                        37,2301   00004 0          OCT     00004
0058                        37,2302   05022 1          OCT     05022
0059                        37,2303   26000 0          OCT     26000
0060   REF  75  LAST  560   37,2304  0 6006 1          TC      INTPRET
0061                        37,2305   77634 0          RTB
0062   REF  10  LAST  530   37,2306   45510 1                  LOADTIME
0063   REF   2  LAST   80   37,2307   35225 1          STCALL  MARKTIME
0064   REF   1              37,2310   56343 0                  SETINTG         SET INTEGRATION FLAGS
0065                        37,2311   43014 0          BOFF    SET
0066   REF   3  LAST  262   37,2312   02756 1                  RENDWFLG
0067   REF   1              37,2313   76315 1                  P20.1
0068   REF   5  LAST  458   37,2314   01476 0                  DIMOFLAG        SET TO INTEGRATE THE W MATRIX
0069                        37,2315   43014 0  P20.1   BON     CLEAR
0070   REF   4  LAST  562   37,2316   00707 1                  VEHUPFLG
0071   REF   1              37,2317   76321 0                  P20.2
0072   REF   6  LAST  457   37,2320   01674 0                  VINTFLAG        SET FOR LM INTEGRATION
0073                        37,2321   77624 1  P20.2   CALL
0074   REF   4  LAST  457   37,2322   27162 1                  INTEGRV
0075                        37,2323   77624 1          CALL
0076   REF   1              37,2324   56750 0                  GRP2PC          GROUP 2 PHASE CHANGE
0077                        37,2325   77624 1          CALL
0078   REF   2  LAST  563   37,2326   56343 0                  SETINTG         SET INTEGRATION FLAGS
0079                        37,2327   43014 0          BOFF    CLEAR
0080   REF   5  LAST  563   37,2330   00747 0                  VEHUPFLG
0081   REF   1              37,2331   76333 0                  P20.3
0082   REF   7  LAST  563   37,2332   01674 0                  VINTFLAG        SET FOR LM INTEGRATION
0083                        37,2333   77624 1  P20.3   CALL
0084   REF   5  LAST  563   37,2334   27162 1                  INTEGRV
0085                        37,2335   77776 1          EXIT
0086   REF   2  LAST  417   37,2336  3 7663 0          CAF     PRIO26
0088   REF  20  LAST  540   37,2337  0 5147 0          TC      FINDVAC
0089   REF   7  LAST  513   E7,1734                    EBANK=  MRKBUF2
0090   REF   2  LAST  213   37,2340   02630 0          2CADR   R22
0090                        37,2341   70067 1
0092   REF   6  LAST  563   37,2342  0 5372 1          TC      2PHSCHNG
0093                        37,2343   00072 1          OCT     00072
0094                        37,2344   00111 0          OCT     00111
0095   REF   2  LAST  392   37,2345  3 5066 1  PIKUP20 CAF     PRIO14          ALLOW HIGHER PRIO THAN LAMBERT
0096   REF   5  LAST  447   37,2346  0 5210 1          TC      PRIOCHNG
0097   REF  25  LAST  520   37,2347  3 5013 0          CAF     BIT5            IS TRACK FLAG SET
0098   REF  33  LAST  230   37,2350  7 0075 1          MASK    STATE +1
0099                        37,2351  0 0006 1          EXTEND
0100   REF  69  LAST  560   37,2352  1 5217 1          BZF     ENDOFJOB        NO
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0101  REF  21  LAST  341   37,2353  3 5003 1          CAF     BIT13
0102  REF  34  LAST  563   37,2354  7 0077 0          MASK    STATE +3        IS REFSMFLG SET
0103                       37,2355  0 0006 1          EXTEND
0104  REF  66  LAST  563   37,2356  1 5217 1          BZF     ENDOFJOB
0107  REF 121  LAST  562   37,2357  3 5021 1          CAF     ZERO
0108  REF   2  LAST  116   37,2360  55'775 1          TS      R61CNTR         INITIALIZE R61 COUNTER
0113  REF 119  LAST  562   37,2361  0 4662 1          TC      BANKCALL
0114  REF   1              37,2362   76557 1          CADR    R61CSM
0117  REF   2  LAST  101   E5,1777                    EBANK=  QMIN
0118  REF   2  LAST  242   37,2363  3 5056 1          CAF     EBANK5
0119  REF  25  LAST  538   37,2364  54 003 0          TS      EBANK
01191 REF  25  LAST  563   37,2365  0 5546 0          TC      UPFLAG          SET TARGET FLAG TO LEM
01192 REF   2  LAST  391   37,2366   00024 1          ADRES   TARG1FLG        BIT 10  FLAG 1
0120  REF  76  LAST  563   37,2367  0 6006 1  P20R52JB TC      INTPRET
0121                       37,2370   77624 1          CALL
0122  REF   1              37,2371   30011 1                  R52             SET UP AUTO OPTICS JOB
0123                       37,2372   77776 1          EXIT
0124  REF 120  LAST  564   37,2373  0 4662 1          TC      BANKCALL
0125  REF   1              37,2374   16071 0          CADR    MKRLEES
0126  REF  67  LAST  539   37,2375  3 5017 1          CAF     ONE             HOLD PRESENT ATTITUDE
0127  REF   4  LAST  416   37,2376  55'332 0          TS      HOLDFLAG
0128  REF  67  LAST  564   37,2377  0 5217 0          TC      ENDOFJOB
0129                       37,2400   00203 0  OCT203   OCT     00203
0130  REF   1              7707                       FIRST3  EQUALS FURST3
```

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P0131   ORBITAL NAVIGATION PROGRAM 22
 0132                           31,2332                          BANK   31
 0133   REF   1                 30,2000                          SETLOC P20S1
 0134                           30,2000                          BANK

 0135   REF  12  LAST  281      E5,1751                          EBANK= LANDMARK
 0136   REF   1                                                  COUNT* $$/P22

 0139   REF  25  LAST  562      30,2000  0 5560 1  PROG22       TC     DOWNFLAG        RESET RNDVZFLG  BIT 7  FLAG 0
 01394  REF   3  LAST  563      30,2001   00010 0                 ADRES  RNDVZFLG
 01396  REF 121  LAST  564      30,2002  0 4662 1                 TC     BANKCALL
 0140   REF   2  LAST  562      30,2003   17653 1                 CADR   R02BOTH         IMU STATUS CHECK
 0141   REF  77  LAST  564      30,2004  0 6006 1                 TC     INTPRET         COMPUTE ANGLE BETWEEN Y AND VXR SM
 0142                           30,2005   77634 0                 RTB
 0143   REF  11  LAST  563      30,2006   45510 1                        LOADTIME
 0145   REF  26  LAST  555      30,2007   34041 0                 STCALL TDEC1
 0146   REF   3  LAST  555      30,2010   27114 0                        CSMCONIC        INTEGRATE TO PRESENT TIME
 0147                           30,2011   47375 0                 VLOAD  VXV             CROSS PRODUCT BETWEEN V AND R
 0148   REF  14  LAST  555      30,2012   00007 0                        VATT
 0149   REF  17  LAST  555      30,2013   00001 0                        RATT
 0150                           30,2014   50256 0                 UNIT   DOT
 0151   REF  13  LAST  538      30,2015   01744 1                        REFSMMAT +6
 0152                           30,2016   77646 0                 ABS
 0153                           30,2017   65552 0                 SL1    ARCCOS
 0154   REF   7  LAST  493      30,2020   03626 0                 STORE  +MGA
 0155                           30,2021   77414 0                 CLEAR  EXIT
 0156   REF   4  LAST  563      30,2022   02676 1                        RENDWFLG
 0157   REF   1                 30,2023  3 2114 1                 CAF    V06N45B
 0158   REF 122  LAST  565      30,2024  0 4662 1                 TC     BANKCALL
 0159   REF   5  LAST  560      30,2025   21057 0                 CADR   GOFLASHR
 0160   REF  19  LAST  561      30,2026  0 4105 1                 TC     GOTOPOOH        TERM P22
 0161   REF   1                 30,2027  0 2034 1                 TC     PROG22A         PROC
 0162                           30,2030  0 2023 1                 TC     -5              ENTER
 0163   REF  19  LAST  540      30,2031  3 6214 0                 CAF    THREE
 0164   REF   5  LAST  560      30,2032  0 5526 0                 TC     BLANKET         BLANK OUT R1 + R2
 0165   REF  68  LAST  564      30,2033  0 5217 0                 TC     ENDOFJOB
 0166   REF   7  LAST  519      30,2034  4 5063 0  PROG22A       CS     PRIO7           RESULT=70777  SET OFFSET NO.=0
 01661  REF  13  LAST  565      30,2035  7 1751 1                 MASK   LANDMARK
 01662  REF  14  LAST  565      30,2036  55'751 1                 TS     LANDMARK
 01663  REF  78  LAST  565      30,2037  0 6006 1                 TC     INTPRET
 01664                          30,2040   77614 1                 CLEAR
 01665  REF   1                 30,2041   01664 1                        P22MKFLG
 0167                           30,2042   43014 0                 SET    BOFF
 0168   REF   3  LAST  537      30,2043   00462 1                        ERADFLAG
 0169   REF   5  LAST  494      30,2044   04343 1                        CMOONFLG
 0170   REF   1                 30,2045   60055 1                        PROG22B         EARTH
 0171                           30,2046   77614 1                 SET                    MOON
 0172   REF   3  LAST  458      30,2047   01463 1                        LUNAFLAG
 0174                           30,2050   45145 0                 DLOAD  CALL            MPAC=V05N70,MPAC+1=NONZERO FOR N70
 0178   REF   1                 30,2051   20116 0                        V05N7022
```

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0179   REF   1                30,2052   60175 1                    S22N7071
0196                          30,2053   77650 1           GOTO
0197   REF   1                30,2054   60062 0                    CALLR52
0202                          30,2055   43014 0  PROG22B  CLEAR    SET             EARTH ORBIT
0203   REF   4  LAST  565     30,2056   01663 0                    LUNAFLAG
0204   REF   2  LAST   58     30,2057   03067 0                    KNOWNFLG
0205                          30,2060   77624 1           CALL                     GET LAT/LONG/ALT FROM ASTRO
0206   REF   1                30,2061   60143 1                    P22SUBR8
0207                          30,2062   77776 1  CALLR52  EXIT
02111  REF   7  LAST  563     30,2063   0 5372 1          TC       2PHSCHNG
02112                         30,2064    00004 0          OCT      00004
02113                         30,2065    05022 1          OCT      05022
02114                         30,2066    13000 0          OCT      13000
0212   REF  10  LAST  526     30,2067   3 5022 1          CAF      FIVE
0213   REF   3  LAST  208     30,2070   54 301 1          TS       MARKINDX        SET MARK INDEX=5 FOR R52
02131  REF  26  LAST  564     30,2071   0 5546 0          TC       UPFLAG
02132  REF   1                30,2072    00025 0          ADRES    TARG2FLG        SET FOR SIGHTING LMK
02133  REF  26  LAST  565     30,2073   0 5560 1          TC       DOWNFLAG
02134  REF   3  LAST  564     30,2074    00024 1          ADRES    TARG1FLG        CLEAR FOR NON-LEM
0217   REF  79  LAST  565     30,2075   0 6006 1          TC       INTPRET
0218                          30,2076   77624 1           CALL
0219   REF   2  LAST  564     30,2077   30011 1                    R52
0220                          30,2100   45135 1  DOV5N71  SLOAD    CALL            MPAC=V05N71,MPAC+1=0 FOR N71
0221   REF   1                30,2101   20117 1                    V05N7122
0222   REF   2  LAST  566     30,2102   60175 1                    S22N7071
0235                          30,2103   66744 0  PROG22C  LXC,2    SLOAD*
0235   REF  29  LAST  454     30,2104   01330 0                    MARKSTAT
0237   REF  10  LAST  513     30,2105   77724 0                    QPRET,2
0238   REF   3  LAST  179     30,2106   36750 0           STCALL   3NN
0240   REF   1                30,2107   60312 1                    S22.1           ESTABLISH LANDMARK - COMPUTE ORBITAL
0241                          30,2110   77776 1  P22OVER  EXIT
02411  REF  27  LAST  540     30,2111   0 5412 0          TC       PHASCHNG
02412                         30,2112    04022 0          OCT      04022
0242   REF   2  LAST  565     30,2113   0 2034 1          TC       PROG22A         POINT A ON GSOP
0243                          30,2114    01455 1  V06N45B  VN       0645
0244                          30,2115    01306 0  V05N7022 VN       00570
0245                          30,2116    01307 1  V05N7122 VN       00571
02505  REF   3  LAST  562     37,2000                     SETLOC   P20S
02506                         37,2401                     BANK

02715  REF   2  LAST  565     30,2000                     SETLOC   P20S1
02716                         30,2117                     BANK

0272                          30,2117   77634 0  S22LSITE RTB                     CONVERT RLS FROM MOON-FIXED TO BASIC REF
0273   REF  12  LAST  565     30,2120   45510 1                    LOADTIME
02731                         30,2121   24007 0          STOVL    6D              6-7D= TIME
02732  REF   6  LAST  546     30,2122   02026 1                    RLS
02733                         30,2123   14001 0          STODL    0D              0-5D= LANDING SITE VECTOR
02734  REF   4  LAST  447     30,2124   15333 0                    HIDPHALF        MPAC= ANY NON-ZERO FOR MOON
02735                         30,2125   77624 1           CALL
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02736  REF   1                30,2126   55344 1                  RP-TO-R        RLS IN BASIC REF B-27 IN MPAC
02737                         30,2127   77742 0           VSR2                  LUNAFLAG AND ERADFLAG SET ABOVE
0274   REF   3  LAST  458     30,2130   02152 0           STORE  ALPHAV         SCALE RLS B-29 FOR LAT-LONG
0275                          30,2131   77634 0           RTB
0276   REF  13  LAST  566     30,2132   45510 1                  LOADTIME       SET PRESENT TIME IN MPAC FOR LAT-LONG
0277                          30,2133   77624 1           CALL
0278   REF   2  LAST  458     30,2134   26370 1                  LAT-LONG
0279                          30,2135   77650 1           GOTO
0280   REF   2  LAST  125     30,2136   03667 0                  S22TOFF        EXIT
0281                          30,2137   77624 1  OBTAINLL CALL                  GET LAT/LONG/ALT FROM ASTRO
0282   REF   2  LAST  566     30,2140   60143 1                  P22SUBRB
0283                          30,2141   77650 1           GOTO
0284   REF   3  LAST  567     30,2142   03667 0                  S22TOFF        EXIT
0285                          30,2143   77420 1  P22SUBRB STQ    EXIT           GET LAT/LONG/ALT FROM ASTRO
0286   REF   4  LAST  567     30,2144   03670 0                  S22TOFF +1
0287   REF   1                30,2145  3 3644 1           CAF    V06N89B
0288   REF 123  LAST  565     30,2146  0 4662 1           TC     BANKCALL
0289   REF  18  LAST  560     30,2147   20720 0           CADR   GOFLASH
0290   REF  20  LAST  565     30,2150  0 4106 1           TC     GOTOPOOH       TERMINATE
0291                          30,2151  0 2153 1           TC     +2             PROCEED
0292                          30,2152  0 2145 0           TC     -5             ENTER OR RECYCLE
0293   REF  80  LAST  566     30,2153  0 6006 1           TC     INTPRET
02931                         30,2154   51545 1           DLOAD  ABS            TEST LAT/LONG GREATER THAN 90
029315 REF   2  LAST  282     30,2155   01104 0                  LANDLAT
02932                         30,2156   50021 1           BDSU   BMN            1/4 REV - LAT
029325 REF   3  LAST  400     30,2157   15325 1                  DP1/4TH
02933  REF   1                30,2160   60166 0                  N89ERRX
029345                        30,2161   51545 1           DLOAD  ABS
02935  REF   3  LAST  282     30,2162   02360 0                  LANDLONG
029355                        30,2163   51021 0           BDSU   BPL
02936  REF   4  LAST  567     30,2164   15325 1                  DP1/4TH
029365                        30,2165   60171 0                  +4
02937                         30,2166   77776 1  N89ERRX  EXIT
029373 REF   8  LAST  364     30,2167  0 4400 1           TC     FALTON
029375 REF   3  LAST  567     30,2170  0 2145 0           TC     P22SUBRB +2    LONG GR. THAN 90  REDISPLAY
0294                          30,2171   77624 1           CALL
0295   REF   1                30,2172   62374 0                  LLASRDA
0296                          30,2173   77650 1           GOTO
0297   REF   5  LAST  567     30,2174   03670 0                  S22TOFF +1     EXIT
0298   REF   2  LAST   97     30,2175   02747 1  S22N7071 STORE  8KK            8KK=V05N71,V05N70 8KK+1=0 N71,NOT 0 N70
02982                         30,2176   77420 1           STO    EXIT
02984  REF   6  LAST  567     30,2177   03667 0                  S22TOFF
02986  REF   3  LAST  567     30,2200  3 1746 0  S22DSPPA CA     8KK            V05N70 OR V05N71
02988  REF 124  LAST  567     30,2201  0 4662 1           TC     BANKCALL
0299   REF   6  LAST  565     30,2202   21057 0           CADR   GOFLASHR
02992  REF  21  LAST  567     30,2203  0 4106 1           TC     GOTOPOOH       V34E TERMINATE
02994                         30,2204  0 2211 1           TC     +5             V33E PROCEED
02996                         30,2205  0 2200 1           TC     -5             V32E RECYCLE
02998  REF  11  LAST  566     30,2206  3 5022 1           CAF    FIVE           IMMEDIATE RETURN BLANK OUT R1,R3
0300   REF   6  LAST  565     30,2207  0 5926 0           TC     BLANKET
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03002  REF   69  LAST  565   30,2210  0 5217 0          TC      ENDOFJOB
03004  REF   15  LAST  565   30,2211  3 1751 0          CA      LANDMARK
03006  REF    8  LAST  565   30,2212  7 5063 0          MASK    PRIO7          07000
03008  REF    2  LAST   97   30,2213  55'745 1          TS      CXOFF          08000 = OFFSET INDICATOR
0301   REF    6  LAST  267   30,2214  4 5061 1          CS      PRIO5          5 B-5
03012  REF    3  LAST  568   30,2215  6 1745 0          AD      CXOFF
03014                       30,2216  0 0006 1          EXTEND
03016                       30,2217  6 2221 1          BZMF    +2             OFF=0 THRU 5 OK
03018  REF    1             30,2220  0 2233 1          TC      S22DSPP        OFF=6,7 ILLEGAL REDISPLAY
0302   REF   27  LAST  566   30,2221  0 5560 1          TC      DOWNFLAG
03022  REF    3  LAST  566   30,2222   00141 0          ADRES   KNOWNFLG       CLEAR KNOWNFLG
03024  REF   16  LAST  568   30,2223  3 1751 0          CA      LANDMARK       MASK A FROM ABCDE
03026  REF    3  LAST  391   30,2224  7 7707 1          MASK    13,14,15
03028                       30,2225  0 0006 1          EXTEND
0303   REF    2  LAST  568   30,2226  6 2233 1          BZMF    S22DSPP        A=0,4,5,6,7  ILLEGAL REDISPLAY
03031  REF    2  LAST   97   30,2227  55'744 0          TS      22SUBSCL       TEMP
03032  REF   37  LAST  383   30,2230  4 5002 1          CS      BIT14
03034  REF    3  LAST  568   30,2231  6 1744 1          AD      22SUBSCL
03036  REF  145  LAST  545   30,2232  10 000 0          CCS     A
03038  REF    9  LAST  567   30,2233  0 4400 1  S22DSPP TC      FALTON         +  A=3 ILLEGAL REDISPLAY
0304   REF    1             30,2234  0 2200 1          TC      S22DSPPA       COMMON ERROR EXIT BACK TO DISPLAY
03042                       30,2235  0 2237 0          TC      +2             -   A=1 KNOWN LMK  CHECK DE
03044  REF    1             30,2236  0 2263 1          TC      S22ABDE        -0  A=2 UNKNOWN LMK,DE MEANINGLESS
03046  REF   27  LAST  566   30,2237  0 5546 0          TC      UPFLAG
03048  REF    4  LAST  568   30,2240   00141 0          ADRES   KNOWNFLG       SET KNOWNFLG
0305   REF    2  LAST  484   30,2241  4 7713 1          CS      HIGH9          RESULT= 00077
03052  REF   17  LAST  568   30,2242  7 1751 1          MASK    LANDMARK
03054  REF    4  LAST  568   30,2243  55'744 0          TS      22SUBSCL       00ODE
03056  REF   35  LAST  546   30,2244  4 5017 0          CS      BIT1
03058  REF    5  LAST  568   30,2245  6 1744 1          AD      22SUBSCL
0306                        30,2246  0 0006 1          EXTEND
03062  REF    2  LAST  568   30,2247  6 2263 1          BZMF    S22ABDE        DE=0,1 OK FOR BOTH N70,N71
03064  REF    4  LAST  567   30,2250  3 1747 1          CA      BKK +1         =0 FOR N71, NOT =0 FOR N70
03066                       30,2251  0 0006 1          EXTEND
03068  REF    3  LAST  568   30,2252  1 2233 0          BZF     S22DSPP        N71 REDISPLAY  DE MUST= 0 OR 1
0307   REF   26  LAST  563   30,2253  3 5013 0          CA      BIT5           N70 TEST DE= 50-57 OCTAL FOR ADV. ORBIT
03072  REF    3  LAST  270   30,2254  6 5033 1          AD      OCT50          SUM=00070
03074  REF    6  LAST  568   30,2255  7 1744 0          MASK    22SUBSCL       00D0
03076  REF  146  LAST  568   30,2256  4 0000 0          CS      A
03078  REF    4  LAST  568   30,2257  6 5033 1          AD      OCT50
0308                        30,2260  0 0006 1          EXTEND
03082  REF    1             30,2261  1 2273 1          BZF     DE-GR-50       D=5 OR DE=50-57,OK FOR N70
03084  REF    4  LAST  568   30,2262  0 2233 1          TC      S22DSPP        DE NOT 50-57  ILLEGAL,REDISPLAY
03086  REF   81  LAST  567   30,2263  0 6006 1  S22ABDE TC      INTPRET
03088                       30,2264   67214 1          BOFF    SLOAD
0309   REF    5  LAST  568   30,2265   03347 1          KNOWNFLG       UNKNOWN LMK, DE MEANINGLESS
03092  REF    7  LAST  567   30,2266   03667 0          S22TOFF
03094  REF    7  LAST  568   30,2267   02743 0          22SUBSCL       =0 GET LLA FROM ASTRO,NOT=0 USE RLS
03096                       30,2270   52030 0          BHIZ    GOTO
03098  REF    1             30,2271   60137 1          OBTAINLL       GET LAT/LONG/ALT FROM ASTRO  N89
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0310   REF   1                30,2272   60117 0                    S22LSITE      GET LAT/LONG/ALT FROM RLS
03102  REF   8  LAST  566     30,2273   0 5372 1  DE-GR-50 TC      2PHSCHNG
03104                         30,2274   00004 0           OCT      00004
03106                         30,2275   05022 1           OCT      05022
03108                         30,2276   13000 0           OCT      13000
0311   REF  12  LAST  567     30,2277   3 5022 1          CA       FIVE
03112  REF   4  LAST  566     30,2300   54 301 1          TS       MARKINDX
03114  REF  28  LAST  568     30,2301   0 5546 0          TC       UPFLAG
03116  REF   2  LAST  566     30,2302   00025 0           ADRES    TARG2FLG
03118  REF  28  LAST  568     30,2303   0 5560 1          TC       DOWNFLAG
0312   REF   4  LAST  566     30,2304   00024 1           ADRES    TARG1FLG
03122  REF  82  LAST  568     30,2305   0 6006 1          TC       INTPRET
03124                         30,2306   77624 1           CALL
03126  REF   1                30,2307   30215 1                    ADVORB
0313                          30,2310   77650 1           GOTO
0314   REF   1                30,2311   60100 0                    DOV5N71
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R0315   PROGRAM NAME- OPTICS CALIBRATION ROUTINE
R0316   MOD NO- 1
R0317   MOD BY- TOM KNATT
R0318
R0319   FUNCTIONAL DESCRIPTION- TO MEASURE THE EFFECT OF SOLAR RADIATION ON
R0320     THE SXT TRUNNION ANGLE AND TO STORE THE MEASURED TRUNNION BIAS FOR P23
R0321
R0322   CALLING SEQUENCE- CALL
R0323                           R57
R0324
R0325   SUBROUTINES CALLED- DISPLAY ROUTINES
R0326
R0327   NORMAL EXIT MODES-VIA EGRESS
R0328
R0329   ALARMS- NONE
R0330
R0331   ABORT MODES- P23ABORT IF MARKING SYSTEM OR EXTENDED VERB ACTIVE
R0332   INPUT- NONE REQUIRED. NORMALLY CALLED BY P23
R0333   OUTPUT- TRUNNION BIAS ANGLE- ANGLE DETERMINED WHEN SHAFT LINE OF SIGHT
R03332  (SLOS) AND LANDMARK LINE OF SIGHT (LLOS) ARE SUPERIMPOSED. THIS ANGLE
R03334  MAY NOT BE EXACTLY ZERO BECAUSE OF UNEVEN HEATING OF THE OPTICS,FOR
R03336  EXAMPLE.
R0334
R0335   ERASABLE INITIALIZATION REQUIRED- MRKBUF1, EXTVBACT
R0336
R0337   DEBRIS- RUPTREGS USED BY MARKRUPT AND ERASABLES USED BY DISPLAYS
 0338                           33,3776                  BANK   33
 0339   REF   4  LAST  566     37,2000                  SETLOC P20S
 0340                           37,2401                  BANK
 0341   REF   1                                         COUNT* $$/R57
 0342   REF  20  LAST  282     E7,1725                  EBANK= MRKBUF1
 0343                           37,2401   77420 1  R57   STQ    EXIT
 0344   REF   2  LAST   90      37,2402   02317 0         EGRESS
 03442  REF   3  LAST  441     37,2403   3 5060 1        CAF    EBANK7
 03444  REF  26  LAST  564     37,2404   54 003 0        TS     EBANK
 0345   REF  19  LAST  527     37,2405   3 6211 0        CAF    SIX             BIT2 = MARKING SYSTEM IN USE
 0346   REF  16  LAST  520     37,2406   7 1044 1        MASK   EXTVBACT        BIT3 = EXTENDED VERB IN PROGRESS
 0347   REF 147  LAST  568     37,2407   10 000 0        CCS    A
 0348   REF   1                37,2410   0 2460 1        TC     P23ABRT         SET, THEREFORE ABORT
 0349   REF  24  LAST  518     37,2411   3 5016 0        CAF    BIT2            NOT SET
 0350   REF  17  LAST  570     37,2412   27'044 1        ADS    EXTVBACT        SET IT
 0351   REF  29  LAST  569     37,2413   0 5546 0  R57A  TC     UPFLAG          SET V59FLAG (BIT 12  FLAG 5) TO INDICATE
 0352   REF   1                37,2414    00116 1        ADRES  V59FLAG         CALIBRATION MARK
 0353   REF   1                37,2415   3 2463 1        CAF    V59NB
 0354   REF 125  LAST  567     37,2416   0 4662 1        TC     BANKCALL
 0355   REF   1                37,2417    20600 0        CADR   GOMARKFR
 0356   REF  22  LAST  567     37,2420   0 4106 1        TC     GOTOPOOH        TERMINATE
 0357   REF   1                37,2421   0 2445 0        TC     ENDR57
 0358   REF   2  LAST  570     37,2422   0 2445 0        TC     ENDR57
 0359   REF  11  LAST  446     37,2423   3 5023 0        CAF    SEVEN
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 0360   REF   7  LAST  567   37,2424  0 5526 0          TC     BLANKET        BLANK OUT R1,R2,R3
 0361   REF  70  LAST  568   37,2425  0 5217 0          TC     ENDOFJOB
R0362   STORE TRUNNION ANGLE (OCDU)
 0363   REF   1              37,2426  3 2462 0 MARKDISP CAF    V06N87NB
 0364   REF 126  LAST  570   37,2427  0 4662 1          TC     BANKCALL
 0365   REF   2  LAST  570   37,2430   20600 0          CADR   GOMARKFR
 0366   REF  23  LAST  570   37,2431  0 4106 1          TC     GOTOPOOH       TERMINATE
 0367   REF   1              37,2432  0 2437 0  .       TC     R57B           PROCEED
 0368   REF   1              37,2433  0 2413 0          TC     R57A           ENTER (RECYCLE)
 0369   REF  13  LAST  569   37,2434  3 5022 1          CAF    FIVE
 0370   REF   8  LAST  571   37,2435  0 5526 0          TC     BLANKET        BLANK OUT R1,R3
 0371   REF  71  LAST  571   37,2436  0 5217 0          TC     ENDOFJOB
 03712  REF   1              37,2437  3 2465 1 R57B     CA     19.77DEG       PUT FIXED INTO ERASABLE FOR MSU
 03714  REF  62  LAST  542   37,2440  54 001 1          TS     L              INSTRUCTION COMING UP
 0372   REF  21  LAST  570   37,2441  3 1732 0          CA     MRKBUF1 +5     CONTAINS TRUNNION
 037245                       37,2442  0 0006 1          EXTEND
 03725  REF  63  LAST  571   37,2443  20 001 1          MSU    L              CORRECTS TRUNBIAS FROM 2'S TO 1'S
 0373   REF   1              37,2444  55'342 1          TS     TRUNBIAS
 0376   REF  29  LAST  569   37,2445  0 5560 1 ENDR57   TC     DOWNFLAG       RESET V59FLAG
 0377   REF   2  LAST  570   37,2446   00116 1          ADRES  V59FLAG        BIT 12  FLAG 5
 03772  REF   3  LAST  564   37,2447  3 5056 1          CAF    EBANK5
 03774  REF  27  LAST  570   37,2450  54 003 0          TS     EBANK
 03776  REF   3  LAST  563   37,2451  3 5066 1          CAF    PRIO14
 03777  REF  16  LAST  518   37,2452  0 5134 1          TC     NOVAC          THIS JOB CLEARS BIT IN
 03778  REF  30  LAST  566      1330                    EBANK= MARKSTAT
 037785 REF   2  LAST  233   37,2453   05534 0          2CADR  ENDMARK        MARKING  IN R57 SO R53 CAN TAKE OVER
 037785                       37,2454   04062 1
 0378   REF  83  LAST  569   37,2455  0 6006 1          TC     INTPRET
 0379                         37,2456   77650 1          GOTO
 0380   REF   3  LAST  570   37,2457   02317 0                 EGRESS
 0381   REF   3  LAST  223   37,2460  0 7755 1 P23ABRT  TC     BAILOUT
 0382                         37,2461   01211 1          OCT    01211
 0383                         37,2462   01527 0 V06N87NB VN     0687
 0384                         37,2463   16600 0 V59NB    VN     5900
 0385                         37,2464   14600 1 V51NB    VN     5100
 03852                        37,2465   61740 0 19.77DEG OCT    61740
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P0386   PROGRAM DESCRIPTION
R0387   MOD NO - 1
R0388   MOD BY - N.BRODEUR
R0389   FUNCTIONAL DESCRIPTION
R0390
R0391     TO PERFORM SIGHTING MARKS IN CONJUNCTION WITH THE RENDEZVOUS NAVIG-
R0392   ATION PROGRAM. CALLED BY ASTRONAUT VIA EXTENDED VERB
R0394   CALLING SEQUENCE -
R0395           R21 VIA V 57
R0396           R23 VIA V 54
R0399   SUBROUTINES CALLED -
R0400     FLAGUP        FLAGDOWN        BANKCALL
R0401     ENDOFJOB      GOMARK2         GOMARKF
R04011    INTPRET       GENTRAN         KLEENEX
R04012    ENDMARK
R0402   NORMAL EXIT MODES-
R0403     MARKRUPT USED BY SXTMARK HAS BEEN MODIFIED TO STORE MARK IN MRKBUF2
R0404   FOR USE BY R22. WHEN ASTRONAUT IS FINISHED TAKING MARKS, HE HITS AN
R0405   PROCEED ,  R21 IS TERMINATED THUS CAUSING THE FINAL MARK TO BE TRANSFRD
R04051  TO MRKBUF2 FOR PROCESSING BY R22
R0406   ALARM OR ABORT EXIT MODES -
R0407     NONE
R0408   OUTPUT -
R0409     7 REGISTER MRKBUF2 CONTAINING TIME2,TIME1,CDUY,OPTICS X,CDUZ,OPTICS Y,
R0410   CDUX.
R0411   ERASABLE INITIALIZATION REQUIRED
R0412   FLAGS SET AND RESET
R0413     R21MARK   (COMMUNICATION TO MARKRUPT TO STORE MARKS IN MRKBUF1 + 2)
R0414     R23FLG  INDICATES COAS MARKING
R0415   DEBRIS
 0416   REF  22  LAST  571   E7,1725                        EBANK= MRKBUF1
 0417   REF   1              37,2000                        SETLOC RENDEZ
 0418                        37,2466                        BANK

 0419   REF   1                                             COUNT* $$/R21

 0420   REF  30  LAST  570   37,2466  0 5545 0  R21CSM     TC     UPFLAG          SET R21MARK
 0421   REF   2  LAST  200   37,2467   00037 0              ADRES  R21MARK         BIT 14  FLAG 2
 0422   REF  12  LAST  513   37,2470  3 7716 0  R23CSM     CA     NEGONE
 0423   REF  23  LAST  572   37,2471  55'725 1             TS     MRKBUF1
 0424   REF   8  LAST  563   37,2472  55'734 1             TS     MRKBUF2
 0427   REF  16  LAST  453   37,2473  3 0075 0             CA     FLAGWRD1
 0428   REF   2  LAST  257   37,2474  7 5007 1             MASK   R23BIT          TEST R23FLG
 0429                        37,2475  0 0006 1             EXTEND
 0430   REF   1              37,2476  1 2531 0             BZF    R21C1           NOT SET REGULAR R21 MARKING
 0431   REF   1              37,2477  3 2556 0             CAF    V0694           R23 BACKUP MARKING
 0432   REF 127  LAST  571   37,2500  0 4662 1             TC     BANKCALL        DISPLAY SHAFT + TRUNNION
 0433   REF   5  LAST  505   37,2501   20561 1             CADR   GOMARKF
 0434   REF   1              37,2502  0 2550 0             TC     R21END          TERM
 0435                        37,2503  0 2505 0             TC     +2              PROC
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0436                                37,2504  0 2477 1                TC      -5                      ENTER
0437   REF   1                     37,2505  3 2555 0  R23CSM1       CAF     V53                     PERFORM ALT LOS SIGHT MARK
0438   REF 128  LAST  572          37,2506  0 4662 1                TC      BANKCALL
0439   REF   1                     37,2507   20564 1                CADR    GOMARK2
0440   REF   2  LAST  572          37,2510  0 2550 0                TC      R21END                  V34-TERMINATE R23
0441   REF   1                     37,2511  1 2537 0                TCF     R21CSMA                 PROCEED-END BACK UP MARKING (R23)
0442   REF  20  LAST  570          37,2512  3 6211 0                CAF     SIX                     TRANSFER MRKBUF1 TO MRKBUF2
0443   REF   8  LAST  265          37,2513  0 5606 1                TC      GENTRAN
0444   REF  24  LAST  572          37,2514   01725 0                ADRES   MRKBUF1
0445   REF   9  LAST  572          37,2515   01734 0                ADRES   MRKBUF2
0451                                37,2516  0 0006 1                EXTEND
0452   REF  17  LAST  542          37,2517  3 0025 0                DCA     TIME2
0453   REF  25  LAST  573          37,2520  53'726 1                DXCH    MRKBUF1                 READ TIME
0454   REF   4  LAST  537          37,2521  3 0033 1                CA      CDUY                    READ CDU ANGLES
0455   REF  26  LAST  573          37,2522  55'727 0                TS      MRKBUF1 +2
0456   REF   8  LAST  537          37,2523  3 0034 0                CA      CDUZ
0457   REF  27  LAST  573          37,2524  55'731 1                TS      MRKBUF1 +4
0458   REF  11  LAST  537          37,2525  3 0032 0                CA      CDUX
0459   REF  28  LAST  573          37,2526  55'733 0                TS      MRKBUF1 +6
0464                                37,2527  0 0003 1                RELINT
0465   REF   1                     37,2530  0 2505 0                TC      R23CSM1
0466   REF   1                     37,2531  3 2464 0  R21C1         CAF     V51NB
0467   REF 129  LAST  573          37,2532  0 4662 1                TC      BANKCALL
0468   REF   2  LAST  573          37,2533   20564 1                CADR    GOMARK2
0469   REF   3  LAST  573          37,2534  0 2550 0                TC      R21END                  V34-TERMINATE R21
0470   REF   2  LAST  573          37,2535  1 2537 0                TCF     R21CSMA                 PROCEED-END R21
0471   REF   2  LAST  572          37,2536  1 2531 0                TCF     R21C1                   RECYCLE

0473   REF  29  LAST  573          37,2537  3 1725 0  R21CSMA       CA      MRKBUF1                 IF -1 NO MARK
0474   REF  68  LAST  564          37,2540  6 5017 1                AD      ONE
0475                                37,2541  0 0006 1                EXTEND
0476   REF   4  LAST  573          37,2542  1 2550 1                BZF     R21END                  ZERO = NO MARK
0478   REF  21  LAST  573          37,2543  3 6211 0                CAF     SIX                     MARK THEREFORE TRANSFER IT TO MRKBUF2
0479   REF   9  LAST  573          37,2544  0 5606 1  R21CSM1       TC      GENTRAN                 TRANSFER MRKBUF1 TO MRKBUF2
0480   REF  30  LAST  573          37,2545   01725 0                ADRES   MRKBUF1
0481   REF  10  LAST  573          37,2546   01734 0                ADRES   MRKBUF2
0482                                37,2547  0 0003 1                RELINT
0487   REF 130  LAST  573          37,2550  0 4662 1  R21END        TC      BANKCALL
0488   REF   2  LAST  232          37,2551   20560 0                CADR    KLEENEX
04881  REF  30  LAST  571          37,2552  0 5560 1                TC      DOWNFLAG                RESET R21MARK
04882  REF   3  LAST  572          37,2553   00037 0                ADRES   R21MARK                 BIT 14  FLAG 2
0491   REF   3  LAST  571          37,2554  0 5534 0                TC      ENDMARK                 END MARKING AND ENDJOB
0494                                37,2555   15200 1  V53           VN      5300
0495                                37,2556   01536 0  V0694         VN      0694
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P0496   PREFERRED TRACKING ATTITUDE ROUTINE R61CSM
R0497   PROGRAM DESCRIPTION
R0498   MOD NO - 2
R0499   MOD BY - N.BRODEUR
R0500   FUNCTIONAL DESCRIPTION-
R0501     TO COMPUTE THE PREFERRED TRACKING ATTITUDE OF THE CSM TO ENABLE OPTICS
R0502   TRACKING OF THE LM AND TO PERFORM THE MANEUVER TO THE PREFERRED
R0503   OR X-AXIS TRACKING ATTITUDE.
R0504   CALLING SEQUENCE-
R0505            TC     BANKCALL
R0506            CADR   R61CSM
R0507   SUBROUTINES CALLED
R0508     MAKECADR          BANKCALL
R0509     INTPRET       FLAGUP          FLAGDOWN
R0510     BANKJUMP      CRS61.1         R60CSM
R0511     PHASCHNG
R0512   NORMAL EXIT MODES-
R0513     NORMAL RETURN IS TO CALLER + 1
R0517   OUTPUT -
R0518     SEE OUTPUT FOR CRS61.1 & ATTITUDE MANEUVER ROUTINE (R60CSM)
R0519   ERASABLE INITIALIZATION REQUIRED
R0520     GENRET USED TO SAVE Q FOR RETURN
R0521     R61CNTR MUST BE PRESET TO ZERO
R0522   FLAGS SET + RESET
R0523     3-AXIS FLAG
R0524   DEBRIS
R0525     SEE SUBROUTINES
 0527   REF   3  LAST  116   E6,1770                          EBANK= GENRET
 0528   REF   1                                               COUNT* $$/R61          ROUTINES - NAVIGATION - PREF. TR. 9TT=

 0529   REF   9  LAST  538   37,2557  3 5057 0  R61CSM       CAF    EBANK6          SWITCH TO EBANK 6
 0530   REF  28  LAST  571   37,2560  56 003 1                XCH    EBANK
 0531   REF   2  LAST  115   37,2561  55'771 0                TS     SAVBNK          SAVE EBANK
 0532   REF   2  LAST  390   37,2562  0 4711 1                TC     MAKECADR
 0533   REF   4  LAST  574   37,2563  55'770 1                TS     GENRET
 0534   REF   3  LAST  564   37,2564  11'775 1                CCS    R61CNTR         TEST R61CNTR
 0535   REF   1               37,2565  0 2616 1                TC     DECRM61         NOT READY TO DO R61.
 0536                         37,2566  0 2570 1                TC     +2              DO R61
 0537   REF   2  LAST  574   37,2567  0 2617 0                TC     DECRM61 +1
 0538   REF  34  LAST  571   37,2570  0 6006 1                TC     INTPRET
 0539                         37,2571   77624 1               CALL
 0540   REF   1               37,2572   71343 0                      CRS61.1         LOS DETERMINATION + VEH ATTITUDE
 0541                         37,2573   77776 1               EXIT
 0542   REF 249  LAST  560   37,2574  50 154 1                INDEX  MPAC
 0543                         37,2575  0 2576 1                TC     +1
 0544   REF   1               37,2576  0 2615 1                TC     R61END          SUBROUTINE DRIVING DAP (EXIT R61)
A0544                                                                                  OR AUTO MODE NOT SET (EXIT R61)
A0545                                                                                  OR STIKFLAG SET      (EXIT R61)
 0545   REF  31  LAST  573   37,2577  0 5560 1  R61C1        TC     DOWNFLAG        RESET 3-AXIS FLAG
 0553   REF   3  LAST  398   37,2600   00124 0                ADRES  3AXISFLG        BIT 6  FLAG 5
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0554   REF  69  LAST  573   37,2601  4 5017 0          CS     ONE              SET R61CNTR NEG. TO INDICATE KALCMANU
0555   REF   4  LAST  574   37,2602  55'775 1          TS     R61CNTR

0556   REF  31  LAST  572   37,2603  0 5546 0          TC     UPFLAG           SET FLAG FOR PROIRITY DISPLAYS FOR R60
0557   REF   2  LAST  391   37,2604   00077 1          ADRES  PDSPFLAG         BIT 12  FLAG 4
0558   REF 131  LAST  573   37,2605  0 4662 1          TC     BANKCALL
0559   REF   2  LAST  398   37,2606   56000 1          CADR   R60CSM
0560   REF  32  LAST  574   37,2607  0 5560 1          TC     DOWNFLAG         RESET FLAG FOR PRIORITY DISPLAYS IN R60
0561   REF   3  LAST  575   37,2610   00077 1          ADRES  PDSPFLAG         BIT 12  FLAG 4
0564   REF  28  LAST  566   37,2611  0 5412 0          TC     PHASCHNG
0565                        37,2612   00111 0          OCT    00111
05651  REF 122  LAST  564   37,2613  3 5021 1          CAF    ZERO
05652  REF   3  LAST  574   37,2614  0 2616 1          TC     DECRM61
0567   REF  20  LAST  565   37,2615  3 6214 0  R61END  CAF    THREE

0568   REF   5  LAST  575   37,2616  55'775 1  DECRM61 TS     R61CNTR

0569   REF   5  LAST  574   37,2617  31'770 0          CAE    GENRET
0570   REF 148  LAST  570   37,2620  22 000 1          LXCH   A               RETURN IS IN L
0571   REF   3  LAST  574   37,2621  3 1771 1          CA     SAVBNK           RESTORE EBANK
0572   REF  29  LAST  574   37,2622  56 003 1          XCH    EBANK
0573   REF 149  LAST  575   37,2623  22 000 1          LXCH   A               RETURN IS NOW BACK IN A
0574   REF   6  LAST  391   37,2624  0 4704 0          TC     BANKJUMP         EXIT R61
0575                        13,2231                    BANK   13
0576   REF   1              23,2000                    SETLOC P20S2
0577                        23,3043                    BANK

0578   REF  31  LAST  573   E7,1725                    EBANK= MRKBUF1
```

```
R0579    BVECTOR PERFORMS COMPUTATIONS FOR
R0580   DELTAQ,THE MEASURED DEVIATION BASED ON THE DIFFERENCE BETWEEN THE CSM-LE
R0581   M STATE VECTOR ESTIMATES AND THE ACTUAL TRACKING MEASUREMENT.
R0582   US,THE MODIFIED FICTITIOUS STAR DIRECTION VECTOR
R0583   GEOMETRY VECTOR B ASSOCIATED WITH EACH TRACKING MEASUREMENT.
R0584   INPUT
R0585      UM,1/2 UNIT VECTOR ALONG THE CSM-LM LINE OF SIGHT (BASIC REF.SYSTEM)
R0586      USTAR,FICTITIOUS STAR DIRECTION (1/2 UNIT VECTOR)
R0587      RCLP,RELATIVE CSM TO LM POSITION VECTOR
R0588   OUTPUT
R0589      USTAR,MODIFIED FICTITOUS STAR DIRECTION (1/2 UNIT VECTOR)
R0590      BVECTOR = 9 DIMENSIONAL BVECTOR (1/2 UNIT VEC.)
R0591      DELTAQ = MEASURED DEVIATION
R0592   CALLING SEQUENCE
R0593      L  CALL BVECTORS
R0594   NORMAL EXIT
R0595      L+1 OF CALLING SEQUENCE

 0596   REF   1                                          COUNT  23/20SUB

 0597                        23,3043   77620 0  BVECTORS STQ
 0598   REF   4  LAST  571   23,3044   02317 0                  EGRESS
 0599                        23,3045   53575 0           VLOAD  UNIT
 0600   REF   2  LAST  121   23,3046   03531 0                  RCLP          RELATIVE POSITION VECTOR
 0601                        23,3047   14033 1     STODL  26D                  RCLP UNIT VEC
 0602                        23,3050   00045 0            36D                  RCLP ABS VALUE
 0603   REF   1              23,3051   25301 1     STOVL  TEMPOR1              MOVE TO SAFE LOCATION
 0604   REF   2  LAST   80   23,3052   01245 0            USTAR
 0605                        23,3053   53435 0     VXV    UNIT
 0606                        23,3054   00033 1            26D                  USTAR = UNIT(US X UCL)
 0607   REF   3  LAST  121   23,3055   37502 1     STCALL BVECTOR
 0608   REF   2  LAST  563   23,3056   56750 0            GRP2PC               PHASE CHANGE
 0609                        23,3057   77775 1     VLOAD
 0610   REF   4  LAST  576   23,3060   03502 0            BVECTOR
 0611   REF   3  LAST  576   23,3061   01245 0     STORE  USTAR
 0612                        23,3062   72441 0     DOT    SL1
 0613   REF   2  LAST   80   23,3063   01235 1            UM                   USTAR DOT UM
 0614                        23,3064   45326 1     ACOS   DSU
 0615   REF   5  LAST  567   23,3065   15325 1            DP1/4TH
 0616                        23,3066   41301 0     NORM   DMP
 0617   REF  17  LAST  559   23,3067   00047 1            X1
 0618   REF   1              23,3070   07103 1            P1/4.0
 0619                        23,3071   53605 1     DMP    SR*
 0620   REF   2  LAST  576   23,3072   01301 1            TEMPOR1              RCLP ABS VALUE
 0621                        23,3073   21576 0            0 -3,1               ADJUST SCALING
 0622   REF   2  LAST  121   23,3074   27524 1     STOVL  DELTAQ
 0623   REF   8  LAST  544   23,3075   15335 0            ZEROVECS
 0624   REF   5  LAST  576   23,3076   03510 0     STORE  BVECTOR +6
 0625   REF   6  LAST  576   23,3077   03516 0     STORE  BVECTOR +12D
 0626                        23,3100   77650 1     GOTO
```

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0627   REF   5  LAST  576   23,3101   02317 0                        EGRESS
0628                       23,3102   31103 1  PI/4.0   2DEC   .785398164
0629                       23,3103   36652 0
```

```
P0629    GETUM-DETERMINES THE LINE OF SIGHT UNIT VECTOR UM IN THE BASIC REFERENC
R0630   E COORDINATE SYSTEM FROM THE OPTICS SHAFT AND TRUNNION ANGLES AND THE IM
R0631   U GIMBAL ANGLES.
R0632   INPUT
R0633      MARKDATA,BASE ADDRESS OF MARK DATA
R0634      REFSMMAT,ROTATION MATRIX FROM STABLE MEMBER TO BASIC REF.COORD.SYSTEM

R0635   SUBROUTINES CALLED-
R0636      SXTNB - SEXT. ANGULAR READINGS TO NAV. BASE COOR.
R0637      NBSM  - TRANSFORM FROM NAV. BASE TO STABLE MEMBER
R0638   OUTPUT
R0639      MPAC = LINE OF SIGHT 1/2 UNIT VECTOR IN BASIC REFERENCE SYSTEM
R0640   CALLING SEQUENCE
R0641      L  CALL GETUM

R0642   NORMAL EXIT
R0643      L+1 OF CALLING SEQUENCE

 0644                        23,3104   40220 0  GETUM    STQ     SETPD
 0645   REF   6  LAST  577   23,3105   02317 0                   EGRESS
 0646                        23,3106   00001 0                   0
 0647                        23,3107   76740 0          LXC,1    VLOAD*
 0648   REF   2  LAST   80   23,3110   01242 1                   MARKDATA        CONTAINS ADDRESS OF MARK DATA
 0649                        23,3111   00002 0                   1,1
 0650   REF   7  LAST  228   23,3112   23676 1          STODL*   MARKDOWN +1     TRANSFER DATA FROM WORKING STORAGE
 0651                        23,3113   00001 0                   0,1             TO MARKDOWN ARRAY FOR DOWNLINK
 0652   REF   8  LAST  578   23,3114   03675 0          STORE    MARKDOWN
 0653                        23,3115   77774 0          AXT,2
 0654                        23,3116   00002 0                   2
 0655                        23,3117   57064 1          XSU,2    SXA,2
 0656   REF  18  LAST  576   23,3120   00046 0                   X1              X1 = MARKDATA
 0657   REF   6  LAST  438   23,3121   00050 1                   S1              S1 = MARKDATA(ADR) +2
 0658                        23,3122   77624 1          CALL
 0659   REF   3  LAST  510   23,3123   46000 0                   SXTNB           SEXT. ANGULAR READINGS TO NAV.BASE COOR.
 0660                        23,3124   77624 1          CALL
 0661   REF   1              23,3125   47606 1                   NBSM            TRANSFORM FROM NAV.BASE TO STABLE MEM.
 0662                        23,3126   76505 0          VXM      VSL1
 0663   REF  14  LAST  565   23,3127   01736 1                   REFSMMAT
 0664                        23,3130   77650 1          GOTO                     MPAC =(UM)LINE OF SIGHT VECTOR
 0665   REF   7  LAST  578   23,3131   02317 0                   EGRESS          EXIT
```

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P0666                RENDEZVOUS TRACKING DATA PROCESSING ROUTINE (R22)

R0667   PURPOSE      (1) TO PROCESS RENDEZVOUS SIGHTING MARK DATA TO UPDATE THE STATE VECTOR OF EITHER THE CSM OR LM AS
R0669                DEFINED BY THE RENDEZVOUS NAVIGATION PROGRAM (P20).

R0670   ASSUMPTIONS  (1) THIS ROUTINE IS MANUALLY SELECTED BY THE ASTRONAUT BY V55E WHENEVER RENDEZVOUS SIGHTING MARKS
R0672                ARE DESIRED. ITS SELECTION HOWEVER IS LIMITED TO PERIODS WHEN THE CMC IS HOLDING FOR A V/N FLASHING
R0674                DATA DISPLAY. THIS ROUTINE RETURNS TO THE ORIGINAL PROGRAM AT THE INTERRUPTED DISPLAY.
 0676                        34,2630                         BANK    34
 0677   REF   1              34,2000                         SETLOC  P20S3
 0678                        34,2630                         BANK

 0679   REF   1                                              COUNT   34/R22

 0680   REF   3  LAST  563   34,2630  3 7663 0  R22          CAF     PRIO26
 0681   REF   2  LAST  200   34,2631  55'056 1               TS      PHSPRDT2
 06811  REF   6  LAST  563   34,2632  0 5210 1               TC      PRIOCHNG
 0682   REF   1              34,2633  3 7714 1               CA      NEG3
 0683   REF  11  LAST  573   34,2634  55'734 1               TS      MRKBUF2
 0684   REF  85  LAST  574   34,2635  0 6006 1               TC      INTPRET
 0685                        34,2636   77634 0               RTB
 0687   REF  14  LAST  567   34,2637   45510 1                       LOADTIME
 0688   REF   2  LAST  175   34,2640   01152 0               STORE   VHFTIME         PRESENT TIME
 0689                        34,2641   77624 1  REND1        CALL
 0690   REF   3  LAST  576   34,2642   56750 0                       GRP2PC
 06901                       34,2643   77624 1               CALL
 0691   REF   1              34,2644   56409 1                       WAITONE
 0692                        34,2645   77776 1  REND1A       EXIT
 0700   REF  12  LAST  579   34,2646  3 1734 0               CA      MRKBUF2
 0701                        34,2647  0 0006 1               EXTEND
 0702   REF   1              34,2650  1 2653 1               BZF     REND2
 0703                        34,2651  0 0006 1               EXTEND
 0704   REF   1              34,2652  6 2672 0               BZMF    REND3A
 0705   REF  22  LAST  573   34,2653  3 6211 0  REND2        CAF     SIX
 0706   REF  10  LAST  573   34,2654  0 5606 1               TC      GENTRAN
 0707   REF  13  LAST  579   34,2655   01734 0               ADRES   MRKBUF2
 0708   REF   3  LAST  563   34,2656   01224 1               ADRES   MARKTIME        MARKTIME MUST BE CONTIGUOUS WITH VTEMP
 0718   REF   2  LAST  579   34,2657  3 7714 1               CAF     NEG3            NEG VALUE TO INDICATE VALUES USED
 0719   REF  14  LAST  579   34,2660  55'734 1               TS      MRKBUF2
 0720                        34,2661  0 0003 1               RELINT
 0721   REF  86  LAST  579   34,2662  0 6006 1               TC      INTPRET
 0722                        34,2663   45014 0               CLEAR   CALL
 0723   REF   1              34,2664   04667 1                       SOURCFLG        0 = OPTICS DATA
 0724   REF   4  LAST  579   34,2665   56750 0                       GRP2PC          PHASE CHANGE
 0725                        34,2666   52131 0               SSP     GOTO
 0726   REF   3  LAST  578   34,2667   01243 0                       MARKDATA
 0727   REF   2  LAST   80   34,2670   01224 1               ECADR   VTEMP -2
 0728   REF   1              34,2671   70715 0                       REND4
 0729   REF  87  LAST  579   34,2672  0 6006 1  REND3A       TC      INTPRET
 0732                        34,2673   77624 1  REND3        CALL
```

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07321  REF   5  LAST  579   34,2674   56750 0              GRP2PC
07322                      34,2675   77624 1        CALL
0733   REF   2  LAST  579   34,2676   56404 1              WAITONE
0734                       34,2677   77614 1        BOFF
0736   REF   4  LAST  264   34,2700   04746 0              VHFRFLAG
0737   REF   1              34,2701   70645 1              RENDIA
0738                       34,2702   77634 0        RTB
0739   REF  15  LAST  579   34,2703   45510 1              LOADTIME      PRESENT TIME
0740                       34,2704   45225 0        DSU   DSU
0741   REF   1              34,2705   14650 1              60SECDP       1 MIN
0742   REF   3  LAST  579   34,2706   01152 0              VHFTIME       LAST READING OF RADAR
0743                       34,2707   45040 1        BMN   CALL
0744   REF   2  LAST  580   34,2710   70645 1              RENDIA
0745   REF   1              34,2711   56415 1              RANGERD       READ RADAR RANGE
0746                       34,2712   77745 1        DLOAD
0747   REF   4  LAST  579   34,2713   01225 0              MARKTIME
0748   REF   4  LAST  580   34,2714   01152 0        STORE VHFTIME       FOR DOWNLINK
0749                       34,2715   77624 1  REND4 CALL
0750   REF   3  LAST  563   34,2716   56343 0              SETINTG       SET INTEGRV FLAGS
0751                       34,2717   45014 0        BON   CALL
0752   REF   6  LAST  563   34,2720   00707 1              VEHUPFLG
0753   REF   1              34,2721   71152 1              CSMUPP        BRANCH IF CSM UPDATE
0754   REF   6  LAST  563   34,2722   27162 1              INTEGRV
0755                       34,2723   77624 1        CALL
0756   REF   6  LAST  580   34,2724   56750 0              GRP2PC        PHASE CHANGE
0757                       34,2725   77624 1        CALL
0758   REF   4  LAST  580   34,2726   56343 0              SETINTG       SET INTEGRV FLAGS
0759                       34,2727   77614 1        CLEAR
0760   REF   8  LAST  563   34,2730   01674 0              VINTFLAG      SET INTEGRATION VEHICLE TO LM
0761                       34,2731   43014 0  REND5 BOFF   SET
0762   REF   5  LAST  565   34,2732   02756 1              RENDWFLG
0763   REF   1              34,2733   70735 1              REND5A        DO NOT INTEGRATE W IF FLAG = 0
0764   REF   6  LAST  563   34,2734   01476 0              DIMOFLAG
0765                       34,2735   77624 1  REND5A CALL
0766   REF   7  LAST  580   34,2736   27162 1              INTEGRV
0767                       34,2737   77624 1        CALL
0768   REF   1              34,2740   56547 1              SHIFTNDX      SET EARTH MOON SCALING INDEX
0769                       34,2741   77624 1        CALL
0770   REF   1              34,2742   71241 0              CMPOS         SET CSM POSITION
0771                       34,2743   45014 0        SET   CALL
0772   REF   1              34,2744   02464 0              INCORFLG      SET FOR 1ST PASS
0773   REF   1              34,2745   71250 0              LMPOS         SET LM POSITION
0774                       34,2746   43014 0        CLEAR BON
0775   REF   3  LAST  263   34,2747   01671 0              ORBWFLAG      CLEAR FOR ORBITAL AND CISLUNAR
0776   REF   6  LAST  580   34,2750   02716 0              RENDWFLG
0777   REF   1              34,2751   70761 0              REND6
0778                       34,2752   77745 1        DLOAD
07781  REF   1              34,2753   02001 1              WRENDPOS
07782                      34,2754   34001 1        STCALL 0      0 = WRENDPOS   1= WRENDVEL
0779   REF   1              34,2755   56565 1              INITIALW      INITIALIZE W MATRIX
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07791                                  34,2756   77745 1           DLOAD
07792  REF   9  LAST  576              34,2757   15335 0                 ZEROVECS
07793  REF   6  LAST  562              34,2760   01126 0           STORE VHFCNT          ZERO OUT VHFCNT AND TRKMKCNT
0780                                   34,2761   77614 1  REND6    SET
0781   REF   7  LAST  580              34,2762   02476 0                 RENDWFLG
0782                                   34,2763   52375 1           VLOAD VSU
0783   REF   2  LAST   80              34,2764   01215 0                 LEMPOS
0784   REF   2  LAST   80              34,2765   01207 0                 CSMPOS
0785   REF   3  LAST  576              34,2766   03531 0           STORE RCLP            LM - CSM
0786                                   34,2767   43056 0  REND7    UNIT  BON
0787   REF   2  LAST  579              34,2770   04707 0                 SOURCFLG
0788   REF   1                         34,2771   71163 0                 REND14          BRANCH IF DATA IS RADAR
0789   REF   1                         34,2772   01273 0           STORE UCL
0790                                   34,2773   45014 0           BOFF  CALL
0791   REF   2  LAST  580              34,2774   02744 1                 INCORFLG
0792   REF   1                         34,2775   71007 0                 REND9
0793   REF   1                         34,2776   47104 1                 GETUM           CALCULATE UM LINE OF SIGHT
0794   REF   3  LAST  576              34,2777   25235 1           STOVL UM
0795   REF   2  LAST  581              34,3000   01273 0                 UCL
0796                                   34,3001   40035 0           VXV   BOV
0797   REF   4  LAST  581              34,3002   01235 1                 UM              UCL X UM
0798   REF   1                         34,3003   71004 0                 REND8
0799                                   34,3004   40056 0  REND8    UNIT  BOV
0800   REF   1                         34,3005   70673 1                 REND3           BRANCH IF OVERFLOW IGNORE MARK
0801   REF   4  LAST  576              34,3006   01245 0           STORE USTAR
0802                                   34,3007   77624 1  REND9    CALL
0803   REF   1                         34,3010   47043 0                 BVECTORS
0804                                   34,3011   77214 0           BON   VLOAD
0805   REF   7  LAST  580              34,3012   00707 1                 VEHUPFLG
0806   REF   1                         34,3013   71017 1                 REND9A
0807   REF   7  LAST  576              34,3014   03502 0                 BVECTOR
0808                                   34,3015   77676 0           VCOMP
0809   REF   8  LAST  581              34,3016   03502 0           STORE BVECTOR
0810                                   34,3017   77624 1  REND9A   CALL
08101  REF   7  LAST  580              34,3020   56750 0                 GRP2PC
08102                                  34,3021   77614 1           BON
0811   REF   3  LAST  257              34,3022   00706 0                 R23FLG
0812   REF   1                         34,3023   71214 0                 REND15          BRANCH IF BACKUP OPTICS (R23 WORKING)
0813                                   34,3024   43345 1           DLOAD DAD
0814   REF   1                         34,3025   31336 0                 SXTVAR
0815   REF   1                         34,3026   31340 1                 IMUVAR
0816   REF   2  LAST  121              34,3027   27526 0  REND10   STOVL VARIANCE        TEMP STORAGE FOR VARIANCE CALC.
0817   REF   4  LAST  581              34,3030   03531 0                 RCLP
0818                                   34,3031   60246 1           ABVAL NORM
0819   REF  19  LAST  578              34,3032   00047 1                 X1
0820                                   34,3033   41316 0           DSQ   DMP
0821   REF   3  LAST  591              34,3034   03526 0                 VARIANCE
0822                                   34,3035   45070 1           XAD,1 CALL
0823   REF  20  LAST  581              34,3036   00046 0                 X1
0824   REF   2  LAST  580              34,3037   56547 1                 SHIFTNDX        GET EARTH MOON SCALING INDEX
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0825                                34,3040  56070 0          XAD,1   XAD,1
0826   REF   8  LAST  556           34,3041  00047 1                  X2
0827   REF   9  LAST  582           34,3042  00047 1                  X2
0828                                34,3043  72257 1          SR*     TLOAD
0829                                34,3044  20577 0                  0 -2,1          ADJUST SCALING TO B-40
0830   REF 250  LAST  574           34,3045  00155 0                  MPAC
0831   REF   4  LAST  581           34,3046  03526 0          STORE   VARIANCE
08311                               34,3047  54335 0          SLOAD   SR
083114 REF   2  LAST   92           34,3050  02400 1                  INTVAR          INTEGRATION VARIANCE SCALED B-15
083118                              34,3051  20632 1                  25D             SCALE IT B-40
083122                              34,3052  47171 0          TAD     RTB
083126 REF   5  LAST  582           34,3053  03526 0                  VARIANCE
083128 REF   1                      34,3054  45565 0                  TPMODE
08313  REF   6  LAST  582           34,3055  03526 0          STORE   VARIANCE
0832                                34,3056  76214 1          BOFF    TAD
0833   REF   3  LAST  581           34,3057  04747 1                  SOURCFLG        BRANCH IF NOT VHF RADAR
0834   REF   1                      34,3060  71067 0                  RENDIOA
0835   REF   1                      34,3061  03005 1                  RVARMIN         VHF RADAR MIN. VARIANCE
0836                                34,3062  72244 0          BPL     TLOAD
0837   REF   2  LAST  582           34,3063  71067 0                  RENDIOA
0838   REF   2  LAST  582           34,3064  03005 1                  RVARMIN
08381                               34,3065  77646 0          ABS                     MIN. VALUE WAS STORED AS NEG.
0839   REF   7  LAST  582           34,3066  03526 0          STORE   VARIANCE        STORE MIN. VALUE
0840                                34,3067  45014 0 RENDIOA  CLEAR   CALL
0841   REF   1                      34,3070  02666 0                  DMENFLG         CLEAR FOR 6 X 6 W MATRIX
0842   REF   1                      34,3071  75254 0                  INCORP1         CALCULATE UPDATE
08421                               34,3072  77624 1          CALL
08422  REF   8  LAST  581           34,3073  56750 0                  GRP2PC
0843                                34,3074  45014 0          BOFF    CALL
0844   REF   3  LAST  581           34,3075  02744 1                  INCORFLG
0845   REF   1                      34,3076  71124 0                  RENDI2
0846   REF   3  LAST  581           34,3077  56547 1                  SHIFTNOX        GET EARTH MOON SCALING INDEX
0847                                34,3100  51575 1          VLOAD   ABVAL
0848   REF   5  LAST   80           34,3101  01265 1                  DELTAX +6
0849                                34,3102  77657 0          SR*
0850                                34,3103  57176 0                  0,2
0851   REF   4  LAST  280           34,3104  27504 0          STOVL   N49DISP +2
0852   REF   6  LAST  582           34,3105  01257 0                  DELTAX
0853                                34,3106  53646 0          ABVAL   SR*
0854                                34,3107  57176 0                  0,2
0855   REF   5  LAST  582           34,3110  03502 0          STORE   N49DISP
08551                               34,3111  77735 0          SLOAD
0856   REF   1                      34,3112  02003 0                  RMAX
0857                                34,3113  45261 0          SR      DSU
0858                                34,3114  20613 1                  100
0859   REF   6  LAST  582           34,3115  03502 0                  N49DISP
0860                                34,3116  67240 0          BMN     SLOAD
0861   REF   1                      34,3117  71257 1                  RENDISP         BRANCH IF POS UP.GREATER THAN MAX.
0862   REF   1                      34,3120  02004 1                  VMAX
0863                                34,3121  50025 0          DSU     BMN
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0884   REF   7  LAST  582   34,3122   03504 0                    N49DISP +2
0885   REF   2  LAST  582   34,3123   71257 1                    RENDISP        BRANCH IF VEL.UPDATE GREATER THAN MAX.
0886                       34,3124   77624 1  REND12   CALL
0869   REF   1             34,3125   75486 1                    INCORP2        INCORPORATE UPDATE VALUES INTO STATE VEC
0870                       34,3126   43014 0          BON       BOFF
0871   REF   4  LAST  582   34,3127   04707 0                    SOURCFLG
0872   REF   1             34,3130   71221 0                    REND16         BRANCH IF DATA IS RADAR
0873   REF   4  LAST  582   34,3131   02744 1                    INCORFLG
0874   REF   1             34,3132   71227 0                    REND17
0875                       34,3133   77624 1          CALL
0876   REF   4  LAST  582   34,3134   56547 1                    SHIFTNDX       GET EARTH MOON SCALING INDEX
0877                       34,3135   45014 0          BON       CALL
0878   REF   8  LAST  581   34,3136   00707 1                    VEHUPFLG
0879   REF   1             34,3137   71235 0                    REND18         BRANCH IF CSM UPDATE
0880   REF   2  LAST  580   34,3140   71250 0                    LMPOS          GET LM POSITION
0881                       34,3141   77624 1  REND13   CALL
0882   REF   9  LAST  582   34,3142   56750 0                    GRP2PC         PHASE CHANGE
0883                       34,3143   52375 1          VLOAD     VSU
0884   REF   3  LAST  581   34,3144   01215 0                    LEMPOS
0885   REF   3  LAST  581   34,3145   01207 0                    CSMPOS
0886   REF   5  LAST  581   34,3146   03531 0          STORE     RCLP           LM - CSM
0887                       34,3147   77614 1          CLRGO
0888   REF   5  LAST  583   34,3150   02624 0                    INCORFLG
0889   REF   1             34,3151   70767 0                    REND7          BRANCH FOR 2ND PASS THIS OPTICS MARK
0890                       34,3152   45014 0  CSMUPP   CLEAR     CALL
0891   REF   9  LAST  580   34,3153   01674 0                    VINTFLAG       SET INTEGRATION VEHICLE EQ LM
0892   REF   8  LAST  580   34,3154   27162 1                    INTEGRV
0893                       34,3155   77624 1          CALL
0894   REF  10  LAST  583   34,3156   56750 0                    GRP2PC         PHASE CHANGE
0895                       34,3157   77624 1          CALL
0896   REF   5  LAST  580   34,3160   56343 0                    SETINTG        SET FLAGS FOR INTEGRATION
0897                       34,3161   77650 1          GOTO
0898   REF   1             34,3162   70731 0                    REND5
0899   REF   9  LAST  581   34,3163   27502 0  REND14   STOVL     BVECTOR        VHF RADAR BVECTOR
0900   REF  10  LAST  581   34,3164   15335 0                    ZEROVECS
0901   REF  10  LAST  583   34,3165   03510 0          STORE     BVECTOR +6
0902   REF  11  LAST  583   34,3166   27516 0          STOVL     BVECTOR +12D
0903   REF   6  LAST  583   34,3167   03531 0                    RCLP
0904                       34,3170   71256 0          UNIT      OLOAD
0905   REF   1             34,3171   01257 0                    VHFRANGE       VHFRANGE SCALED B-27
0906                       34,3172   60414 0          BON       SR2
0907   REF   6  LAST  509   34,3173   04303 0                    MOONTHIS
0908                       34,3174   71175 1                    +1
0909                       34,3175   43025 1          DSU       SET
0910                       34,3176   00045 0                    36D            ABVAL (RCLP)
0911   REF   6  LAST  583   34,3177   02464 0                    INCORFLG
0912   REF   3  LAST  576   34,3200   03524 1          STORE     DELTAQ
0913                       34,3201   77214 0          BOFF      VLOAD
0914   REF   9  LAST  583   34,3202   00747 0                    VEHUPFLG
0915   REF   1             34,3203   71207 1                    REND14A
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0916   REF  12  LAST  583   34,3204   03502 0                  BVECTOR
0917                        34,3205   77676 0          VCOMP
0918   REF  13  LAST  584   34,3206   03502 0          STORE   BVECTOR
0919                        34,3207   77624 1  REND14A CALL
09191  REF  11  LAST  583   34,3210   56750 0                  GRP2PC
09192                       34,3211   52145 0          DLOAD   GOTO
0920   REF   1               34,3212   03003 1                  RVAR
0921   REF   1               34,3213   71027 1                  REND10
0922                        34,3214   43335 0  REND15  SLOAD   DAD          GET ALT LOS VARIANCE
0923   REF   1               34,3215   01357 1                  ALTVAR       BACKUP OPTICS
0924   REF   2  LAST  581   34,3216   31340 1                  IMUVAR       IMU VARIANCE
0925                        34,3217   77650 1          GOTO
0926   REF   2  LAST  584   34,3220   71027 1                  REND10
0927                        34,3221   62150 1  REND16  LXA,1   INCR,1
0928   REF   7  LAST  581   34,3222   01125 0                  VHFCNT       VHF RADAR UPDATE COUNT
0929                        34,3223   00001 0          DEC     1
0930                        34,3224   52130 1          SXA,1   GOTO
0931   REF   8  LAST  584   34,3225   01125 0                  VHFCNT       UPDATE COUNT
0932   REF   1               34,3226   70641 0                  REND1
0933                        34,3227   62150 1  REND17  LXA,1   INCR,1
0934   REF   4  LAST  582   34,3230   01126 0                  TRKMKCNT     OPTICS MARK COUNT
0935                        34,3231   00001 0          DEC     1
0936                        34,3232   52130 1          SXA,1   GOTO
0937   REF   5  LAST  584   34,3233   01126 0                  TRKMKCNT     UPDATE COUNT
0938   REF   2  LAST  581   34,3234   70673 1                  REND3
0939                        34,3235   77624 1  REND18  CALL
0940   REF   2  LAST  580   34,3236   71241 0                  CMPOS        GET CSM POSITION
0941                        34,3237   77650 1          GOTO
0942   REF   1               34,3240   71141 0                  REND13
0943                        34,3241   53775 1  CMPOS   VLOAD   VSR*
0944   REF   1               34,3242   01573 1                  DELTACSM
0945                        34,3243   57167 0                  7,2
0946                        34,3244   77655 1          VAD
0947   REF   1               34,3245   01607 1                  RCVCSM
0948   REF   4  LAST  583   34,3246   01207 0          STORE   CSMPOS       CSM POSITION SCALED B-27 OR B-29
0949                        34,3247   77616 0          RVQ
0950                        34,3250   53775 1  LMPOS   VLOAD   VSR*
0951   REF   1               34,3251   01645 1                  DELTALEM
0952                        34,3252   57167 0                  7,2
0953                        34,3253   77655 1          VAD
0954   REF   1               34,3254   01661 1                  RCVLEM
0955   REF   4  LAST  583   34,3255   01215 0          STORE   LEMPOS       LM POSITION SCALED B-27 OR B-29
0956                        34,3256   77616 0          RVQ
0963                        34,3257   77776 1  RENDISP EXIT
0964   REF   8  LAST  505   34,3260   3 0105 0         CA      FLAGWRD9
0965   REF   1               34,3261   7 5010 1         MASK    SOURCBIT
0966                        34,3262   0 0006 1         EXTEND
0967                        34,3263   1 3266 1         BZF     +3
0968   REF  25  LAST  570   34,3264   3 5016 0         CA      RIT2
0969                        34,3265   0 3267 1         TC      +2
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0970   REF  36  LAST  568   34,3266  3 5017 1           CA     BIT1
0971   REF   8  LAST  583   34,3267  55'505 1           TS     N49DISP +4
09711  REF 123  LAST  575   34,3270  3 5021 1           CAF    ZERO            SET TEMPOR1 > ZERO TO INDICATE
09712  REF   3  LAST  576   34,3271  55'300 1           TS     TEMPOR1         V06 N49 DISPLAY HASNT BEEN ANSWERED
09713  REF  29  LAST  575   34,3272  0 5412 0           TC     PHASCHNG
09714                        34,3273   04022 0           OCT    04022
09715  REF   1              34,3274  3 7664 1           CAF    PRIO27          SET UP DISPLAY JOB WITH HIGHER PRIORITY
09716  REF  17  LAST  571   34,3275  0 5134 1           TC     NOVAC
097165 REF  32  LAST  575   E7,1725                     EBANK= MRKBUF1         THAN PRESENT JOB
09717  REF   1              34,3276   03310 0           2CADR  RENDISP2
09717  REF   1              34,3277   70067 1
097175 REF  88  LAST  579   34,3300  0 6006 1  RENDISP7 TC     INTPRET
097177 REF 251  LAST  582   34,3301   00155 0           STORE  MPAC
097179                       34,3302   53135 0           SLOAD  BZE
097181 REF   4  LAST  585   34,3303   01301 1                  TEMPOR1
097183 REF   1              34,3304   71301 0                  RENDISP7 +1     DISPLAY HAS NOT BEEN ANSWERED YET
097185                       34,3305   52040 1           BMN    GOTO
097187 REF   2  LAST  582   34,3306   71124 0                  RENDI2          NEG INDICATES PROCEED
097189 REF   1              34,3307   71317 1                  RENDISP3        POS INDICATES RECYCLE
0972   REF   1              34,3310  3 3341 1  RENDISP2 CAF    V06N49
0973   REF 132  LAST  575   34,3311  0 4662 1           TC     BANKCALL
0974   REF   1              34,3312   20731 0           CADR   PRIODSP
0975   REF   2  LAST  392   34,3313  0 4622 0           TC     GOTOV56         TERM EXIT P20 VIA V56
0976   REF  70  LAST  575   34,3314  4 5017 0           CS     ONE             NEG INDICATES PROCEED RENDISP7 JOB
0977   REF   5  LAST  585   34,3315  55'300 1           TS     TEMPOR1         POS INDICATES RECYCLE RENDISP7 JOB
0978   REF  72  LAST  571   34,3316  0 5217 0           TC     ENDOFJOB        GO COMPLETE ABOVE JOB
0985                        34,3317   77614 1  RENDISP3 BON
0988   REF   5  LAST  583   34,3320   04707 0                  SOURCFLG
0989   REF   2  LAST  584   34,3321   70641 0                  REND1           DATA WAS RADAR GO LOOK FOR OPTICS NEXT
0990                        34,3322   77776 1           EXIT
0991   REF  33  LAST  585   E7,1725                     EBANK= MRKBUF1
0992                        34,3323  0 0004 0           INHINT
0993   REF   1              34,3324  3 3342 1           CAF    BUFBANK
0994   REF  13  LAST  420   34,3325  54 006 0           TS     BBANK
0995   REF  13  LAST  572   34,3326  3 7716 0           CA     NEGONE
0996   REF  34  LAST  585   34,3327  55'725 1           TS     MRKBUF1         ERASE MARK ONE BUFFER
0997   REF  15  LAST  579   34,3330  55'734 1           TS     MRKBUF2         ERASE MARK TWO BUFFER
0998                        34,3331  0 0003 1           RELINT
0999   REF  89  LAST  585   34,3332  0 6006 1  RENDISP4 TC     INTPRET
1000                        34,3333   77650 1           GOTO
1001   REF   3  LAST  584   34,3334   70673 1                  REND3
1002                        34,3335   00052 0  SXTVAR   2DEC   0.04 E-6 B+16   SXT ERROR VARIANCE = .04 (MR)SQ
1002                        34,3336   36307 0
1003                        34,3337   00052 0  IMUVAR   2DEC   0.04 E-6 B+16   IMU ERROR VARIANCE = .04 (MR)SQ
1003                        34,3340   36307 0
1008                        34,3341   01461 0  V06N49   VN     0649
1009   REF  35  LAST  585   E7,1725                     EBANK= MRKBUF1
1010   REF   2  LAST  585   34,3342   70067 1  BUFBANK  BBCON  RENDISP3
1011                        31,2332                     BANK   31
1012   REF   1              27,2000                     SETLOC R22S1
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1013                                27,2343                        BANK
1014                                27,2343   45020 1  SETINTG     STQ     CALL
1015   REF   8  LAST  575           27,2344   02317 0                      EGRESS
1016   REF  15  LAST  520           27,2345   27442 0                      INTSTALL      RESERVE INTEGRATION
1017                                27,2346   43145 0              DLOAD   SET
1018   REF   5  LAST  580           27,2347   01225 0                      MARKTIME
1019   REF   1                     27,2350   01472 1                      STATEFLG
1020   REF  27  LAST  565           27,2351   00041 1              STORE   TDEC1         MARKTIME
1021                                27,2352   43014 0              CLEAR   CLEAR
1022   REF  10  LAST  512           27,2353   01673 1                      INTYPFLG      PRECISION INTEGRATION
1023   REF   7  LAST  580           27,2354   01676 1                      DIMOFLAG
1024                                27,2355   43014 0              SET     CLRGO
1025   REF  10  LAST  583           27,2356   01474 1                      VINTFLAG      SET VEHICLE EQ. CSM
1026   REF   1                     27,2357   01635 0                      D60R9FLG      SET W MATRIX DIM. EQ 6
1027   REF   9  LAST  586           27,2360   02317 0                      EGRESS        EXIT
1028                                27,2361   77620 0  CNTCHK      STQ
1029   REF   2  LAST   79           27,2362   01150 1                      POINTEX
10291                               27,2363   77614 1  CONTCHK     BOFF
10292  REF   3  LAST  538           27,2364   01742 1                      REFSMFLG      BRANCH TO END OF JOB IF REFSMMAT NO GOOD
10293  REF   1                     27,2365   30156 0                      ENDPLAC
1030                                27,2366   50135 0              SLOAD   BMN
10301  REF   6  LAST  575           27,2367   03376 0                      R61CNTR
10302  REF   1                     27,2370   56406 0                      WAITONE1
10303                               27,2371   43014 0              BON     BOFF          IS TRACK FLAG SET
1031   REF  14  LAST  563           27,2372   00710 1                      UPDATFLG
1032   REF   3  LAST  586           27,2373   01150 1                      POINTEX
1033   REF   4  LAST  563           27,2374   00752 1                      TRACKFLG
1034   REF   2  LAST  586           27,2375   30156 0                      ENDPLAC
1035                                27,2376   77776 1              EXIT
1036   REF  30  LAST  585           27,2377   0 5412 0  REDOR22     TC      PHASCHNG
1037                                27,2400   00132 1              OCT     00132
1038   REF   4  LAST  579           27,2401   3 7663 0             CAF     PRIO26
1039   REF   7  LAST  579           27,2402   0 5210 1             TC      PRIOCHNG
1040   REF   3  LAST  580           27,2403   0 2407 0             TC      WAITONE +3
1041                                27,2404   77620 0  WAITONE     STQ
1042   REF   4  LAST  586           27,2405   01150 1                      POINTEX
10421                               27,2406   77776 1  WAITONE1    EXIT
1043   REF   2  LAST  143           27,2407   3 5045 0             CAF     4SECS         WAIT 4 SECS.
1044   REF 133  LAST  585           27,2410   0 4662 1             TC      BANKCALL
1045   REF   8  LAST  546           27,2411   01732 0              CADR    DELAYJOB
1046   REF  90  LAST  585           27,2412   0 6006 1             TC      INTPRET
1047                                27,2413   77650 1              GOTO
1048   REF   1                     27,2414   56363 1                      CONTCHK       CHECK AGAIN NOW
1049                                27,2415   77776 1  RANGERD     EXIT
1050                                27,2416   0 0004 0             INHINT
1051   REF   1                     27,2417   4 2500 1             CS      OCT17
1052                                27,2420   0 0006 1             EXTEND
1053   REF   6  LAST  388           27,2421   03 013 0             WAND    CHAN13        ZERO OUT BITS 1-4 OF CHANNEL 13
1054   REF   1                     27,2422   3 4334 1             CAF     OCT11
1055                                27,2423   0 0006 1             EXTEND
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 1056   REF   7  LAST  586   27,2424  05 013 0           WOR    CHAN13          GENERATE SHIFT PULSES TO RADR,SET R.BIT
 1057                        27,2425  0 0003 1           RELINT
 1058                        27,2426  0 0006 1           EXTEND
 1059   REF  18  LAST  573   27,2427  3 0025 0           DCA    TTME2
 1060   REF   6  LAST  586   27,2430  53'225 1           DXCH   MARKTIME        READ PRESENT TIME
10601   REF  33  LAST  575   27,2431  0 5560 1           TC     DOWNFLAG
10602   REF   1              27,2432   00043 0           ADRES  SKIPVHF         CLEAR VHF RESTART FLAG
 1061   REF 134  LAST  586   27,2433  0 4662 1           TC     BANKCALL
 1062   REF   1              27,2434   17575 0           CADR   RADSTALL        WAIT FOR RANGE COMPLETE
 1063   REF   1              27,2435  0 2464 0           TC     LIGHTON         BAD DATA GOOD BIT
10635   REF   2  LAST  264   27,2436  0 5631 0           TC     TRFAILOF        TURN TRACKER LIGHT OFF
 1065   REF   2  LAST  125   27,2437  11'703 0  RANGERD1 CCS    RM              15 BIT UNSIGNED RANGE
 1066   REF   1              27,2440  0 2444 1           TC     RANGERD4        GR + 0
 1067   REF   2  LAST  587   27,2441  0 2470 0           TC     LIGHTON +4      =  + 0
10671   REF   1              27,2442  0 2453 1           TC     RANGERD3        L  - 0
10672   REF   2  LAST  587   27,2443  0 2453 1           TC     RANGERD3        =  - 0
 1068   REF  91  LAST  586   27,2444  0 6006 1  RANGERD4 TC     INTPRET
10681                        27,2445   41335 1           SLOAD  DMP
10682   REF   3  LAST  587   27,2446   03704 1                  RM
 1069   REF   1              27,2447   16503 0                  CONVRNGE        CONVERT RANGE TO METERS B-27
10691   REF   2  LAST  583   27,2450   01257 0  RANGERD2 STORE  VHFRANGE
10692                        27,2451   43414 1           SET    RVQ
 1070   REF   6  LAST  585   27,2452   04467 0                  SOURCFLG        SOURCE OF DATA TO VHF RADAR
10722   REF   4  LAST  587   27,2453  3 1703 1  RANGERD3 CA     RM
10723   REF  13  LAST  549   27,2454  7 4777 0           MASK   POSMAX
10724   REF 252  LAST  585   27,2455  54 154 0           TS     MPAC            MASK OUT NEG. SIGN BIT
10725   REF  92  LAST  587   27,2456  0 6006 1           TC     INTPRET
 1073                        27,2457   77605 1           DMP
10731   REF   2  LAST  587   27,2460   16503 0                  CONVRNGE        CONVERT FROM NM TO METERS AND SCALE B-27
10732                        27,2461   52015 1           DAD    GOTO
10733   REF   1              27,2462   16477 1                  RANGEB14        VALUE IN METERS OF SIGN BIT SCALED B-27
10734   REF   1              27,2463   56450 0                  RANGERD2
10738   REF   3  LAST  587   27,2464  3 1256 1  LIGHTON  CA     VHFRANGE
10739                        27,2465  0 0006 1           EXTEND
 1074                        27,2466  1 2470 1           BZF    +2
107404  REF   1              27,2467  0 5643 0           TC     TRFAILON
107406  REF  93  LAST  587   27,2470  0 6006 1           TC     INTPRET
10741                        27,2471   77745 1           DLOAD
10742   REF   7  LAST  587   27,2472   01225 0                  MARKTIME
10743   REF   5  LAST  580   27,2473   01152 0           STORE  VHFTIME
 1075                        27,2474   77650 1           GOTO
 1076   REF   3  LAST  585   27,2475   70641 0                  REND1
10761                        27,2476   00045 0  RANGEB14 2DEC   303431.7 B-27   16384 X 18.52 SCALED B-27
10761                        27,2477   01217 1
 1077                        27,2500   00017 1  OCT17    OCT    00017
10781                        27,2501   40200 1  OC40200  OCT    40200
 1079                        27,2502   00045 0  CONVRNGE 2DEC   18.52 B-13      VHF INPUT RANGE CONV.FROM.01 NM TO M
 1079                        27,2503   01217 1
 1080                        27,2504  0 0006 1  VHFREAD  EXTEND
 1081   REF   9  LAST  374   27,2505  04 007 1           ROR    SUPERBNK        MUST SAVE SBANK BECAUSE OF RUPT
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1082   REF   5  LAST  550   27,2506  54 016 1          TS      BANKRUPT        EXITS VIA TASKOVER BADEND OR GOODEND
10821  REF 124  LAST  585   27,2507  4 5021 0          CS      ZERO
10822  REF   2  LAST   74   27,2510  54 734 0          TS      RUPTAGN
1083                        27,2511  0 0006 1          EXTEND
1084   REF   5  LAST  550   27,2512  22 012 1          QXCH    QRUPT
108401 REF  35  LAST  584   27,2513  4 0076 1          CS      STATE +2
108402 REF   2  LAST  190   27,2514  7 5006 0          MASK    SKIPVBIT        SKIPVHF FLAG
108403                      27,2515  0 0006 1          EXTEND
108404 REF  26  LAST  540   27,2516  1 5324 0          BZF     TASKOVER        BRANCH IF VHF RESTART BIT SET
10841  REF   1              27,2517  3 5011 1          CAF     UPDATBIT
10842  REF  36  LAST  588   27,2520  7 0075 1          MASK    STATE +1        UPDATEFLG
10843                       27,2521  0 0006 1          EXTEND
10844  REF   1              27,2522  1 2542 1          BZF     BYPASS1
10845  REF  37  LAST  588   27,2523  4 0100 1          CS      STATE +4
10846  REF   1              27,2524  7 5004 1          MASK    PDSPFBIT        PDSPFLAG
10847                       27,2525  0 0006 1          EXTEND
10848  REF   2  LAST  580   27,2526  1 2542 1          BZF     BYPASS1
1085   REF   1              27,2527  3 0046 0          CA      RNRAD
1086   REF   5  LAST  587   27,2530  55'703 0          TS      RM              SAVE RANGE
1087   REF  26  LAST  584   27,2531  3 5016 0          CAF     BIT2
1088                        27,2532  0 0006 1          EXTEND
1089   REF   5  LAST  186   27,2533  02 033 0          RAND    CHAN33          READ DATA GOOD BIT
1094                        27,2534  0 0006 1          EXTEND
1095   REF   1              27,2535  1 2544 1          BZF     VHFGOOD         BRANCH IF DATA GOOD BIT EQUALS GOOD
10951  REF   4  LAST  587   27,2536  55'256 0  BYPASS  TS      VHFRANGE        STORE NON ZERO VALUE
1096   REF  32  LAST  560   27,2537  3 5016 0          CAF     TWO
1097   REF  41  LAST  539   27,2540  0 4701 0          TC      POSTJUMP
1098   REF   1              27,2541   17545 0          CADR    BADEND
10983  REF 125  LAST  588   27,2542  3 5021 1  BYPASS1 CAF     ZERO
10985  REF   1              27,2543  0 2536 0          TC      BYPASS
1099   REF  33  LAST  588   27,2544  3 5016 0  VHFGOOD CAF     TWO
1100   REF  42  LAST  588   27,2545  0 4701 0          TC      POSTJUMP
1101   REF   2  LAST  233   27,2546   17550 1          CADR    GOODEND
1102                        27,2547   43174 1  SHIFTNDX AXT,2  BON
1103                        27,2550   00000 1                  0
1104   REF  10  LAST  583   27,2551   00707 1                  VEHUPFLG
1105   REF   1              27,2552   56560 1                  SHIFTA          VEHICLE IS CSM
1106                        27,2553   43414 1          BON     RVQ
1107   REF   2  LAST   35   27,2554   04304 1                  LMOONFLG
1108                        27,2555   56556 1                  +1
1109                        27,2556   43514 0          INCR,2  RVQ
1110                        27,2557   77775 1          DEC     -2
1111                        27,2560   43414 1  SHIFTA  BON     RVQ
1112   REF   6  LAST  565   27,2561   04303 0                  CMOONFLG
1113                        27,2562   56563 1                  +1              MOON ORB.
1114                        27,2563   43514 0          INCR,2  RVQ
1115                        27,2564   77775 1          DEC     -2
1116                        27,2565   66370 0  INITIALW AXT,1  SSP
1117                        27,2566   00044 1                  36D
1118   REF   7  LAST  578   27,2567   00051 0                  S1
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 1119                                  27,2570   00006 1                 6
 1120                                  27,2571   77775 1          VLOAD
 1121   REF  11  LAST  583             27,2572   15335 0                 ZEROVECS
 1122   REF   5  LAST  267             27,2573   06445 1  INITA  STORE   W +36D,1      CLEAR 0 - 35
 1123                                  27,2574   76100 1          TIX,1  AXT,1
 1124   REF   1                        27,2575   56573 0                 INITA
 11241                                 27,2576   00044 1                 36D
 11242  REF   6  LAST  589             27,2577   06533 1  INIT8  STORE   W +90D,1      CLEAR 54 - 89
 11243                                 27,2600   67300 0          TIX,1  SLOAD
 11244  REF   1                        27,2601   56577 1                 INIT8
 1125                                  27,2602   00001 0                 0              POSITION VALUE
 1127   REF   7  LAST  589             27,2603   02401 0          STORE  W              INITIALIZE DIAGONAL W  POSITION
 1128   REF   8  LAST  589             27,2604   02411 1          STORE  W +8D
 1129   REF   9  LAST  589             27,2605   02421 1          STORE  W +16D
 1130                                  27,2606   77735 0          SLOAD
 1131                                  27,2607   00002 0                 1              VELOCITY VALUE
 1132   REF  10  LAST  589             27,2610   02511 0          STORE  W +72D         INITIALIZE DIAGONAL W VELOCITY
 1133   REF  11  LAST  589             27,2611   02521 0          STORE  W +80D
 1134   REF  12  LAST  589             27,2612   02531 1          STORE  W +88D
 1135                                  27,2613   77616 0          RVQ
R1136
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P1137
R1138   CRS61.1  4/10/68
R1139     TO COMPUTE THE PREFERRED TRACKING ATTITUDE OF THE CSM WHICH ENABLES
R1140   OPTICS  TRACKING OF THE LM AND LM TRACKING OF THE CSM RADAR TRANSPONDER
R1141   AND TO COMPUTE THE &X-AXIS TRACKING ATTITUDE OF THE CSM WHICH ENABLES
R11411  COAS TRACKING OF THE LM.
R11412    TO PERFORM THE MANEUVER TO THE SELECTED TRACKING ATTITUDE IF THE
R11413  MANEUVER IS LESS THAN 10 DEGREES BUT TO CALL R60 IF THE MANEUVER IS
R11414  GREATER THAN 10 DEGREES OR IF THE R60FLAG IS SET.
R1142             (1) EXTRAPOLATE LM AND CSM STATE VECTORS TO PRESENT TIME USING
R1143                 CONIC EQUATIONS.

R1144             (2) CALCULATE LOS FROM CSM TO LM = RL - RC.

R1145             (3) THE PREFERRED TRACKING ATTITUDE IS DEFINED AS FOLLOWS:
R1146                 THE TRACK AXIS (I) IS ALIGNED ALONG THE LOS TO THE LM. THE
R1147                 TRACK AXIS (I) IS DEFINED AS:
R1148
R1149                 UNIT(I)=UNIT(Z  )COS55 &UNIT(X  )SIN55
R1150                      -       -SC             -SC
R1159             (4) COMPUTE DESIRED CDU ANGLES, USING VECPOINT.
R1169             (7) FORM DIFFERENCE BETWEEN DESIRED AND ACTUAL CDUS.
R1170                 IF ANY OF THE THREE ANGLE DIFFERENCES EXCEEDS 10 DEGREES,
R1171                 GROSS MANEUVER IS REQUIRED. SIGNAL R61 (SET MPAC=1) TO
R1172                 OPERATE KALCMANU AND EXIT CRS61.1.
R1173                 IF ALL DIFFERENCES ARE LESS THAN 10 DEGREES, CONTINUE.

R1174           (8) CALCULATE ORTHOGONAL LOS RATE IN REF COORDS AS

R1175                 OMEGATH = (UNITLOS(B1) X UNITDV(B1))(ABSDV(B7)/ABSLOS(B29))
R1176                 CONVERSION FACTOR OF 100/2PI (B4) REV CSEC PER RAD SEC IS
R1177                 APPLIED TO YIELD UNITS OF REVS/SEC. SCALE IS CARRIED AS
R1178                 B+1+1+7-29+4+1 PLUS RESULTS OF NORMALIZING ABSDV, ABSLOS.
R1179                 THE EXTRA B+1 RESULTS FROM RESCALING ABSDV B8 AFTER NORM
R1180                 TO AVOID OVFLOW ON DIVIDE.

R1181                 UNITLOS = UNIT( RL - RC) B1.
R1182                 UNITDV  = UNIT( VL - VC) B1.
R1183                 ABSLOS  = LENGTH OF LOS, METERS B29.
R1184                 ABSDV   = LENGTH OF DV , METERS/CSEC B7.

R1185           (9) OBTAIN RATE IN SM COORDS.

R1186                 OMEGATHSM = (REFSMMAT)(OMEGATH).

R1187           (10)OBTAIN GIMBAL ANGLE INCREMENTS FOR 0.1 SECOND.

R1188                 DTHETASM = (0.1)(OMEGATHSM)

R1189           (11)OBTAIN DELCDUX,Y,Z USING SUBR SMCDURES.
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R1190                INPUT CONSISTS OF

R1191                (A) VECTOR OF ANGULAR INCREMENTS, DTHETASM, STORED
R1192                    IN V(DTHETASM).

R1193                (B) SIN,COS CDUX,Y,Z FROM  SUBR CDUTRIG.

R1194                TRANSFER OUTPUT OF SMCDURES FROM V(DCDU) TO VAC14D.

R1195             (12)CALCULATE ANG LOS RATE IN BODY(NB) COORDS USING SUBR SMNB.

R1196                OMEGANB = (SMNB)(OMEGATHSM)

R1197                SUBR SMNB REQUIRES  OMEGATHSM IN V(VAC32D) AND ACTUAL CDUS
R1198                (Y,X,Z ORDER) IN V(VAC20D) WITH S1 OF VAC = BASE ADDRESS
R1199                OF CDUS (FIXLOC + 20D).

R1200             (13)CALCULATE ANG LOS RATE IN CONTROL COORDS AS FOLLOWS

R1201                WBODY = (MBODYTCTL)(OMEGANB)   UNITS=REVS/SEC(B0).

R1202                                 ( 0.5       0             0       ) BODY TO
R1203                MBODYTCTL(B1) = (  0   COS(7.25)B1  -SIN(7.25)B1 )=CONTROL
R1204                                 (  0   SIN(7.25)B1   COS(7.25)B1 ) AXES
R1205                                                                    CONVERSION
R1206                                                                     MATRIX

R1207             (14)RESCALE WBODY TO UNITS OF 450 DEG/SEC BY APPLYING FACTOR
R1208                 OF 0.8 TO REVS/SEC.

R1209             (15)ADDRESS LIVE AUTOPILOT REGISTERS IN BASIC (UNDER INHINT).

R1210                    TRANSFER DESIRED CDUS, SCALED 180 DEGREES,FROM T(SAVEDCDU)
R1211                    TO V(CDUXD).
R1212                    TRANSFER DELCDUS, SCALED 180 DEG, FROM V(VAC14D)
R1213                    TO V(DELCDUX).
R1214                    TRANSFER OMEGA CONTROL, SCALED 450 DEG/SEC,FROM V(MPAC)
R1215                    TO V(WBODY).
R1216                    RELINT, SET MPAC=0, EXIT CRS61.1

R1217  CALL       L  CALL CRS61.1

R1218  RETURNS    ALL TO L+1.

R1219             (1) S(MPAC)=0. NORMAL EXIT. 3 SETS OF INPUTS FED TO DAP.
R1220             (2) S(MPAC)=1. CALCULATED DESIRED CDUS,SP, SET IN T(CPHI)
R1221                 FOR KALCMANU. ABS(ACDU - DCDU) EXCEEDS 10 DEGREES.
R1222             (3) S(MPAC)=2. GNCS AUTO MODE NOT SELECTED (BIT10=1).
R1223             (4) S(MPAC)=3. DAP HOLD FLAG (HOLDFLAG) NOT EQUAL -1.
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R1224   INPUT    (1) TIME2,TIME1. COMPUTER CLOCK TIME,DP, CENTISEC B28.
R1225            (2) CDUX,Y,Z. PRESENT CDU ANGLES,SP,2S COMPL HALF-REVS B0.
R1226            (3) M(REFSMMAT),STABLE MEMBER COORDS B1.

R1227   OUTPUT   NORMAL. EXIT WITH S(MPAC) = 0.

R1228            (1) CDUXD,CDUYD,CDUZD, DESIRED OUTER, INNER, MIDDLE CDU ANGLES,
R1229                DP, 1S COMPL, SCALED 180 DEGREES (HALF-REVS B0).
R1230            (2) DELCDUX,DELCDUY,DELCDUZ. 0.1 SEC DCU ANGULAR INCREMENTS,
R1231                DP, 1S COMPL, SCALED 180 DEG.
R1232            (3) WBODY,WBODY1,WBODY2. LOS ANGULAR RATE IN CONTROL COORDS,
R1233                DP, 1S COMPL, SCALED 450 DEG/SEC.

R1234            SPECIAL. EXIT WITH S(MPAC) = 1.

R1235            (1) CPHI,CTHETA,CPSI. DESIRED OUTER, INNER, MIDDLE CDU ANGLES,
R1236                SP, 2S COMPL, SCALED 180 DEGREES.

R1237   EXTERNAL SUBROUTINES USED   (B)=BASIC

R1238            (1) CALCGA     (5) LOADTIME(B)  (9) SMNB
R1239            (2) CDUTRIG    (6) MATMOVE
R1240            (3) CSMCONIC   (7) RDCOUS(B)
R1241            (4) LEMCONIC   (8) SMCOURES

R1242   ERASABLE (1) S(Q611),EBANK7  CRS61.1 EXIT .
R1243            (2) S(Q6111)EBANK7  CALCDCDU EXIT.
R1244            (3) T(SAVEDCDU) E6  SP VECTOR OF CDUDS.
R1245            (4) V(SAVEPOS)  E7  CSM POS VEC AND  D(SAVEPOS)= LENGTH OF LOS.
R1246            (5) V(SAVEVEL) E7  CSM VEL VEC.

R1247   FLAGWDS  HOLDFLAG. USED, NOT SET.

R1248   MISC     (1) ERASABLE ITEMP1 USED TO TEMP STORE EBANK UNDER INHINT.
R1249            (2) ERASABLE P21TIME USED AS TEMP STORE DURING CRS61.1
R1250            (3) ERAS DTHETASM USED AS TEMP STORE DURING EARLY CRS61.1

R1251   DEBRIS - CURRENT VAC AREA, CRS61.1 ERASABLES, ITEMP1, P21TIME

 1252                          24,2002                        BANK   24
 1253   REF   1                34,2000                        SETLOC P20S4
 1254                          34,3343                        BANK

 1255   REF   6  LAST  419     E6,1546                        EBANK= CDUXD
 1256   REF   1                                               COUNT* $$/CRS61
A1257
 1258                          34,3343   40220 0  CRS61.1  STO    SETPD
 1259   REF   2  LAST  125     34,3344   03704 1                 0611
 1260                          34,3345   00001 0                 0
 1261                          34,3346   77634 0           RTB
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 1262   REF  16  LAST  580   34,3347   45510 1                  LOADTIME      LOAD CLOCK TIME2,1 INTO MPAC.
A1263
 1264   REF   7  LAST  459   34,3350   36316 0  STORT   STCALL  P21TIME       STORE CLOCK TIME FOR SUBR R63
 1265   REF   1               34,3351   71572 1                  R63           SUBR TO CALC DCDU(T=PRESENT,PASS1)
 1266                         34,3352   77751 1          TLOAD
 1267   REF  13  LAST  428   34,3353   01156 1                  THETAD        SAVE DCDU(T) FROM CALCDCDU FOR STEP4.
 1268   REF   2  LAST  116   34,3354   03373 0          STORE   SAVEDCDU
A1269
 1270                         34,3355   77776 1          EXIT
 12701  REF   1               34,3356   0 3377 1         TC      STEP2CK
 1271   REF   8  LAST  390   34,3357   3 4371 0  AUTOCK  CAF     PRIO30
 1272                         34,3360   0 0006 1         EXTEND
 1273   REF   3  LAST  550   34,3361   06 031 0         RXOR    CHAN31
 1274   REF   2  LAST  564   34,3362   7 7707 1         MASK    FURST3
 1275                         34,3363   0 0006 1         EXTEND                AUTO MODE SELECTED (BITS 15-13=011)
 1276   REF   1               34,3364   1 3366 0         BZF     DAPCK           YES-CONTINUE.
 1278   REF   1               34,3365   0 3372 1         TC      ASET

 1279   REF  17  LAST  572   34,3366   4 0075 1  DAPCK   CS      FLAGWRD1      IS STIKFLAG SET (I.E. IS SOMEONE ON RHC)
 1280   REF   1               34,3367   7 5002 1         MASK    STIKBIT
 1281   REF 150  LAST  575   34,3370   10 000 0         CCS     A
 1282   REF   1               34,3371   0 3432 1         TC      STEP3CK
 1283   REF 126  LAST  588   34,3372   3 5021 1  ASET    CAF     ZERO
 1284   REF 253  LAST  587   34,3373   54 154 0         TS      MPAC
 1285   REF  94  LAST  587   34,3374   0 6006 1         TC      INTPRET       EXIT CRS61.1
 1286                         34,3375   77650 1          GOTO
 1287   REF   3  LAST  592   34,3376   03704 1                  0611

 12911  REF 135  LAST  587   34,3377   0 4662 1  STEP2CK TC      BANKCALL
 12912  REF   2  LAST  200   34,3400   57757 0           CADR    UPACTOFF

 1292   REF  34  LAST  588   34,3401   3 5016 0         CAF     TWO           SET TEMPORARY INDEX DTHETASM = 2
 1293   REF   2  LAST  109   34,3402   55'611 1 CDULOOP TS      DTHETASM
 1294   REF   3  LAST  593   34,3403   51'611 0         INDEX   DTHETASM
 1295   REF  12  LAST  573   34,3404   3 0032 0         CA      CDUX          SET A = ACTUAL CDU (ACDU).
 1296                         34,3405   0 0006 1         EXTEND
 1297   REF   4  LAST  593   34,3406   5 1611 0         INDEX   DTHETASM      SET INDEX TO ACCESS DESIRED CDU (DCDU).
 1298   REF  14  LAST  593   34,3407   21'155 0         MSU     THETAD        A = DIFF = ACDU - DCDU.
 1299   REF 254  LAST  593   34,3410   54 154 0         TS      MPAC          RETURN TO INTERPRETER FOR 10 DEGREE CK.
 1300   REF  95  LAST  593   34,3411   0 6006 1         TC      INTPRET       (DP APPROX SP OK FOR ROUGH CHECK)
 1301                         34,3412   45246 0          ABS     DSU
 1302   REF   1               34,3413   31661 1                  DEGREE10      IS (ACDU - DCDU) MORE THAN 10 DEGREES.
 1303                         34,3414   77444 0          BPL     EXIT          NO - OK, CONTINUE CHECKING OTHER ANGLES.
 1304   REF   1               34,3415   71421 0                  STKTEST       TEST STICK FLAG
 1305   REF   5  LAST  593   34,3416   11'611 1         CCS     DTHETASM      HAVE ALL 3 ANGLE DIFFS BEEN CHECKED.
 1306   REF   1               34,3417   0 3402 1         TC      CDULOOP       NO - DIM COUNT, CHECK NEXT ANGLE DIFF.
 13061  REF   1               34,3420   0 3357 0         TC      AUTOCK
 13062                         34,3421   77776 1  STKTEST EXIT
 130625 REF  18  LAST  593   34,3422   4 0075 1         CS      FLAGWRD1
 13063  REF   2  LAST  593   34,3423   7 5002 1         MASK    STIKBIT
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 130635 REF 151  LAST  593   34,3424  10 000 0          CCS    A
  13064 REF   1               34,3425  0 3563 1         TC     MANUEXIS      STIKFLAG IS NOT SET (DO R63)
 130645 REF  19  LAST  549   34,3426  3 5015 0          CAF    BIT3
  13065                      34,3427  0 0006 1         EXTEND
 130655 REF  21  LAST  388   34,3430  05 011 1          WOR    DSALMOUT      TURN ON UPACTY LIGHT

 130665 REF   2  LAST  593   34,3431  0 3372 1          TC     ASET          EXIT AND SET R61CNTR
  1307  REF  96  LAST  593   34,3432  0 6006 1  STEP3CK TC     INTPRET
  1308                       34,3433   77601 0          SETPD
  1309                       34,3434   00001 0                0            *
A1310                                                                       NOW HAVE DCDUS STORED IN T(SAVEDCDU).
A1311                                                                       GO CALC OTHER DAP INPUTS (DELCDU,WBODY)
  1312                       34,3435   52375 1  CRS61.2 VLOAD  VSU
  1313  REF   3  LAST  112   34,3436   03204 1           DCDU
  1314  REF   2  LAST  126   34,3437   03715 1           SAVEVEL       DV = VL - VC
  1315                       34,3440   57456 1          UNIT   VCOMP         V(MPAC)=-UNITDV.VAC36D=ABSDV.
  1316                       34,3441   74235 0          VXV    VXSC          (-UNITDV)CROSS(UNITLOS).
  1317  REF   2  LAST  126   34,3442   03707 1           SAVEPOS
  1318  REF   1               34,3443   31662 1           RVCS/RDS      (UNITLOS B1)(UNITDV B1)(CONST B4)=CROSS.
  1319                       34,3444   77606 1          PUSH           HOLD CROSS IN PUSHLISTO. SCALED B6.
  1320                       34,3445   60345 0          DLOAD  NORM    OBTAIN ABS VALUE OF LOS.
  1321  REF   8  LAST  593   34,3446   02316 1           P21TIME       P21TIME IS TEMP STORE FOR ABSLOS.
  1322  REF  21  LAST  581   34,3447   00047 1           X1
  1323                       34,3450   77606 1          PUSH           NORM ABSLOS(DENOM) AND HOLD IN PUSH1.
A1324
  1325                       34,3451   60345 0          DLOAD  NORM
  1326                       34,3452   00045 0                360      NORM ABS VALUE OF DV(NUM).
  1327  REF   9  LAST  588   34,3453   00051 0                S1
A1328
  1329                       34,3454   70460 1          XSU,1  SR1      X1 = X1(N DENOM)-S1(N NUM).
  1330  REF   9  LAST  594   34,3455   00050 1                S1       SR1 TO AVOID OFLOW ON DDV.
  1331                       34,3456   74271 0          DDV    VXSC     ABSDV(MPAC)/ABSLOS(PUSH1) = QUOT.
  1332                       34,3457   77730 0          SXA,1          QUOT(MPAC) X CROSS(PUSH0)
  1333  REF   2  LAST  125   34,3460   03705 0                06111    SAVE SCALE OF RESULT (B-15,1X).
A1334                                                                       X1= NORM OF QUOT. QUOT SCALE B7-B29=B-22
A1335                                                                       CROSS IS SCALED B6. NEED SL1 TO RECOVER
A1336                                                                       SR1 SO THAT -22+6+1=-15. MPAC NOW HOLDS
A1337                                                                       ORTHO LOS RATE (OMEGA TH, B-15,X1).
  1338                       34,3461   76521 0          MXV    VSL1     OBTAIN RATE IN SM COORDS (OMEGTHSM) AND
  1339  REF  15  LAST  578   34,3462   01736 1                REFSMMAT ADJUST FOR REFSMMAT SCALE OF B1.
  1340                       34,3463   00025 0          STORE  20D      OMEGTHSM = VAC20D
A1341                                                                       DELTA THETA SM = OMEGTHSM * .18-3.
  1342                       34,3464   77761 1          VXSC
  1343  REF   1               34,3465   31664 1                TENTH
  1344  REF   6  LAST  593   34,3466   03212 0          STORE  DTHETASM  STORE SM INCREM ANGLES FOR SMCDURES.
  1345                       34,3467   77624 1          CALL
  1346  REF   3  LAST  544   34,3470   47477 0                CDUTRIG  OBTAIN SIN,COSCDUS FOR SMCDURES.
  1347                       34,3471   45001 1          SETPD  CALL     SMCDURES USES PUSH
  1348                       34,3472   00001 0                0
  1349  REF   1               34,3473   47742 0                SMCDURES OBTAIN DELCDU IN V(DCDU).
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 1350                          34,3474   77750 0          LXA,1                  RELOAD X1
 1351  REF   3  LAST  594      34,3475   03705 0                 Q6111
 1352                          34,3476   53775 1          VLOAD  VSL*            RECOVER SCALE.
 1353  REF   4  LAST  594      34,3477   03204 1                 DCDU           (B-15,X1) + TENTH(B-3) + HALFREVS(B1)
 1354                          34,3500   20160 1                 0 -17D,1       EQUALS B-17D,1 TO OBTAIN HALFREVS BO.
 1355                          34,3501   00017 1          STORE  14D            HOLD DELS IN V(VAC14D) FOR AUTOPILOT.
A1356
 1357                          34,3502   77624 1          CALL                   COMPUTES SINES AND COSINES FOR *SMNB*
 1358  REF   4  LAST  594      34,3503   47477 0                 CDUTRIG
 1359                          34,3504   45175 0          VLOAD  CALL            LOAD VECTOR AND CALL TRANSFORMATION
 1360                          34,3505   00025 0                 20D            VECTOR FOR TRG*SMNB INTO MPAC
 1361  REF   2  LAST  286      34,3506   47644 1                 *SMNB*         OBTAIN ANG. RATE REFERRED TO NB (BODY)
 1362                          34,3507   77721 0          MXV
 1363  REF   2  LAST  547      34,3510   31670 1                 MBODYTCTL      CONVERT RATE(OMEGA) TO CONTROL COORDS.
 1364                          34,3511   77761 1          VXSC                   MULT. BY 0.8 TO RESCALE REVS TO 450 DEG.
 1365  REF   1                 34,3512   15271 1                 POINT8         RECOVER SCALE.
 1366                          34,3513   53750 0          LXA,1  VSL*           RELOAD X1 TO RECOVER NORMALIZ.
 1367  REF   4  LAST  595      34,3514   03705 0                 Q6111          (B-15,X1) + MBODYTCTL(B1) = B-14D,1 TO
 1368                          34,3515   20163 1                 0 -14D,1       OBTAIN REVS SCALED AT 450 DEGREES.
A1369
 1370                          34,3516   77776 1  CRS61.2A EXIT
 1371                          34,3517   0 0004 0          INHINT
 1372  REF 127  LAST  593      34,3520   3 5021 1          CAF    ZERO            TRANSFER DESIRED GIMBAL ANGLES
 1373  REF   7  LAST  592      34,3521   55'647 1          TS     CDUXD +1        FROM T(SAVEDCDU) TO V(CDUXD).
 1374  REF   4  LAST  419      34,3522   55'651 0          TS     CDUYD +1
 1375  REF   4  LAST  419      34,3523   55'653 1          TS     CDUZD +1
 1376  REF   3  LAST  593      34,3524   3 1772 1          CA     SAVEDCDU
 1377  REF   8  LAST  595      34,3525   55'646 0          TS     CDUXD
 1378  REF   4  LAST  595      34,3526   3 1773 0          CA     SAVEDCDU +1
 1379  REF   5  LAST  595      34,3527   55'650 1          TS     CDUYD
 1380  REF   5  LAST  595      34,3530   3 1774 1          CA     SAVEDCDU +2
 1381  REF   5  LAST  595      34,3531   55'652 0          TS     CDUZD
A1382
 1393                          34,3532   0 0006 1          EXTEND                 TRANSFER OMEGA CONTROL (ANG.LOS RATE)
 1384  REF 255  LAST  593      34,3533   3 0155 0          DCA    MPAC            FROM V(MPAC) TO V(WBODY ).
 1385  REF   9  LAST  418      34,3534   53'526 0          DXCH   WBODY
 1386                          34,3535   0 0006 1          EXTEND
 1387  REF 256  LAST  595      34,3536   3 0160 0          DCA    MPAC +3
 1388  REF   4  LAST  418      34,3537   53'530 1          DXCH   WBODY1
 1389                          34,3540   0 0006 1          EXTEND
 1390  REF 257  LAST  595      34,3541   3 0162 1          DCA    MPAC +5
 1391  REF   5  LAST  418      34,3542   53'532 0          DXCH   WBODY2
A1392
 1393                          34,3543   0 0006 1          EXTEND                 TRANSFER CDU INCREMENTS
 1394  REF   9  LAST  547      34,3544   5 0120 1          INDEX  FIXLOC          FROM V(VAC14D) TO V(DELCDUX).
 1395                          34,3545   3 0017 1          DCA    14D
 1396  REF   5  LAST  418      34,3546   53'576 0          DXCH   DELCDUX
 1397                          34,3547   0 0006 1          EXTEND
 1398  REF  10  LAST  595      34,3550   5 0120 1          INDEX  FIXLOC
 1399                          34,3551   3 0021 1          DCA    16D
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 1400   REF   4  LAST  418   34,3552  53'600 1          DXCH   DELCDUY
 1401                        34,3553  0 0006 1          EXTEND
 1402   REF  11  LAST  595   34,3554  5 0120 1          INDEX  FIXLOC
 1403                        34,3555  3 0023 0          DCA    18D
 1404   REF   4  LAST  418   34,3556  53'602 0          DXCH   DELCDUZ
 1405   REF  71  LAST  585   34,3557  4 5017 0          CS     ONE             NOW DAP VARIABLES LOADED. SET HOLDFLAG.
 1406   REF   5  LAST  564   34,3560  55'332 0          TS     HOLDFLAG        TO -1.
 1407                        34,3561  0 0003 1          RELINT
 1409   REF   3  LAST  594   34,3562  0 3372 1          TC     ASET
 1410   REF  97  LAST  594   34,3563  0 6006 1 MANUEXIS TC     INTPRET
 1411                        34,3564   77751 1 MANUEXIT TLOAD                   ENTER FROM STEP2. ACDU-DCDU EXCEEDS
 1412   REF   6  LAST  595   34,3565   03373 0          SAVEDCDU        10 DEG. STORE DCDU(T) IN CPHI,CTHETA,
 1413   REF   8  LAST  419   34,3566   01156 1          STORE  CPHI     CPSI FOR KALCMANU.
 1414                        34,3567   52135 1          SLOAD  GOTO     SPECIAL RETURN (MPAC+0 = 1
 1415   REF   1              34,3570   31712 1                 LOONE   OCTAL 00001
 1416   REF   4  LAST  593   34,3571   03704 1                 Q611
A1417
 1418                        34,3572   71220 1 R63       STQ    DLOAD           SUBR TO CALC DCDUS(T)
 1419   REF   5  LAST  595   34,3573   03705 0                 Q6111
 1420   REF   9  LAST  594   34,3574   02316 1                 P21TIME
 1421   REF  28  LAST  586   34,3575   34041 0          STCALL TDEC1
 1422   REF   4  LAST  565   34,3576   27114 0                 CSMCONIC
 1423                        34,3577   77775 1 HOLDATT   VLOAD                  HOLD EXTRAPOLATED CSM POSITION AND
 1424   REF  18  LAST  565   34,3600   00001 0                 RATT            VELOCITY
 1425   REF   3  LAST  594   34,3601   27707 1          STOVL  SAVEPOS
 1426   REF  15  LAST  565   34,3602   00007 0                 VATT
 1427   REF   3  LAST  594   34,3603   03715 1          STORE  SAVEVEL
 1428                        34,3604   77745 1 CALCLEM   DLOAD                  EXTRAPOLATE LEM STATE VECTOR TO SAME
 1429   REF  10  LAST  596   34,3605   02316 1                 P21TIME         TIME AS CSM USING LEMCONIC.
 1430   REF  29  LAST  596   34,3606   34041 0          STCALL TDEC1
 1431   REF   3  LAST  555   34,3607   27126 1                 LEMCONIC
 1432                        34,3610   77775 1          VLOAD
 1433   REF  16  LAST  596   34,3611   00007 0                 VATT
 1434   REF   5  LAST  595   34,3612   27204 1          STOVL  DCDU             STORE VATT IN DCDU TEMPORARILY
 1435   REF  19  LAST  596   34,3613   00001 0                 RATT            LOS = RL  RC
 1436                        34,3614   53451 1          VSU    UNIT
 1437   REF   4  LAST  596   34,3615   03707 1                 SAVEPOS
 1438   REF   5  LAST  596   34,3616   03707 1          STORE  SAVEPOS         SAVE UNITLOS FOR CRS61.2 RATE CALC.
 1439                        34,3617   76521 0          MXV    VSL1
 1440   REF  16  LAST  594   34,3620   01736 1                 REFSMMAT        CONVERT TO STABLE MEMBER
 1441   REF   3  LAST  394   34,3621   17357 0          STODL  POINTVSM
 1442                        34,3622   00045 0                 36D             HOLD ABS VAL OF LOS (VAC 36D)
 1443   REF  11  LAST  596   34,3623   02316 1          STORE  P21TIME         IN D(P21TIME) FOR CRS61.2 RATE CALC.
 1444                        34,3624   77775 1          VLOAD
 1445   REF   4  LAST   35   34,3625   15333 0                 UNITX
 1446   REF  11  LAST  395   34,3626   37351 1          STCALL SCAXIS          TRACK AXIS UNIT VECTOR
 1447   REF   3  LAST  390   34,3627   56126 1                 VECPOINT        FOR +X-AXIS TRACKING ATTITUDE
 1448   REF   7  LAST  283   34,3630   01334 1          STORE  CPHIX           STORE ANGLES FOR N96 DISPLAY
 1449                        34,3631   77775 1          VLOAD
 1450   REF   1              34,3632   31653 0                 PRFUNIT
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1451  REF  12  LAST  596   34,3633  37351 1          STCALL SCAXIS
1452  REF   4  LAST  596   34,3634  56126 1                 VECPOINT
1453  REF   5  LAST  283   34,3635  03723 1          STORE  PRAXIS          STORE ANGLES FOR N95 DISPLAY
1454                       34,3636  77614 1          BOFF
1455  REF   4  LAST  562   34,3637  02745 0                 PRFTRKAT
1456  REF   1               34,3640  71644 1                 CRSTORI
1457  REF  15  LAST  593   34,3641  01156 1  CRSTOR  STORE  THETAD         STORE ANGLES FOR N18 DISPLAY
1458                       34,3642  77650 1          GOTO
1459  REF   6  LAST  596   34,3643  03705 0                 Q6111
1460                       34,3644  77775 1  CRSTORI VLOAD
1461  REF   5  LAST  596   34,3645  15333 0                 UNITX
1462  REF  13  LAST  597   34,3646  03351 0          STORE  SCAXIS
1463                       34,3647  52151 0          TLOAD  GOTO
1464  REF   8  LAST  596   34,3650  01334 1                 CPHIX
1465  REF   1               34,3651  71641 1                 CRSTOR
1466                       34,3652  15066 0  PRFUNIT 2DEC   .40957602       55 DEG TRACK AXIS UNIT VECTOR
1466                       34,3653  17626 0
1467                       34,3654  00000 1          2DEC   0.0             FOR USE WITH VECPOINT
1467                       34,3655  00000 1
1468                       34,3656  11132 1          2DEC   .28678822
1468                       34,3657  27477 0
1469                       34,3660  01616 1  DEGREE10 DEC    .05556          10 DEG IN REVS                  STEP2
1470                       34,3661  37651 1  RVCS/RDS 2DEC   15.915494 B-4   100/2PI REV-CSEC/RAD-SEC.
1470                       34,3662  16721 1
1471                       34,3663  31463 1  TENTH    2DEC   .1 B+3          .1 B-3 (TO SCALE ANG.RATE TO .1 INREMS)
1471                       34,3664  08315 0
1474                       34,3665  20000 0  MAT1B1   2DEC   1.0 B-1
1474                       34,3666  00000 1
1475                       34,3667  20000 0  MBDYTCTL 2DEC   .5                              7.25 DEG NEGATIVE
1475                       34,3670  00000 1
1476                       34,3671  00000 1          2DEC   0                               X-AXIS ROTATION MATRIX
1476                       34,3672  00000 1
1477                       34,3673  00000 1          2DEC   0                               CONVERTS BODY TO CTL
1477                       34,3674  00000 1
1478                       34,3675  00000 1          2DEC   0                               AXES. SAME AS QUADROT
1478                       34,3676  00000 1
1479                       34,3677  17676 0          2DEC   .99200495 B-1   COS7.25 B1      BUT SCALED B1
1479                       34,3700  20113 0
1480                       34,3701  75766 1          2DEC   -.12619897 B-1  -SIN7.25 B1
1480                       34,3702  45544 0
1481                       34,3703  00000 1          2DEC   0
1481                       34,3704  00000 1
1482                       34,3705  02011 0          2DEC   .12619897 B-1   SIN7.25 B1
1482                       34,3706  32233 1
1483                       34,3707  17676 0          2DEC   .99200495 B-1   COS7.25 B1
1483                       34,3710  20113 0
1484                       34,3711  00001 0  LOONE    OCT    00001           TO SET MPAC = 00001 FOR SPECIAL EXIT.
1485  REF   4  LAST  568     7707           FURST3   EQUALS 13,14,15        CONSTANT FOR AUTOCK (OCT 70000).
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P1486   ..... S22.1 ORBITAL NAVIGATION ROUTINE
R1487   MOD 1

R1488   FUNCTIONAL DESCRIPTION
R1489    1. UPDATE CSM STATE VECTOR
R1490    2. UPDATE LANDMARK POSITION
R1491    3. CONVERT W MATRIX FROM 9 TO 6 DIMENSIONS

R1492   SUBROUTINES CALLED
R1493    INTSTALL,INTEGRV,GETUM,SETRE,R-TO-TP,RP-TO-R,BVECTORS,INCORP1,INCORP2
R1494    LALOTORV,S22F2410,LAT-LONG,ROWDOT

R1495   ERASABLE INITIALIZATION
R1496    W=9X9 MATRIX
R1497    ORBWFLAG=0 FOR INVALID W MATRIX,=1 FOR VALID W MATRIX
R1498    ASTRONAUT ENTRY OF KNOWN,L,OFF
R1499    8NN= NUMBER OF MARKS  DECIMAL INTEGER B-14
R1500    REFSMMAT= TRANSFORMATION MATRIX
R1501    MARKSTAT= ADDRESS OF START OF MARK DATA (MARK DATA OF EACH MARK IS
R1502              STORED AS FOLLOWS,  TIME,AIG,SA,AMG,PA,AOG) TIME IS IN DOUBLE
R1503              PRECISION,ALL OTHERS ARE IN SINGLE PRECISION
R1504    CSM STATE VECTOR

R1505   OUTPUT
R1506    UPDATED CSM STATE VECTOR
R1507    UPDATED LANDMARK POSITION
R1508    NEW 6 DIMENSIONAL W MATRIX

R1509   DEBRIS
R1510    PUSH LIST,CSMPOS,ALPHAV,ERADM,UM,RCLP,USTAR,VARIANCE,X789,BVECTOR,8KK,
R1511    S22LOC, SVMRKDAT TABLE,22SUBSCL,LANDMARK,CXOFF,S22C,LAT,LONG,ALT,
R1512    TEMPOR1,S22TOFF,S221OFF,OSPTEM1,S22EORM,S22TPRIM

 1513                        13,2231                     BANK   13

 1514   REF   1              30,2000                     SETLOC P20S6
 1515                        30,2312                     BANK

 1516   REF  18  LAST  568   E5,1751                     EBANK= LANDMARK
 1517   REF   1                                         COUNT  35/LUORB

 1518                        30,2312   66220 1  S22.1    STQ    SSP
 1519   REF   3  LAST  125   30,2313   03703 0           S22RTNEX
 1520   REF  10  LAST  594   30,2314   00051 0           S1
 1521                        30,2315   00006 1          DEC    6
 1522                        30,2316   66331 0          SSP    SSP              SET I=1  ITEM 8KK IS I
 1523   REF   5  LAST  568   30,2317   02747 1           8KK
 1524                        30,2320   00001 0          DEC    1
 1525   REF   2  LAST   97   30,2321   02751 0           S22LOC
 1526   REF   5  LAST  179   30,2322   03537 0          ECADR  SVMRKDAT         SET MARK DATA ADDRESS INTO S22LOC
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 1527                                30,2323   76144 1           LXC,2  AXT,1
 1528   REF  31  LAST  571           30,2324   01330 0                  MARKSTAT
 1529                                30,2325   00044 1           DEC    36
 1530                                30,2326   77773 1  S22.111  VLOAD*                  MOVE MARK DATA (5 SETS) FROM ADDR. IN
 1531                                30,2327   77776 1                   0,2             MARKSTAT TO SVMRKDAT TABLE TO AVOID LOSS
 1532   REF   6  LAST  598           30,2330   07604 1           STORE  SVMRKDAT +36D,1 IF RESTART OCCURS
 1533                                30,2331   60114 0           INCR,2 TIX,1
 1534                                30,2332   77771 0           DEC    -6
 1535   REF   1                     30,2333   60326 0                  S22.111
 1536                                30,2334   77414 0           SET    EXIT
15361   REF   2  LAST  565           30,2335   01464 0                  P22MKFLG        DOWNLINKED SVMRKDAT HOLDS PRESENT MARKS
 1537   REF 136  LAST  593           30,2336   0 4662 1          TC     BANKCALL        RELEASE VAC AREA WHERE MARK DATA WAS
 1538   REF   5  LAST  451           30,2337   16063 0           CADR   MKRELEAS
 1539   REF   9  LAST  569           30,2340   0 5372 1          TC     2PHSCHNG
 1540                                30,2341   00004 0           OCT    00004
 1541                                30,2342   05022 1           OCT    05022
15411                                30,2343   13000 0           OCT    13000
 1542   REF  98  LAST  596           30,2344   0 6006 1          TC     INTPRET
 1543                                30,2345   43170 0           AXT,1  BOFF
 1544                                30,2346   00000 1                  0D
 1545   REF   7  LAST  588           30,2347   04343 1                  CMOONFLG        =0 EARTH,=1 MOON
 1546   REF   1                     30,2350   60353 1                  S22SHIFT
 1547                                30,2351   77710 1           INCR,1
 1548                                30,2352   77775 1           DEC    -2
 1549                                30,2353   40330 0  S22SHIFT SXA,1  SETPD
 1550   REF   2  LAST  125           30,2354   03673 0                  S22FORM         SET =0 EARTH,=-2 MOON FOR SHIFTING
 1551                                30,2355   00001 0                  0D
 1554                                30,2356   77624 1  FIG2EXIT CALL
 1555   REF  16  LAST  586           30,2357   27442 0                  INTSTALL
 1556                                30,2360   77624 1           CALL
 1557   REF   1                     30,2361   62355 0                  S22FLGS
R1558                  FLOWCHART D=0   THEN DIMOFLAG=0  D60R9FLG NOT TESTED
R1559                  FLOWCHART D=6   THEN DIMOFLAG=1  D60R9FLG=0
R1560                  FLOWCHART D=9   THEN DIMOFLAG=1  D60R9FLG=1

 1561                                30,2362   43014 0           BOFF   CLRGO
 1562   REF   4  LAST  580           30,2363   01751 0                  ORBWFLAG
 1563   REF   1                     30,2364   60367 0                  SETWW5D         BRANCH TO SET W0-W5,ORBWFLAG,D
 1564   REF   2  LAST  586           30,2365   01635 0                  D60R9FLG        FLOWCHART D=6 PATH
 1565   REF   1                     30,2366   60414 0                  SETVANDI
 1566                                30,2367   77614 1  SETWW5D  CLEAR
 1567   REF   8  LAST  586           30,2370   01676 1                  DIMOFLAG        FLOWCHART D=0 PATH
 1568                                30,2371   66370 0           AXT,1  SSP
 1569                                30,2372   00154 1           DEC    108
 1570   REF  11  LAST  598           30,2373   00051 0                  S1
 1571                                30,2374   00006 1           DEC    6
 1572                                30,2375   77214 0           CLEAR  VLOAD
 1573   REF   8  LAST  581           30,2376   02676 1                  RENDWFLG        GSOP CHANGE 8/18/67
 1574   REF  12  LAST  589           30,2377   15335 0                  ZEROVECS
 1575   REF  13  LAST  599           30,2400   06655 1  CLEARWW5 STORE  W +108D,1
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1576                          30,2401   67300 0          TIX,1  SLOAD
1577  REF   1                 30,2402   60400 0                 CLEARWW5
1578  REF   1                 30,2403   02005 0                 WORBPOS
1580  REF  14  LAST  599      30,2404   02401 0          STORE  W              SET DIAGONALS OF WO
1581  REF  15  LAST  600      30,2405   02411 1          STORE  W +8D
1582  REF  16  LAST  600      30,2406   02421 1          STORE  W +16D
1583                          30,2407   77735 0          SLOAD
1584  REF   1                 30,2410   02006 0                 WORBVEL
1585  REF  17  LAST  600      30,2411   02511 0          STORE  W +72D         SET DIAGONALS OF W4
1586  REF  18  LAST  600      30,2412   02521 0          STORE  W +80D
1587  REF  19  LAST  600      30,2413   02531 1          STORE  W +88D
1588                          30,2414   77614 1  SETVANDI CLEAR
1589  REF   2  LAST  582      30,2415   02666 0                 DMENFLG       0=6X6W, 1=9X9W
1590                          30,2416   77624 1  S22NXTIN CALL
1591  REF   1                 30,2417   62351 1                 GETTF
1592  REF  30  LAST  596      30,2420   34041 0          STCALL TDEC1
1593  REF   9  LAST  583      30,2421   27162 1                 INTEGRV
1594                          30,2422   77624 1          CALL
1595  REF   1                 30,2423   61332 1                 S22CALRC      CALC. RC  B-29 OR B-27 (CSMPOS)
1596                          30,2424   66150 0          LXA,1  SXA,1
1597  REF   3  LAST  598      30,2425   02750 1                 S22LOC        SETUP ADDR. OF MARK DATA FOR GETUM SUBR.
1598  REF   4  LAST  579      30,2426   01242 1                 MARKDATA
1599                          30,2427   77624 1          CALL                 COMPUTE UM
1600  REF   2  LAST  581      30,2430   47104 1  S2GETUM        GETUM
1601  REF   5  LAST  581      30,2431   01235 1          STORE  UM
1604                          30,2432   41535 1  DMPINTEG SLOAD  PUSH          TEST OFF=1
1605  REF   6  LAST  598      30,2433   02747 1                 BKK
1606                          30,2434   50535 1          SLOAD  SR3            CXOFF SCALED B-5, MUST MOVE TO B-14
1607  REF   4  LAST  568      30,2435   02746 0                 CXOFF         BEFORE SUBT.
1608                          30,2436   50442 0          SR3    SR3
1609                          30,2437   77625 0          DSU
1610                          30,2440   43030 0          BHIZ   BON
1611  REF   1                 30,2441   60755 0                 S22OFF=1      BRANCH HERE IF OFF=1
1612  REF   3  LAST  600      30,2442   02706 1                 DMENFLG       0=6X6W, 1=9X9W
1613  REF   1                 30,2443   60763 0                 S22O=9
16131                         30,2444   77624 1          CALL
16132 REF  12  LAST  584      30,2445   56750 0                 GRP2PC
1614                          30,2446   77614 1          SET
1615  REF   5  LAST  599      30,2447   01471 1                 ORBWFLAG
1616                          30,2450   43014 0          SET    SET
1617  REF   4  LAST  600      30,2451   02466 1                 DMENFLG       =0 ON FIRST PASS THRU HERE FOR D=0,OR6
1618  REF   1                 30,2452   01062 1                 22DSPFLG      =1 TO DISPLAY OR,DV ON FIRST PASS
1619                          30,2453   43014 0          SET    BON
1620  REF   4  LAST  565      30,2454   00462 1                 ERADFLAG      =1 TO COMPUTE FISCHER RADIUS
1621  REF   6  LAST  568      30,2455   03307 0                 KNOWNFLG
1622  REF   1                 30,2456   61123 0                 S2290X22
1623                          30,2457   53575 0          VLOAD  UNIT          UNIT ALSO PUTS ABVAL(RC) IN 36D
1624  REF   5  LAST  584      30,2460   01207 0                 CSMPOS
1625  REF   4  LAST  567      30,2461   02152 0          STORE  ALPHAV        ALPHAV +4=SINL FOR SETRE
1626                          30,2462   43014 0          CLEAR  BOFF
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1627   REF   5  LAST  566   30,2463   01663 0                LUNAFLAG
1628   REF   8  LAST  599   30,2464   04343 1                CMOONFLG
1629   REF   1              30,2465   60470 1                S22C=I
1630                        30,2466   77614 1          SET
1631   REF   6  LAST  601   30,2467   01463 1                LUNAFLAG
1632                        30,2470   77624 1  S22C=I  CALL                  ERADM= RO METERS B-29 BOTH EARTH/MOON
1633   REF   1              30,2471   26601 1                SETRE
1634                        30,2472   77624 1          CALL                  COMPUTE RL FROM EQUATION 2.4.10
1635   REF   1              30,2473   61277 1                S22F2410        STORED IN X789,MPAC  B-27,B-29
1636                        30,2474   70414 1          BOFF  VSR2            SCALE RL B-29 FOR BOTH EARTH/MOON
1637   REF   9  LAST  601   30,2475   04343 1                CMOONFLG
1638                        30,2476   60477 0                +1
1639   REF   1              30,2477   02635 0          STORE S22RL
1640                        30,2500   72441 0          DOT   SL1
1641   REF   6  LAST  600   30,2501   01235 1                UM
1642   REF   1              30,2502   24037 0          STOVL S22D            D= UM.RL B-29
1643   REF  13  LAST  599   30,2503   15335 0                ZEROVECS
1644                        30,2504   41401 1          SETPD PUSH
1645                        30,2505   00001 0                OD
1646                        30,2506   65206 0          PUSH  PDDL            SET 0-180 = 1 BACKWARDS
1647   REF   5  LAST  566   30,2507   15333 0                HIOPHALF        PD 18
16471                       30,2510   77702 1          SR2                   B-3
1648                        30,2511   00005 1          STORE 4D
1649                        30,2512   00011 1          STORE 8D
1650                        30,2513   24015 0          STOVL 12D
1651   REF   7  LAST  601   30,2514   01235 1                UM              B-1
1652   REF   1              30,2515   24023 0          STOVL S223X1
1653   REF   2  LAST  601   30,2516   02635 0                S22RL           B-29
1654                        30,2517   77624 1          CALL                  (UM)(RL T) B-30 STORED IN S22UMRL THRU
1655   REF   1              30,2520   62332 1                S2231X13        S22UMRL +17D
1656                        30,2521   66370 0          AXT,1 SSP
1657                        30,2522   00022 1          DEC   18
1658   REF  12  LAST  599   30,2523   00051 0                S1
1659                        30,2524   00006 1          DEC   6
1660                        30,2525   70573 1  S22NXTU VLOAD* VSR2            (UM)(RL T) B-32
1661   REF   1              30,2526   03524 1                S22UMRL +18D,1
16611                       30,2527   77741 0          V/SC
1662   REF   2  LAST  601   30,2530   00037 0                S22D            D B-29
1663                        30,2531   45445 0          BVSU  STADR           SUBTRACT FROM I B-3
1664   REF   2  LAST  601   30,2532   70253 1          STORE S22UMRL +18D,1  U MATRIX B-3
1665                        30,2533   76100 1          TIX,1 AXT,1           PD 0 AFTER TIX
1666   REF   1              30,2534   60525 0                S22NXTU
1667                        30,2535   00044 1          DEC   36              S1 STILL 6 FROM ABOVE
1668                        30,2536   64373 1  S22NXTWI VLOAD* MXV
1669   REF  20  LAST  600   30,2537   02445 0                W +36D,1        B-19
1670   REF   3  LAST  601   30,2540   03502 0                S22UMRL         B-3
1671                        30,2541   77732 1          VSL3
1672   REF  21  LAST  601   30,2542   06621 1          STORE W +144D,1       W([+18)= UW(I) B-19
1673                        30,2543   71300 1          TIX,1 DLOAD
1674   REF   1              30,2544   60536 1                S22NXTWI
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1675  REF  1                 30,2545  00041 1                 S22RHO          B-28,B-30
1676                         30,2546  60414 0           BOFF  SR2             MAKE RHO B-30
1677  REF  10 LAST  601      30,2547  04343 1                 CMOONFLG
1678                         30,2550  60551 0                 +1
1679                         30,2551  57101 0           NORM  XAD,2
1680  REF  10 LAST  582      30,2552  00050 1                 X2
1681  REF  11 LAST  602      30,2553  00047 1                 X2
1682                         30,2554  41316 0           DSQ   DMP
1683  REF  1                 30,2555  21636 1                 SCTVAR          B+18
1684                         30,2556  77742 0           SR1                   ACCOUNTS FOR 1/2 IN NEXT FORMULA
1685  REF  2  LAST  602      30,2557  00041 1           STORE S22RHO          1/2(RHO SQ)(VARSCT)
1686                         30,2560  77770 1           AXT,1
1687                         30,2561  00022 1           DEC   18              S1 STILL 6 FROM ABOVE
1688                         30,2562  64373 1 S22NXXA   VLOAD* MXV
1689  REF  4  LAST  601      30,2563  03524 1                 S22UMRL +180,1  B-3
1690  REF  5  LAST  602      30,2564  03502 0                 S22UMRL         B-3
1691                         30,2565  53761 1           VXSC  VSR*
1692  REF  3  LAST  602      30,2566  00041 1                 S22RHO
1693                         30,2567  57212 1                 0 -12D,2        WITH VARRP SCALED B-28
1694  REF  1                 30,2570  05301 0           STORE S22UUT +180,1   1/2(RHO SQ)(VARSCT)(U)(U T)
1695                         30,2571  77300 1           TIX,1 VLOAD
1696  REF  1                 30,2572  60562 0                 S22NXXA
1697  REF  8  LAST  601      30,2573  01235 1                 UM
1698  REF  2  LAST  601      30,2574  34023 1           STCALL S223X1         UM ALSO IN MPAC FOR S2231X13 SUBR.
1699  REF  2  LAST  601      30,2575  62332 1                 S2231X13        (UM)(UM T) B-2 IN S22UMRL,P17D
1700                         30,2576  50545 0           DLOAD SR3
1701  REF  2  LAST   89      30,2577  02241 1                 EPADM           RO B-29
1702                         30,2600  63471 0           DDV   DSQ
1703  REF  3  LAST  601      30,2601  00037 0                 S22D            B-29
1704                         30,2602  77505 1           DMP
1705  REF  1                 30,2603  02010 1                 RPVAR           ***** METERS SQ
1706  REF  4  LAST  602      30,2604  00041 1           STORE S22RHO          TEMP (VARRP)(RO/D)
1707                         30,2605  77770 1           AXT,1
1708                         30,2606  00022 1           DEC   18              S1 STILL 6 FROM ABOVE
1709                         30,2607  74373 0 S22NXXB   VLOAD* VXSC
1710  REF  6  LAST  602      30,2610  03524 1                 S22UMRL +180,1  (UM)(UM T) B-2
1711  REF  5  LAST  602      30,2611  00041 1                 S22RHO
1712                         30,2612  77693 1           VAD*
1713  REF  2  LAST  602      30,2613  01301 1                 S22UUT +18D,1
1714  REF  3  LAST  602      30,2614  05301 0           STORE S22UUT +18D,1   SMALL E MATRIX
1715                         30,2615  77775 1           VLOAD
1716  REF  14 LAST  601      30,2616  15335 0                 ZEROVECS
1717  REF  22 LAST  601      30,2617  06643 0           STORE W +162D,1       CLEAR W8
1718                         30,2620  40100 1           TIX,1 BOV
1719  REF  1                 30,2621  60607 0                 S22NXXB
1720                         30,2622  60623 0                 +1
1721                         30,2623  50145 1           DLOAD BMN
1722  REF  4  LAST  602      30,2624  01277 1                 S22UUT +16D     E5
1723  REF  1                 30,2625  60644 1                 S22W76X
1724                         30,2626  53166 0           SQRT  BZE
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1725  REF   2  LAST  602   30,2627   60644 1                 S22W76X
1726  REF  23  LAST  602   30,2630   16625 1          STODL  W +148D          W74= SQ ROOT E5
1727  REF   5  LAST  602   30,2631   01275 0                 S22UUT +14D     E4
1728                       30,2632   40071 0          DDV    BOV
1729  REF  24  LAST  603   30,2633   02625 1                 W +148D
1730  REF   1               30,2634   60636 1                 S22W72X
1731  REF  25  LAST  603   30,2635   02623 1          STORE  W +146D          W73= E4/W74
1732                       30,2636   56345 0 S22W72X  DLOAD  DDV
1733  REF   6  LAST  603   30,2637   01273 0                 S22UUT +12D     E3
1734  REF  26  LAST  603   30,2640   02625 1                 W +148D
1735                       30,2641   77600 1          BOV
1736  REF   3  LAST  603   30,2642   60644 1                 S22W76X
1737  REF  27  LAST  603   30,2643   02621 0          STORE  W +144D          W72= E4/W74
1738                       30,2644   63545 0 S22W76X  DLOAD  DSQ
1739  REF  28  LAST  603   30,2645   02623 1                 W +146D         W73
1740                       30,2646   50021 1          BDSU   BMN
1741  REF   7  LAST  603   30,2647   01267 0                 S22UUT +8D      E2
1742  REF   1               30,2650   60664 0                 S22W78X
1743                       30,2651   53166 0          SQRT   BZE
1744  REF   2  LAST  603   30,2652   60664 0                 S22W78X
1745  REF  29  LAST  603   30,2653   16631 1          STODL  W +152D          W76= SQ ROOT (E2-W73 SQ)
1746  REF  30  LAST  603   30,2654   02621 0                 W +144D         W72
1747                       30,2655   44205 0          DMP    BDSU
1748  REF  31  LAST  603   30,2656   02623 1                 W +146D         W73
1749  REF   8  LAST  603   30,2657   01265 1                 S22UUT +6D      E1
1750                       30,2660   40071 0          DDV    BOV
1751  REF  32  LAST  603   30,2661   02631 1                 W +152D         W76
1752  REF   3  LAST  603   30,2662   60664 0                 S22W78X
1753  REF  33  LAST  603   30,2663   02627 0          STORE  W +150D          W75= (E1-W72W73)/W76
1754                       30,2664   63545 0 S22W78X  DLOAD  DSQ
1755  REF  34  LAST  603   30,2665   02627 0                 W +150D
1756                       30,2666   63525 0          PDDL   DSQ
1757  REF  35  LAST  603   30,2667   02621 0                 W +144D         W72
1758                       30,2670   77615 0          DAD
1759                       30,2671   50021 1          BDSU   BMN
1760  REF   9  LAST  603   30,2672   01257 0                 S22UUT          E0
1761  REF   1               30,2673   60676 0                 S22SCLW
1762                       30,2674   77766 0          SQRT
1763  REF  36  LAST  603   30,2675   02635 0          STORE  W +156D          W78= SQ RT(E0-W72 SQ-W75 SQ)
1764                       30,2676   74575 0 S22SCLW  VLOAD  VSR1            SCALE W8 METERS B-19
1765  REF  37  LAST  603   30,2677   02621 0                 W +144D
1766  REF  38  LAST  603   30,2700   26621 0          STOVL  W +144D
1767  REF  39  LAST  603   30,2701   02627 0                 W +150D
1768                       30,2702   77762 1          VSR1
1769  REF  40  LAST  603   30,2703   26627 0          STOVL  W +150D
1770  REF  41  LAST  603   30,2704   02635 0                 W +156D
1771                       30,2705   77762 1          VSR1
1772  REF  42  LAST  603   30,2706   02635 0          STORE  W +156D
1773                       30,2707   77624 1 S22SAVET CALL
1774  REF   2  LAST  600   30,2710   62351 1                 GETTF
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1775   REF   2  LAST  125   30,2711   03672 1           STORE  S22TPRIM       SAVE PRESENT TIME FOR PIOS
1776                       30,2712   77776 1  S22I=N   EXIT                   TEST I=N
1777   REF  31  LAST  586   30,2713  0 5412 0           TC     PHASCHNG
1778                       30,2714   04022 0           OCT    04022
1779   REF   7  LAST  600   30,2715  4 1746 1           CS     8KK
1780   REF   4  LAST  566   30,2716  6 1747 1           AD     8NN
1781                       30,2717  0 0006 1           EXTEND
1782   REF   1              30,2720  6 3161 1           BZMF   S22F244X         EXIT TO FIGURE 2.4-4
1783   REF   8  LAST  604   30,2721  3 1746 0           CA     8KK              I=I+1
1784   REF  72  LAST  596   30,2722  6 5017 1           AD     ONE
1785   REF   6  LAST  585   30,2723  55'300 1           TS     TEMPOR1
1786   REF   4  LAST  600   30,2724  3 1750 1           CA     S22LOC           ADD 7 TO LOC TO GET ADDR. OF NEXT MARK
1787   REF  12  LAST  570   30,2725  6 5023 0           AD     SEVEN
1788   REF   7  LAST  604   30,2726  55'301 0           TS     TEMPOR1 +1
1789   REF  32  LAST  604   30,2727  0 5412 0           TC     PHASCHNG
1790                       30,2730   04022 0           OCT    04022
1791   REF   8  LAST  604   30,2731  3 1300 0           CA     TEMPOR1
1792   REF   9  LAST  604   30,2732  55'746 1           TS     8KK
1793   REF   9  LAST  604   30,2733  3 1301 1           CA     TEMPOR1 +1
1794   REF   5  LAST  604   30,2734  55'750 0           TS     S22LOC
1795   REF  99  LAST  599   30,2735  0 6006 1           TC     INTPRET
1796                       30,2736   77624 1           CALL                    FOR ALL INTEGRATIONS OTHER THAN FIRST
1797   REF  17  LAST  599   30,2737   27442 0  S2INTS1          INTSTALL
1798                       30,2740   77624 1           CALL
1799   REF   2  LAST  599   30,2741   62355 0                    S22FLGS
1800                       30,2742   43014 0           BON      CLEAR
1801   REF   5  LAST  600   30,2743   02706 1                    DMENFLG
1802   REF   1              30,2744   60416 1                    S22NXTIN        RETURN ALWAYS EXCEPT OFFSET POINT MARK 1
1803   REF   9  LAST  599   30,2745   01676 1                    DIMOFLAG
1804                       30,2746   43014 0           BOFF     SET
1805   REF   6  LAST  600   30,2747   01751 0                    ORBWFLAG
1806   REF   2  LAST  604   30,2750   60416 1                     S22NXTIN       OFFSET POINT MARK 1,NO W INTEGRATION
1807   REF  10  LAST  604   30,2751   01476 0                    DIMOFLAG
1808                       30,2752   77614 1           CLRGO
1809   REF   3  LAST  599   30,2753   01635 0                    D6OR9FLG
1810   REF   3  LAST  604   30,2754   60416 1                    S22NXTIN        OFFSET POINT MARK 1,INTEGRATE W 6X6
1811                       30,2755   77624 1  S22OFF=I CALL
1812   REF   3  LAST  603   30,2756   62351 1                    GETTF
1813   REF   8  LAST  568   30,2757   27670 0           STOVL    S22TOFF         TIME SUB OFF
1814   REF   9  LAST  602   30,2760   01235 1                    UM
1815   REF   1              30,2761   35215 1           STCALL   S22UOFF         U SUB OFF
1816   REF   1              30,2762   60712 0                    S22I=N          TEST I=N
1817                       30,2763   77775 1  S22O=9   VLOAD                    O=9 PATH
1818   REF   1              30,2764   01701 0                    X789
1819                       30,2765   14001 0           STODL    OD              CALL PIOS TWICE TO TRANSFORM RL TO TIME
1820   REF   3  LAST  604   30,2766   03672 1                    S22TPRIM        T(SUB F) FROM TIME T PRIME
1821                       30,2767   00007 0           STORE    6D
1822                       30,2770   45135 1           SLOAD    CALL
1823   REF   3  LAST  599   30,2771   03674 1                    S22EORM         0=EARTH,NON-ZERO=MOON
1824   REF   1              30,2772   55371 1  S2RTRP           R-TO-RP
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1825                          30,2773  45006 0          PUSH   CALL             R-TO-RP LEAVES PUSHLOC AT 0
1826  REF   4  LAST  604      30,2774  62351 1                 GETTF
1827                          30,2775  00007 0          STORE  6D
1828                          30,2776  45135 1          SLOAD  CALL
1829  REF   4  LAST  604      30,2777  03674 1                 S22EORM
1830  REF   2  LAST  567      30,3000  55344 1  S2RPTR         RP-TO-R
1831  REF   2  LAST  604      30,3001  01701 0  S22BOX32 STORE  X789
1832                          30,3002  40014 0          SET    BOV
1833  REF   7  LAST  583      30,3003  02464 0                 INCORFLG         FLAG=1
1834                          30,3004  61005 0                 +1               CLEAR OVERFLOW
1835                          30,3005  77651 0          VSU
1836  REF   6  LAST  600      30,3006  01207 0                 CSMPOS
1837  REF   7  LAST  583      30,3007  03531 0          STORE  RCLP             RCL=RL-RC
1838                          30,3010  47256 0          UNIT   VXV              USTAR=UNIT(UNIT(RCL)XUM)
1839  REF  10  LAST  604      30,3011  01235 1                 UM
1840                          30,3012  40056 0          UNIT   BOV
1841  REF   1                 30,3013  60707 1                 S22SAVET         COMPUTATION OVERFLOW,SAVE TF
1842  REF   5  LAST  581      30,3014  01245 0          STORE  USTAR
1843                          30,3015  43014 0  S22BOX12 SET    SET
1844  REF   6  LAST  604      30,3016  02466 1                 DMENFLG          =1 FOR 9X9 W
1845  REF  11  LAST  588      30,3017  00467 1                 VEHUPFLG         =1 FOR CSM
1846                          30,3020  43345 1          DLOAD  DAD
1847  REF   2  LAST  602      30,3021  21636 1                 SCTVAR           B+18
1848  REF   1                 30,3022  21640 0                 IMUVARR          B+18
1849  REF   8  LAST  582      30,3023  27526 0          STOVL  VARIANCE
1850  REF   8  LAST  605      30,3024  03531 0                 RCLP             B-29 OR B-27
1851                          30,3025  60246 1          ABVAL  NORM
1852  REF  22  LAST  594      30,3026  00047 1                 X1
1853                          30,3027  41316 0          DSQ    DMP
1854  REF   9  LAST  605      30,3030  03526 0                 VARIANCE
1855                          30,3031  56070 0          XAD,1  XAD,1
1856  REF  23  LAST  605      30,3032  00046 0                 X1               DOUBLE NORM SHIFT SINCE RCLP WAS SQUARED
1857  REF   5  LAST  605      30,3033  03673 0                 S22EORM          DOUBLE EARTH OR MOON SHIFT,SAME REASON
1858                          30,3034  53670 0          XAD,1  SR*
1859  REF   6  LAST  605      30,3035  03673 0                 S22EORM
1860                          30,3036  20601 1                 0,1              SCALE VARIANCE B-40 FOR BOTH EARTH,MOON
1861                          30,3037  77751 1          TLOAD                   CHANGE MODE TO TRIPLE
1862  REF 258  LAST  595      30,3040  00155 0                 MPAC
1863  REF  10  LAST  605      30,3041  37526 1          STCALL VARIANCE         CALC B0,B1,DELTA0, NEW USTAR
1864  REF   2  LAST  581      30,3042  47043 0  S28VTRS        BVECTORS
1865                          30,3043  57575 1          VLOAD  VCOMP
1866  REF  14  LAST  584      30,3044  03502 0                 BVECTOR
1867  REF  15  LAST  605      30,3045  37516 1          STCALL BVECTOR +12D     B2=-B0
1868  REF   2  LAST  582      30,3046  75254 0  S2INCP1        INCORP1
1869                          30,3047  77624 1          CALL
1870  REF  13  LAST  600      30,3050  56750 0                 GRP2PC
1871                          30,3051  43014 0          BOFF   CLEAR
1872  REF   2  LAST  600      30,3052  01342 0                 22DSPFLG         =1 DISPLAY DELTA R,V  =0 DO NOT
1873  REF   1                 30,3053  61104 0                 S22BOX42
1874  REF   3  LAST  605      30,3054  01262 0                 22DSPFLG
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18741                                30,3055   77624 1          CALL
18742  REF  14  LAST  605           30,3056   56750 0                   GRP2PC
1875                                 30,3057   51575 1          VLOAD    ABVAL
1876   REF   7  LAST  582           30,3060   01257 0                   DELTAX          DELTA R
1877                                 30,3061   53750 0          LXA,1    SR*
1878   REF   7  LAST  605           30,3062   03673 0                   S22FORM         SCALE DELTA R ALWAYS METERS B-29
1879                                 30,3063   20601 1                   0,1
1880   REF   9  LAST  585           30,3064   27502 0          STOVL    N49DISP
1881   REF   8  LAST  606           30,3065   01265 1                   DELTAX +6       DELTA V
1882                                 30,3066   53646 0          ABVAL    SR*             DELTA V=METERS/CSEC B-7 ALWAYS
1883                                 30,3067   20601 1                   0,1
1884   REF  10  LAST  606           30,3070   03504 0          STORE    N49DISP +2
1885                                 30,3071   77776 1          EXIT
1886   REF   1                      30,3072  3 3643 0          CAF      V06N49EE
1887   REF 137  LAST  599           30,3073  0 4662 1          TC       BANKCALL
1888   REF   7  LAST  567           30,3074   21057 0          CADR     GOFLASHR
1889   REF  24  LAST  571           30,3075  0 4106 1          TC       GOTOPOOH        V34E TERMINATE
1890                                 30,3076  0 3103 0          TC       +5              INCORPORATE CHANGES
1891   REF   1                      30,3077  0 3267 1          TC       S22EXEX         V32E RECYCLE
1892   REF  20  LAST  594           30,3100  3 5015 0          CAF      BIT3
1893   REF   9  LAST  571           30,3101  0 5526 0          TC       BLANKET
1894   REF  73  LAST  585           30,3102  0 5217 0          TC       ENDOFJOB
1895   REF 100  LAST  604           30,3103  0 6006 1          TC       INTPRET
1896                                 30,3104   77624 1 S22BOX42 CALL
1897   REF   2  LAST  583           30,3105   75466 1                   INCORP2
1898                                 30,3106   77624 1          CALL                     CSMPOS=RC B-29 OR B-27
1899   REF   2  LAST  600           30,3107   61332 1                   S22CALRC
1902                                 30,3110   45014 0 OMPINCP2 BOFF     CALL
1903   REF   8  LAST  605           30,3111   02744 1                   INCORFLG
1904   REF   2  LAST  605           30,3112   60707 1                   S22SAVET        SAVE TF AND TEST I=N
1905   REF  15  LAST  606           30,3113   56750 0                   GRP2PC
1908                                 30,3114   77214 0          CLEAR    VLOAD
1909   REF   9  LAST  606           30,3115   02664 1                   INCORFLG        FLAG=0
1910   REF   3  LAST  605           30,3116   01701 0                   X789
1911                                 30,3117   77651 0          VSU
1912   REF   7  LAST  605           30,3120   01207 0                   CSMPOS
1913   REF   9  LAST  605           30,3121   37531 1          STCALL   RCLP            RCL=RL-RC
1914   REF   1                      30,3122   61015 1                   S22BOX12
1915                                 30,3123   66370 0 S22BOX22 AXT,1    SSP             CLEAR W6,W7,W8  (27 ELEMENTS 54 REGS)
1916                                 30,3124   00066 1          DEC      54
1917   REF  13  LAST  601           30,3125   00051 0                   S1
1918                                 30,3126   00006 1          DEC      6
1919                                 30,3127   77775 1          VLOAD
1920   REF  15  LAST  602           30,3130   15335 0                   ZEROVECS
1921   REF  43  LAST  603           30,3131   06643 0 CLRW678   STORE    W +1620,1
1922                                 30,3132   67300 0          TIX,1    SLOAD
1923   REF   1                      30,3133   61131 0                   CLRW678
1924   REF   1                      30,3134   02007 1                   S22WSUBL
1926   REF  44  LAST  606           30,3135   02621 0          STORE    W +1440
1927   REF  45  LAST  606           30,3136   02631 1          STORE    W +1520
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1928   REF  46  LAST  606   30,3137   02641 0            STORE  W +160D
1929                       30,3140   43014 0            CLEAR  BOFF              SET LUNAFLAG, TIME FOR LALOTORV
1930   REF   7  LAST  601   30,3141   01663 0                   LUNAFLAG         ERADFLAG,LAT,LONG,ALT SET PREVIOUSLY
1931   REF  11  LAST  602   30,3142   04343 1                   CMOONFLG         CHECK SCALING OF ITEMS.ALT INPUT AND
1932   REF   1              30,3143   61146 0                   S22BX22A         RL OUTPUT IN ALPHAV BOTH B-29
1933                       30,3144   77614 1            SET
1934   REF   8  LAST  607   30,3145   01463 1                   LUNAFLAG
1935                       30,3146   77624 1  S22BX22A  CALL
1936   REF   5  LAST  605   30,3147   62351 1                   GETTF
1937                       30,3150   77624 1            CALL                     COMPUTE RL
1938   REF   3  LAST  541   30,3151   26441 1                   LALOTORV
1939                       30,3152   43175 0            VLOAD  BOFF
1940   REF   5  LAST  600   30,3153   02152 0                   ALPHAV           RL B-29
1941   REF  12  LAST  607   30,3154   04343 1                   CMOONFLG
1942   REF   1              30,3155   61157 0                   S22BX22B
1943                       30,3156   77752 1            VSL2                     SCALE RL B-27 FOR MOON
1944                       30,3157   77650 1  S22BX22B  GOTO
1945   REF   1              30,3160   61001 1                   S22BOX32
1946   REF 101  LAST  606   30,3161   0 6006 1  S22F244X  TC     INTPRET
1947                       30,3162   46135 1  S22F244   SLOAD  BHIZ              FIG 2.4-4   TEST OFF=0
1948   REF   5  LAST  600   30,3163   02746 0                   CXOFF
1949   REF   1              30,3164   61220 0                   S22BOX44
19491                      30,3165   77661 0            SR                       SCALE OFFSET B-14 THEN TEST GR. BNN
19492                      30,3166   20612 0                   9D
19493  REF   6  LAST  607   30,3167   02152 0            STORE  ALPHAV           TEMP
19494                      30,3170   45335 0            SLOAD  DSU
19495  REF   5  LAST  604   30,3171   02750 1                   BNN
19496  REF   7  LAST  607   30,3172   02152 0                   ALPHAV
19497                      30,3173   45040 1            BMN    CALL             OFFSET GR. NO. MARKS, FORGET IT
19498  REF   2  LAST  607   30,3174   61220 0                   S22BOX44
19499  REF  16  LAST  606   30,3175   56750 0                   GRP2PC           GROUP 2 PHASE CHANGE
1954                       30,3176   77745 1            DLOAD
1955   REF   9  LAST  604   30,3177   03670 0                   S22TOFF
1956   REF  31  LAST  600   30,3200   34041 0            STCALL TDEC1            CALC RC AT OFFSET TIME
1957   REF   5  LAST  532   30,3201   27071 1                   CSMPREC
1958                       30,3202   77775 1            VLOAD
1959   REF   6  LAST  512   30,3203   00017 1                   RATT1            RC METERS B-29 OR B-27
1960   REF   8  LAST  606   30,3204   25207 0            STOVL  CSMPOS
1961   REF   2  LAST  604   30,3205   01215 0                   S22UOFF
1962   REF  11  LAST  605   30,3206   25235 1            STOVL  UM               U=UOFF
1963   REF   4  LAST  606   30,3207   01701 0                   X789
1964                       30,3210   43046 1            ABVAL  BOFF
1965   REF  13  LAST  607   30,3211   04343 1                   CMOONFLG
1966                       30,3212   61214 1                   +2
1967                       30,3213   77702 1            SR2                      SCALE MOON RO B-29 FOR S22F2410 SUBR
1968   REF   3  LAST  602   30,3214   36241 0            STCALL ERASM
1969   REF   2  LAST  601   30,3215   61277 1                   S22F2410
1970                       30,3216   77650 1            GOTO
1971   REF   1              30,3217   61223 0                   S22BX44A
1972                       30,3220   77624 1  S22BOX44  CALL
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1973  REF   6  LAST  607   30,3221   62351 1                 GETTF
1974  REF  10  LAST  607   30,3222   03670 0          STORE  S22TOFF        PRESENT TIME FOR LAT-LONG SETUP
1975                       30,3223   77214 0  S22BX44A CLEAR  VLOAD
1976  REF   9  LAST  607   30,3224   01663 0                 LUNAFLAG
1977  REF   5  LAST  607   30,3225   01701 0                 X789
1978                       30,3226   43014 0          BOFF   SET
1979  REF  14  LAST  607   30,3227   04343 1                 CMOONFLG
1980  REF   1              30,3230   61233 1                 S22BX44B
1981  REF  10  LAST  608   30,3231   01463 1                 LUNAFLAG       SET = 1 FOR LAT-LONG
1982                       30,3232   77742 0          VSR2                  SCALE RL MOON B-29 FOR LAT-LONG
1983  REF   8  LAST  607   30,3233   16152 0  S22BX44B STODL  ALPHAV        RL SCALED B-29 FOR LAT-LONG
1984  REF  11  LAST  608   30,3234   03670 0                 S22TOFF        EITHER PRESENT OR OFFSET TIME
1985                       30,3235   77624 1          CALL
1986  REF   3  LAST  567   30,3236   26370 1                 LAT-LONG       **** ALT OUTPUT ALWAYS B-29
1989                       30,3237   77624 1          CALL                  DISPLAY LAT/LONG/ALT
1990  REF   1              30,3240   62365 0                 LLASRD
1991                       30,3241   77776 1          EXIT
1992  REF   2  LAST  567   30,3242   3 3644 1         CAF    V06N89B
1993  REF 138  LAST  606   30,3243   0 4662 1         TC     BANKCALL
1994  REF  19  LAST  567   30,3244    20720 0         CADR   GOFLASH
1995  REF   1              30,3245   0 3272 0         TC     S22GTP         V34E TERMINATE
1996                       30,3246   0 3250 0         TC     +2             PROCEED   SAVE LANDING SITE COORD
1997  REF   1              30,3247   0 3263 0         TC     S22.981X       RECYCLE   POINT A IN GSOP
1998  REF 102  LAST  607   30,3250   0 6006 1         TC     INTPRET
2000                       30,3251   77745 1          DLOAD
2001  REF  12  LAST  608   30,3252   03670 0                 S22TOFF        EITHER PRESENT OR OFFSET TIME
2002                       30,3253   24007 0          STOVL  6D             6-7D= LANDING SITE TIME FOR R-TO-RP
2003  REF   6  LAST  608   30,3254   01701 0                 X789
2004                       30,3255   00001 0          STORE  0D             0-5D= LANDING SITE VEC  FOR R-TO-RP
2005                       30,3256   45135 1          SLOAD  CALL
2006  REF   6  LAST  601   30,3257   15333 0                 HIDPHALF       ANY NON-ZERO FOR MOON
2007  REF   2  LAST  604   30,3260   55371 1                 R-TO-RP        CONVERT RLS TO MOON-FIXED COORD
2008  REF   7  LAST  566   30,3261   02026 1          STORE  RLS            LANDING SITE VECTOR
2009                       30,3262   77776 1          EXIT
2010  REF 103  LAST  608   30,3263   0 6006 1 S22.981X TC    INTPRET
2011                       30,3264   77624 1          CALL
2012  REF   1              30,3265   61342 0                 9DWTO6DW
20121                      30,3266   77776 1          EXIT                  GO TO POINT A IN CHAPTER 5
20122 REF 104  LAST  608   30,3267   0 6006 1 S22EXEX  TC     INTPRET        WITHOUT CONVERTING W
2013                       30,3270   77650 1          GOTO
2014  REF   4  LAST  598   30,3271   03703 0                 S22RTNEX

20141 REF 105  LAST  608   30,3272   0 6006 1 S22GTP   TC     INTPRET        CONVERT W BEFORE TC GOTOPOOH
20142                      30,3273   77624 1          CALL
20143 REF   2  LAST  608   30,3274   61342 0                 9DWTO6DW
20144                      30,3275   77776 1          EXIT
20145 REF  25  LAST  606   30,3276   0 4106 1         TC     GOTOPOOH
2015                       30,3277   77201 1 S22F2410 SETPD  VLOAD          COMPUTE FORMULA 2.4.10
2016                       30,3300   00001 0                 0D
2017  REF   9  LAST  607   30,3301   01207 0                 CSMPOS         RC B-29 EARTH,B-27 MOON
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2018                              30,3302  50256 0          UNIT    DDT             UNIT ALSO SETS 36D=ABVAL(RC) USED BELOW
2019  REF  12  LAST  607         30,3303  01235 1                  UM
2020                              30,3304  57552 1          SL1     DCOMP           GSOP CHANGE 8/18/67
2021                              30,3305  77606 1          PUSH                    PD 2D OD=COSA=-(UM.RC)/ABVAL(RC) B-1
2022                              30,3306  44316 0          DSQ     BDSU
2023  REF   1                   30,3307  21642 1                  DEC182
2024                              30,3310  43125 0          PDDL    BOFF            PD 4D  2D=1-COSA SQ=SINA SQ  B-2
2025  REF   4  LAST  607         30,3311  02241 1                  ERADM           RO ALWAYS B-29 FROM SETRE
2026  REF  15  LAST  608         30,3312  04343 1                  CMOONFLG
2027                              30,3313  61315 1                  +2
2028                              30,3314  77712 0          SL2                     SCALE RO B-27 FOR MOON
2029                              30,3315  56362 0          SR1R    DDV             (RO/RC) B-1
2030                              30,3316  00045 0                  36D
2031                              30,3317  45316 1          DSQ     DSU             PD 2D (RO/RC) SQ - SINA SQ  B-2
2032                              30,3320  44366 1          SQRT    BDSU            PD OD COSA-SQRT((RO/RC)SQ-SINA SQ) B-1
2033                              30,3321  77605 1          DMP                     DMP RESULT B-28 MOON,B-30 EARTH
2034                              30,3322  00045 0                  36D             VXSC RESULT B-29 MOON, B-31 EARTH
2035  REF   6  LAST  602         30,3323  00041 1          STORE   S22RHO          RHO FOR W INIT. OF UNKNOWN LMK B-28,B-30
2036                              30,3324  77761 1          VXSC
2037  REF  13  LAST  609         30,3325  01235 1                  UM
2038                              30,3326  53352 0          VSL2    VAD             SCALE B-27 MOON,B-29 EARTH AND ADD RC
2039  REF  10  LAST  608         30,3327  01207 0                  CSMPOS
2040  REF   7  LAST  608         30,3330  01701 0          STORE   X789
2041                              30,3331  77616 0          RVQ                     B-27 FOR EARTH OR B-29 FOR MOON
2042                              30,3332  77350 1  S22CALRC LXA,1   VLOAD           COMPUTE RC B-29 OR B-27
2043  REF   8  LAST  606         30,3333  03673 0                  S22EORM         =0 FOR EARTH,-2 FOR MOON
2044  REF   2  LAST  584         30,3334  01573 1                  DELTACSM
2045                              30,3335  53257 1          VSR*    VAD
2046                              30,3336  20610 1                  7,1
2047  REF   2  LAST  584         30,3337  01607 1                  RCVCSM
2048  REF  11  LAST  609         30,3340  01207 0          STORE   CSMPOS
2049                              30,3341  77616 0          RVQ
20495 REF   1                     31,2000                   SETLOC  P22S
20496                             31,2332                   BANK

2050  REF   1                     31,2332  00031 0  S2231X13 STORE   S221X3          MULT 3X1 BY 1X3,STORE RESULTING 3X3 IN
2051                              31,2333  77131 1          SSP     AXT,2           S22UMRL- S22UMRL +17D
2052  REF   7  LAST  537         31,2334  00052 0                  S2
2053                              31,2335  00002 0          DEC     2
2054                              31,2336  00006 1          DEC     6
2055                              31,2337  77770 1          AXT,1
2056                              31,2340  00022 1          DEC     18
2057                              31,2341  73775 0  S2231NXT VLOAD   VXSC*
2058  REF   2  LAST  609         31,2342  00031 0                  S221X3
2059  REF   3  LAST  602         31,2343  77746 1                  S223X1 +6,2
2060  REF   7  LAST  602         31,2344  07524 0          STORE   S22UMRL +18D,1
2061                              31,2345  61110 0          INCR,1  TIX,2
2062                              31,2346  77771 0          DEC     -6
2063  REF   1                     31,2347  62341 0                  S2231NXT
2064                              31,2350  77616 0          RVQ
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 2065                          31,2351   70740 0  GETTF    LXC,1  DLOAD*          SET MPAC= TF
 2066   REF   6  LAST  604     31,2352   02750 1                  S22LOC
 2067                          31,2353   00001 0                  0,1
 2068                          31,2354   77616 0          RVQ

 2069                          31,2355   43014 0  S22FLGS  SET    SET             INTEGRATION FLAGS
 2070   REF  11  LAST  604     31,2356   01476 0                  DIMOFLAG
 2071   REF   4  LAST  604     31,2357   01475 0                  D60R9FLG
 2072                          31,2360   43014 0          SET    SET
 2073   REF  11  LAST  586     31,2361   01474 1                  VINTFLAG
 2074   REF   2  LAST  586     31,2362   01472 1                  STATEFLG
 2075                          31,2363   43414 1          CLEAR  RVQ
 2076   REF  11  LAST  586     31,2364   01673 1                  INTYPFLG

R2077   SUBROUTINE TO MODIFY ALT AND STORE LAT TO LAT+5 IN LANDLAT TO LANDLAT+5
R2078   PRIOR TO DISPLAY.

 2079                          31,2365   77745 1  LLASRD   DLOAD                  ALT , LANDALT METERS B-29
 2080   REF   4  LAST  279     31,2366   01110 0                  ALT
 2081   REF   3  LAST  282     31,2367   16362 1          STODL  LANDALT
 2082   REF   5  LAST  281     31,2370   01106 1                  LONG
 2083                          31,2371   77742 0          SR1
 2084   REF   4  LAST  567     31,2372   02360 0          STORE  LANDLONG
 2085                          31,2373   77616 0          RVQ
R2086   SUBROUTINE TO MODIFY LANDALT AND STORE LANDALT TO LANDALT+5 IN LAT TO
R2087   LAT+5 AFTER LMK DATA LOADED BY ASTRONAUT.

 2088                          31,2374   77745 1  LLASRDA  DLOAD                  ALT , LANDALT METERS B-29
 2089   REF   4  LAST  610     31,2375   02362 1                  LANDALT
 2090   REF   5  LAST  610     31,2376   15110 0          STODL  ALT
 2091   REF   5  LAST  610     31,2377   02360 0                  LANDLONG
 2092                          31,2400   77752 1          SL1
 2093   REF   6  LAST  610     31,2401   01106 1          STORE  LONG
 2094                          31,2402   77616 0          RVQ
20945   REF   2  LAST  598     30,2000                    SETLOC P20S6
20946                          30,3342                    BANK

 2095                          30,3342   40220 0  9DWTO6DW STQ    SETPD
 2096   REF   1                30,3343   01214 1                  9DWXX
 2097                          30,3344   00001 0                  0D
 2098                          30,3345   41575 0          VLOAD  PUSH            CLEAR WORKING AREA OF PUSHLIST
 2099   REF   5  LAST  555     30,3346   15335 0                  HI6ZEROS        INCLUDING P
 2100                          30,3347   41406 0          PUSH   PUSH            PD 18D
 2101                          30,3350   77731 1          SSP
 2102   REF   1                30,3351   00017 1                  9DWJ            J=29   USE 2*29 FOR DP WORDS
 2103                          30,3352   00072 1          DEC    58
 2104                          30,3353   66150 0  9DWI=J   LXA,1  SXA,1           SET I=J
 2105   REF   2  LAST  510     30,3354   00016 0                  9DWJ
 2106   REF   1                30,3355   00012 1                  9DWI
 2107                          30,3356   77624 1  9DWEPCAL CALL
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2108  REF  1                30,3357  61574 0                 ROWDOT
2109                        30,3360  77750 0          LXA,1                  P VARIES 0-20 INSTEAD OF 20-0
2110  REF  1                30,3361  00010 0                 9DWP
2111  REF  1                30,3362  06641 1          STORE  EMATRIX +40D,1
2112                        30,3363  66110 1          INCR,1 SXA,1
2113                        30,3364  00002 0          DEC    2
2114  REF  2  LAST  611     30,3365  00010 0                 9DWP
2115                        30,3366  46135 1          SLOAD  BHIZ            TEST I=0
2116  REF  2  LAST  610     30,3367  00013 0                 9DWI
2117  REF  1                30,3370  61405 1                 9DWTESTJ
2118                        30,3371  77625 0          DSU                    I=I-1
2119  REF  1                30,3372  21634 0                 9DWID
2120  REF  3  LAST  611     30,3373  00013 0          STORE  9DWI
2121                        30,3374  46025 1          DSU    BHIZ            TEST I=26
2122  REF  1                30,3375  21632 0                 9DW26D
2123  REF  1                30,3376  61401 0                 9DWSETI2
2124                        30,3377  77650 1          GOTO                   NEXT E SUB P
2125  REF  1                30,3400  61356 0                 9DWEPCAL
2126                        30,3401  52131 0  9DWSETI2 SSP    GOTO           I=2
2127  REF  4  LAST  611     30,3402  00013 0                 9DWI
2128                        30,3403  00004 0          DEC    4
2129  REF  2  LAST  611     30,3404  61356 0                 9DWEPCAL
2130                        30,3405  46135 1  9DWTESTJ SLOAD  BHIZ            TEST J=0
2131  REF  3  LAST  610     30,3406  00017 1                 9DWJ
2132  REF  1                30,3407  61424 1                 9DWFIG6
2133                        30,3410  77625 0          DSU
2134  REF  2  LAST  611     30,3411  21634 0                 9DWID
2135  REF  4  LAST  611     30,3412  00017 1          STORE  9DWJ            J=J-1
2136                        30,3413  46025 1          DSU    BHIZ            TEST J=26
2137  REF  2  LAST  611     30,3414  21632 0                 9DW26D
2138  REF  1                30,3415  61420 0                 9DWSETJ2
2139                        30,3416  77650 1          GOTO
2140  REF  1                30,3417  61353 0                 9DWI=J
2141                        30,3420  52131 0  9DWSETJ2 SSP    GOTO           SET J=2
2142  REF  5  LAST  611     30,3421  00017 1                 9DWJ
2143                        30,3422  00004 0          DEC    4
2144  REF  2  LAST  611     30,3423  61353 0                 9DWI=J
2145                        30,3424  77624 1  9DWFIG6 CALL
21451 REF 17  LAST  607     30,3425  56750 0                 GRP2PC
21452                       30,3426  77331 0          SSP    VLOAD          START OF FIGURE 2.4-6
2146  REF  6  LAST  611     30,3427  00017 1                 9DWJ           J=29
2147                        30,3430  00072 1          DEC    58
2148  REF  6  LAST  610     30,3431  15335 0                 HI6ZEROS
2149  REF  3  LAST  611     30,3432  00011 1          STORE  9DWP            P,N,I=0
2150                        30,3433  66370 0          AXT,1  SSP
2151                        30,3434  00154 1          DEC    108             CLEAR WO TO W54
2152  REF 14  LAST  606     30,3435  00051 0                 S1
2153                        30,3436  00006 1                 6
2154  REF 47  LAST  607     30,3437  06555 1  CLEARW54 STORE  W +108D,1
2155                        30,3440  77700 0          TIX,1
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2156   REF   1                  30,3441   61437 0                    CLEARW54
2157                            30,3442   66150 0  9DWI=JA   LXA,1    SXA,1          I=J
2158   REF   7  LAST  611       30,3443   00016 0                    9DWJ
2159   REF   5  LAST  611       30,3444   00012 1                    9DWI
2160                            30,3445   77624 1           CALL
2161   REF   2  LAST  611       30,3446   61574 0                    ROWDOT
2162                            30,3447   43750 1           LXA,1    BDSU*
2163   REF   4  LAST  611       30,3450   00010 0                    9DWP
2164   REF   2  LAST  611       30,3451   02641 0                    EMATRIX +400,1
2165                            30,3452   66110 1           INCR,1   SXA,1          -(P+1)
2166                            30,3453   00002 0                    2
2167   REF   5  LAST  612       30,3454   00010 0                    9DWP
2168                            30,3455   54140 0           LXC,1    XSU,1          -(I+N)
2169   REF   6  LAST  612       30,3456   00012 1                    9DWI
2170   REF   1                  30,3457   00014 1                    9DWN
2171                            30,3460   71244 0           BPL      DLOAD          TEST WSQ LTE 0
2172   REF   1                  30,3461   61465 1                    9DWAAA
2173   REF   7  LAST  611       30,3462   15335 0                    HI6ZEROS       W=0
2174                            30,3463   77650 1           GOTO
2175   REF   1                  30,3464   61466 1                    9DWAAB
2176                            30,3465   77766 0  9DWAAA   SQRT                    W= SQRT(WSQ)
2177   REF  48  LAST  611       30,3466   06401 1  9DWAAB   STORE    W,1
2178   REF   1                  30,3467   14001 0           STODL    WORKW
2179   REF   8  LAST  612       30,3470   00017 1                    9DWJ           TEST J=0
2180                            30,3471   77630 1           BHIZ
2181   REF   1                  30,3472   61560 0                    9DWEXITX       EXIT
2182                            30,3473   46135 1  TST2I=0  SLOAD    BHIZ           TEST I=0
2183   REF   7  LAST  612       30,3474   00013 0                    9DWI
2184   REF   1                  30,3475   61536 0                    9DWN=N+3
2185                            30,3476   77625 0           DSU
2186   REF   3  LAST  611       30,3477   21634 0                    9DW1D
2187   REF   8  LAST  612       30,3500   00013 0           STORE    9DWI           I=I-1
2188                            30,3501   46025 1           DSU      BHIZ           TEST I=26
2189   REF   3  LAST  611       30,3502   21632 0                    9DW26D
2190   REF   1                  30,3503   61506 0                    9DWAAC
2191                            30,3504   77650 1           GOTO
2192   REF   1                  30,3505   61511 0                    9DWNEXEP
2193                            30,3506   77731 1  9DWAAC   SSP                     I=2
2194   REF   9  LAST  612       30,3507   00013 0                    9DWI
2195                            30,3510   00004 0                    4
2196                            30,3511   77624 1  9DWNEXEP CALL
2197   REF   3  LAST  612       30,3512   61574 0                    ROWDOT
2198                            30,3513   43750 1           LXA,1    BDSU*          (EP-ROWI*ROWJ)/W
2199   REF   6  LAST  612       30,3514   00010 0                    9DWP
2200   REF   3  LAST  612       30,3515   02641 0                    EMATRIX +400,1
2201                            30,3516   62071 0           DDV      INCR,1         P=P+1
2202   REF   2  LAST  612       30,3517   00001 0                    WORKW
2203                            30,3520   00002 0                    2
2204                            30,3521   70130 1           SXA,1    LXC,1
2205   REF   7  LAST  612       30,3522   00010 0                    9DWP
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2206   REF  10  LAST  612   30,3523   00012 1                  9DWI
2207                       30,3524   40060 0           XSU,1  BOV            -(I+N)
2208   REF   2  LAST  612   30,3525   00014 1                  9DWN
2209   REF   1              30,3526   61531 1                  SETWIN=0
2210                       30,3527   77650 1           GOTO
2211   REF   1              30,3530   61533 0                  9DWSETWX
2212                       30,3531   77745 1  SETWIN=0 DLOAD                  W(I+N)=0
2213   REF   8  LAST  612   30,3532   15335 0                  HI6ZEROS
2214   REF  49  LAST  612   30,3533   06401 1  9DWSETWX STORE  W,1
2215                       30,3534   77650 1           GOTO
2216   REF   1              30,3535   61473 0                  TST2I=0
2217                       30,3536   62150 1  9DWN=N+3 LXA,1  INCR,1         N=N+3
2218   REF   3  LAST  613   30,3537   00014 1                  9DWN
2219                       30,3540   00006 1                  6
2220                       30,3541   67330 0           SXA,1  SLOAD          J=J-1
2221   REF   4  LAST  613   30,3542   00014 1                  9DWN
2222   REF   9  LAST  612   30,3543   00017 1                  9DWJ
2223                       30,3544   77625 0           DSU
2224   REF   4  LAST  612   30,3545   21634 0                  9DWID
2225   REF  10  LAST  613   30,3546   00017 1           STORE  9DWJ
2226                       30,3547   46025 1           DSU    BHIZ           TEST J=26
2227   REF   4  LAST  612   30,3550   21632 0                  9DW26D
2228   REF   1              30,3551   61554 1                  SETJ=2A
2229                       30,3552   77650 1           GOTO
2230   REF   1              30,3553   61442 1                  9DWI=JA
2231                       30,3554   52131 0  SETJ=2A  SSP    GOTO           J=2
2232   REF  11  LAST  613   30,3555   00017 1                  9DWJ
2233                       30,3556   00004 0                  4
2234   REF   2  LAST  613   30,3557   61442 1                  9DWI=JA
2235                       30,3560   77624 1  9DWEXITX CALL
22351  REF  18  LAST  611   30,3561   56750 0                  GRP2PC
22352                      30,3562   66370 0           AXT,1  SSP            CLEAR W6,W7,W8 USED TEMP FOR EMATRIX
2236                       30,3563   00066 1           DEC    54
2237   REF  15  LAST  611   30,3564   00051 0                  S1
2238                       30,3565   00006 1                  6
2239                       30,3566   77775 1           VLOAD
2240   REF   9  LAST  613   30,3567   15335 0                  HI6ZEROS
2241   REF  50  LAST  613   30,3570   06643 0  9DWEXXXA STORE  W +1620,1
2242                       30,3571   52100 1           TIX,1  GOTO
2243   REF   1              30,3572   61570 1                  9DWEXXXA
2244   REF   2  LAST  610   30,3573   01214 1                  9DWXX
2245                       30,3574   40131 0  ROWDOT   SSP    BOV
2246   REF   1              30,3575   00007 0                  XTMP1
2247                       30,3576   00377 1           OCT    377
2248                       30,3577   61600 0                  +1
2249                       30,3600   71140 1           LXC,1  LXC,2
2250   REF  11  LAST  613   30,3601   00012 1                  9DWI
2251   REF  12  LAST  613   30,3602   00016 0                  9DWJ
2252                       30,3603   41545 0           DLOAD  PUSH
2253   REF  10  LAST  613   30,3604   15335 0                  HI6ZEROS
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2254                                30,3605   56743 1  ROWDOT1  DLOAD*  DMPR*
2255  REF  51  LAST  613           30,3606   02401 0                   W,1
2256  REF  52  LAST  614           30,3607   75376 1                   W,2
2257                                30,3610   41415 1           DAD     PUSH
2258                                30,3611   62000 0           BOV     INCR,1
2259  REF   1                       30,3612   61626 1                   ROWDOT3
2260                                30,3613   77771 0           DEC     -6
2261                                30,3614   67314 0           INCR,2  SLOAD
2262                                30,3615   77771 0           DEC     -6
2263  REF   2  LAST  613           30,3616   00007 0                   XTMP1
2264                                30,3617   70430 1           BHIZ    SR1
2265  REF   1                       30,3620   61624 0                   ROWDOT2
2266  REF   3  LAST  614           30,3621   00007 0           STORE   XTMP1
2267                                30,3622   77650 1           GOTO
2268  REF   1                       30,3623   61605 0                   ROWDOT1
2269                                30,3624   77745 1  ROWDOT2  DLOAD
2270                                30,3625   77616 0           RVQ
2271                                30,3626   77614 1  ROWDOT3  CLRGO
2272  REF   7  LAST  604           30,3627   01631 1                   ORBWFLAG
2273  REF   2  LAST  614           30,3630   61624 0                   ROWDOT2
2274                                  0000            WORKW    =       0D
2275                                  0006            XTMP1    =       6D
2276                                  0010            9DWP     =       8D              P
2277                                  0012            9DW1     =       10D             1
2278                                  0014            9DWN     =       12D             N
2279                                  0016            9DWJ     =       14D             J
2280  REF   3  LAST  607              1214            9DWXX    =       S22UOFF
2281  REF  16  LAST  605           E7,1501            S22UMRL  =       BVECTOR         18
2282  REF   9  LAST  606              1256            S22UUT   =       DELTAX          18
2283                                  0022            S223X1   =       18D             6
2284                                  0030            S221X3   =       24D             6
2285                                  0036            S22D     =       30D             2
2286                                  0040            S22RHO   =       32D             2
2287  REF  53  LAST  614           E5,1634            S22RL    =       W +156D         6
2289                                30,3631   00064 0  9DW26D   2DEC    52 B-14
2289                                30,3632   00000 1
2290                                30,3633   00002 0  9DWID    2DEC    2 B-14
2290                                30,3634   00000 1
2291                                30,3635   10306 0  SCTVAR   2DEC    1.0 E-6 B+18
2291                                30,3636   36750 0
2292                                30,3637   00253 0  IMUVAAR  2DEC    0.04 E-6 B+18
2292                                30,3640   31436 1
2293                                30,3641   10000 0  DEC1B2   2DEC    1 B-2
2293                                30,3642   00000 1
2294                                30,3643   01461 0  V06N49EE VN      00649
2295                                30,3644   01531 1  V06N89B  VN      00689
2299  REF   5  LAST  584              1214            S22UOFF  =       LEMPOS          6       U SUB OFF
2300  REF   2  LAST  575           23,2000                     SETLOC  P20S2
2301                                23,3132                     BANK
```

L   P20-P25   USER'S PAGE NO. 54   E5 S3

P2371

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P2372   SUBROUTINE NAME:   V89CALL
R2373   MOD NO:  0                       DATE: 8 FEB 1968
R2374   MOD BY:  DIGITAL DEVEL GROUP     LOG SECTION: P20-P25

R2375   FUNCTIONAL DESCRIPTION:

R2376   CALLED BY VERB 89 ENTER DURING P00. PRIO 10 USED. CALCULATES AND
R2377   DISPLAYS FINAL GIMBAL ANGLES TO POINT CSM +X AXIS OR PREFERRED AXIS
R2378   (UNIT(Z)COS55 DEG + UNIT(X)SIN55 DEG) AT LM.

R2379   1. KEY IN V 89 E ONLY IF IN PROG 00. IF NOT IN P00, OPERATOR ERROR AND
R2380   EXIT R63, OTHERWISE CONTINUE.

R2381   2. IF IN P00, DO IMU STATUS CHECK (R02BOTH). IF IMU ON AND ITS
R2382   ORIENTATION KNOWN TO CGC, CONTINUE.

R2383   3. FLASH DISPLAY V 04 N 06. R2 INDICATES WHICH SPACECRAFT AXIS IS TO
R2384   BE POINTED AT LM.  INITIAL CHOICE IS PREFERRED AXIS. (R2=1).
R2385   ASTRONAUT CAN CHANGE TO (+X) AXIS (R2 NOT= 1) BY V 22 E 2 E. CONTINUE
R2386   AFTER KEYING IN PROCEED.

R2387   4. SET PREFERRED ATTITUDE FLAG ACCORDING TO OPTION DESIRED. SET FLAG
R2388   FOR PREFERRED AXIS. RESET FLAG FOR X AXIS.

R2389   5. CURRENT TIME IS STORED AND R63COMP IS CALLED

R2390        R63COMP JOB:

R2391          UPDATES CSM AND LM STATE VECTORS USING CONIC EQUATIONS

R2392          CALCULATES BOTH PREFERRED AND X AXIS TRACKING ATT FROM 3SM TO LM.

R2393          DESIRED GIMBAL ANGLES AS INDICATED BY PREFERRED ATTITUDE FLAG
R2394          ARE STORED FOR LATER R60CSM CALL.

R2395   6. FLASH DISPLAY V 06 N18 AND AWAIT RESPONSE.

R2396   7. RECYCLE- RETURN TO STEP 5.
R2397      TERMINATE- EXIT R63 ROUTINE
R2398      PROCEED- RESET 3AXISFLG AND CALL R60CSM FOR ATTITUDE MANEUVER.


R2399   CALLING SEQUENCE: V 89 E

R2400   SUBROUTINES CALLED: CHKPOOH, R02BOTH, GOXDSPF, R63COMP, R60CSM

R2401   ALARMS   1. OPERATOR ERROR IF NOT IN P00
R2402            2. PROGRAM ALARM IF IMU IS OFF
R2403            3. PROGRAM ALARM IF IMU ORIENTATION IS UNKNOWN
```

R2404   ERASABLE INITIALIZATION REQUIRED: NONE

R2405   DEBRIS: OPTION1, OPTION1+1, PREFRKAT(PREF ATT FLAG),P21TIME, 3AXISFLG

```
 24055                          23,3132   00000 1  DP1MIN   2DEC   6000
 24055                          23,3133   13560 0

 2406   REF  12  LAST  596     E4,1715                    EBANK= P21TIME
 2407                          34,3712                    BANK   34
 2408   REF   2  LAST  592     34,2000                    SETLOC P20S4
 2409                          34,3712                    BANK
 2410   REF   1                                          COUNT* $$/R63

 2411   REF 139  LAST  608     34,3712   0 4662 1 V89CALL TC     BANKCALL        IMU STATUS CHECK. RETURNS IF ORIENTATION
 2412   REF   3  LAST  565     34,3713    17653 1         CADR   R02BOTH         KNOWN. ALARMS IF NOT.
 2413   REF  21  LAST  575     34,3714   3 6214 0         CAF    THREE           ALLOW ASTRONAUT TO SELECT DESIRED
 2414   REF   3  LAST  526     34,3715   55'131 1         TS     OPTION1         TRACKING ATTITUDE AXIS.
 2415   REF  73  LAST  604     34,3716   3 5017 1         CAF    ONE
 2416   REF   4  LAST  617     34,3717   55'132 1         TS     OPTION1 +1
 2417   REF   1                34,3720   3 3761 1         CAF    V04N06          V 04 N 06
 2418   REF 140  LAST  617     34,3721   0 4662 1         TC     BANKCALL
 2419   REF  20  LAST  608     34,3722    20720 0         CADR   GOFLASH
 2420   REF  27  LAST  520     34,3723   0 5534 0         TC     ENDEXT          TERMINATE
 2421                          34,3724   0 3726 1         TC     +2              PROCEED
 2422                          34,3725   0 3720 1         TC     -5              DATA IN. OPTION1 +1 = 1 FOR PREF AXIS
A2423                                                                                = 2 FOR X AXIS
 2424   REF   5  LAST  617     34,3726   4 1132 1         CS     OPTION1 +1      1 FOR PREF AXIS. 2 FOR X AXIS.
 2425   REF  74  LAST  617     34,3727   6 5017 1         AD     ONE
 2426                          34,3730   0 0006 1         EXTEND
 2427   REF   1                34,3731   1 3756 1         BZF    SETPAF
 2428   REF  34  LAST  587     34,3732   0 5560 1 RSTPAF  TC     DOWNFLAG        RESET PREF ATT FLAG FOR R63COMP
 2429   REF   2  LAST   56     34,3733    00120 1         ADRES  RNGSCFLG        TO DO X AXIS. RESET BIT 10  FLAG 5
 2430   REF 106  LAST  608     34,3734   0 6006 1 V89RECL TC     INTPRET
 2431                          34,3735    43234 0         RTB    DAD
 2432   REF  17  LAST  593     34,3736    45510 1                LOADTIME        READ PRESENT TIME
 24325  REF   1                34,3737    07133 1                DP1MIN          INTEGRATE TO 1 MIN FROM NOW
 2433   REF  13  LAST  617     34,3740    36316 0         STCALL P21TIME         STORE TIME FOR CALL TO R63COMP.  R63COMP
 2434   REF   1                34,3741    71572 1                R63COMP         LEAVES DESIRED GIM ANGS IN THETAD,LOS IN
 2435                          34,3742    77776 1         EXIT                   POINTVSM, AND SELECTED AXIS IN SCAXIS.
 2436   REF   1                34,3743   3 3762 1         CAF    V06N18          V 06 N 18
 2437   REF 141  LAST  617     34,3744   0 4662 1         TC     BANKCALL        NOUN 18 REFERS TO THE DESIRED GIMBAL
 2438   REF  21  LAST  617     34,3745    20720 0         CADR   GOFLASH
 2439   REF  28  LAST  617     34,3746   0 5534 0         TC     ENDEXT          TERMINATE
 2440                          34,3747   0 3751 1         TC     +2              PROCEED
 2441   REF   1                34,3750   0 3734 1         TC     V89RECL         RECYCLE
 2442   REF  35  LAST  617     34,3751   0 5560 1         TC     DOWNFLAG        RESET 3 AXIS FLAG
 2443   REF   4  LAST  574     34,3752    00124 0         ADRES  3AXISFLG        RESET BIT 6 FLAG 5
```

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2444   REF 142  LAST  617   34,3753  0 4662 1          TC     BANKCALL        PERFORMS CSM MANEUVER TO ALIGN SELECTED
2445   REF   3  LAST  575   34,3754   56000 1          CADR   R60CSM          SPACECRAFT AXIS TO LOS.
2446   REF  29  LAST  617   34,3755  1 5534 1          TCF    ENDEXT

2447   REF  32  LAST  575   34,3756  0 5546 0 SETPAF   TC     UPFLAG          SET PREFERRED ATT FLAG FOR R63COMP
2448   REF   3  LAST  617   34,3757   00120 1          ADRES  RNGSCFLG        TO DO PREF AXIS. SET BIT 10  FLAG 5.
2449   REF   2  LAST  617   34,3760  0 3734 1          TC     V89RECL

2450                        34,3761   01006 0 VB04N06  VN     0406
2451                        34,3762   01422 1 VB06N18  VN     0618

2452   REF   2  LAST  593   34,3572          R63COMP  EQUALS R63
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P2453   PROGRAM NAME- P23 CISLUNAR MIDCOURSE NAVIGATION
R2454   MOD NO
R2455   MOD BY- TOM KNATT
R2456   FUNCTIONAL DESCRIPTION- DO MIDCOURSE NAVIGATION BY INCORPORATION OF STAR
R2457   /EARTH AND STAR/MOON OPTICAL MEASUREMENTS.
R2458   CALLING SEQUENCE- ASTRONAUT OPERATED
R2459   SUBROUTINES CALLED-R52,R53,R57,R60,ORBITAL INTEGRATION (INTEGRV)
R2460   INCORP1,INCORP2,LALOTORV,LUNLMKLD,AND DISPLAY INTERFACE ROUTINES.
R2461   NORMAL EXIT MODES- VIA ROD
R2462   ALARMS- NONE
R2463   ABORT MODES- NONE
R2464   ERASABLE INITIALIZATION REQUIRED- PAD-LOADED ERASABLES,ORBWFLAG RESET,
R24645  REFSMFLG=0 IF IMU OFF AND REFSMFLG=1 IF IMU ON
R24647  INPUTS BY USER REQUIRED- STAR NUMBER,LANDMARK LAT,LONG/2,ALT OR ID NUMB.
R24648  IF LANDMARK IS USED,         NEAR OR FAR HORIZON IF HORIZON IS USED, AND
R24649  BODY TO BE MARKED ON(EARTH OR MOON).  SEE GSOP CHAPT 4.
R2465   OUTPUT-UPDATED CMC STATE VECTOR. VECTOR FROM S/C TO HORIZON OR LANDMARK
R24651  IN POINTAXS. POINTAXS CAN BE USED TO GENERATE THIS VECTOR APART FROM
R24652  P23 IF DESIRED.
R2466   DEBRIS-NO USABLE DEBRIS IS GENERATED. RENDWFLG IS RESET FOR P20 UPON
R24665  COMPLETION OF P23. RUPTREGS AND ERASABLES USED BY DISPLAYS ARE DEBRIS
 2467                          31,2403                          BANK   31
 2468   REF   1                31,2000                          SETLOC RT23
 2469                          31,2403                          BANK
 2470   REF   1                                                 COUNT  31/S23
 2471   REF  54  LAST  614     E5,1400                          EBANK= W
 24712  REF  36  LAST  617     31,2403   0 5560 1  P23          TC     DOWNFLAG
 24714  REF   4  LAST  565     31,2404    00010 0               ADRES  RNDVZFLG

 2472   REF  10  LAST  599     31,2405   0 5372 1               TC     2PHSCHNG
 2473                          31,2406    00004 0               OCT    00004          LEAVE GROUP 4
 2474                          31,2407    00012 1               OCT    00012          ENTER GROUP 2
 2475   REF   1                31,2410   3 5065 1               CAF    PRIO13
 2476   REF   3  LAST  579     31,2411   55*056 1               TS     PHSPRDT2
 2477   REF 107  LAST  617     31,2412   0 6006 1               TC     INTPRET
 2478                          31,2413    43131 0               SSP    CLEAR
 2479   REF   5  LAST  569     31,2414    00302 0                      MARKINDX
 2480                          31,2415    00001 0                      1
 2481   REF   3  LAST  569     31,2416    00666 1                      TARG2FLG       TARGET FLAG USED BY R52 AND R53
 2482                          31,2417    66214 0               CLEAR  SSP
 2483   REF   5  LAST  569     31,2420    00665 1                      TARG1FLG
 2484   REF   3  LAST  208     31,2421    00305 1                      STARIND
 2485                          31,2422    00000 1                      0
 2486                          31,2423    43131 0               SSP    CLEAR
 2487   REF   6  LAST  215     31,2424    00303 1                      BESTI
 2488                          31,2425    00000 1                      0
 24882  REF   1                31,2426    03267 1                      R57FLAG        SET = DO NOT REPERFORM R57
 24883                          31,2427    77414 0               CLEAR  EXIT
 24884  REF   2  LAST  266     31,2430    04664 1                      V94FLAG        SET = ALLOW V94
 24885  REF 108  LAST  619     31,2431   0 6006 1  P23.00       TC     INTPRET
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 2489                                31,2432   45014 0           BON     CALL
 2490   REF   4  LAST  586           31,2433   01702 0                   REFSMFLG        SET NOW AS INPUT, NORMALLY EXTERNAL CONT
 2491   REF   1                     31,2434   62442 1                   P23.05          WHEN ALIGNED,PERFORM MEASUREMENT
 2492   REF   1                     31,2435   76401 0                   R57             DO OPTICS CALIBRATION IF IMU NOT ALIGNED
 2493                                31,2436   77624 1           CALL
 2494   REF   1                     31,2437   31300 0                   R53
 2495                                31,2440   77650 1           GOTO
 2496   REF   1                     31,2441   62641 0                   P23.60
 2500                                31,2442   77414 0 P23.05    CLEAR   EXIT
 2501   REF   1                     31,2443   04665 0                   SAVECFLG        USED TO SAVE SPACE IN P23.65
 2502   REF   1                     31,2444   3 3456 0 P23.06   CAF     V05N70
 2503   REF 143  LAST  618          31,2445   0 4662 1          TC      BANKCALL        IDENTIFICATION-STAR,HOR IDENT.
 2504   REF  22  LAST  617          31,2446    20720 0          CADR    GOFLASH
 2505   REF  26  LAST  608          31,2447   0 4106 1          TC      GOTOPOOH        TERMINATE
 2506   REF   1                     31,2450   0 2452 0          TC      P23.15
 2507                                31,2451   0 2444 1          TC      -5              REDISPLAY
 2508   REF  19  LAST  598          31,2452   3 1751 0 P23.15   CA      LANDMARK        IF C=2,LUNAFLAG=1. IF C=1,LUNAFLAG=0
 2509                                31,2453   0 0006 1          EXTEND
 2510   REF   1                     31,2454   1 2463 0          BZF     P23.151
 2511   REF   4  LAST  281          31,2455   3 1752 0          CA      HORIZON
25111                                31,2456   0 0006 1          EXTEND
25112                                31,2457   1 2461 1          BZF     +2
25113   REF   1                     31,2460   0 3134 1          TC      R23.10          OPERATOR DSKY ERROR
25114   REF  20  LAST  620          31,2461   3 1751 0          CA      LANDMARK
25115   REF   1                     31,2462   0 2466 1          TC      P23.152
 2512   REF   5  LAST  620          31,2463   3 1752 0 P23.151  CA      HORIZON
 2513                                31,2464   0 0006 1          EXTEND
251301  REF   2  LAST  620          31,2465   1 3134 0          BZF     R23.10
25132   REF   1                     31,2466   7 3473 0 P23.152  MASK    BITS7-9         IS C EQUAL TO 1 OR 2
 2514   REF   1                     31,2467   6 5234 1          AD      NEG100
 2515                                31,2470   0 0006 1          EXTEND
251501  REF   1                     31,2471   1 2501 0          BZF     P23.16
251502  REF   2  LAST  620          31,2472   6 5234 1          AD      NEG100
251503                              31,2473   0 0006 1          EXTEND
251504                              31,2474   1 2476 1          BZF     +2
251505  REF   3  LAST  620          31,2475   0 3134 1          TC      R23.10
 2516   REF  33  LAST  618          31,2476   0 5546 0          TC      UPFLAG
 2517   REF  11  LAST  608          31,2477    00060 1          ADRES   LUNAFLAG
 2518                                31,2500   1 2503 1          TCF     +3
 2520   REF  37  LAST  619          31,2501   0 5560 1 P23.16   TC      DOWNFLAG
 2521   REF  12  LAST  620          31,2502    00060 1          ADRES   LUNAFLAG
252202  REF   5  LAST  451          31,2503   3 0735 0          CA      STARCODE        IS STARCODE GREATER THAN OR
252203                              31,2504   0 0006 1          EXTEND                  EQUAL TO 0 AND LESS THAN 37
252204  REF   1                     31,2505   1 2532 0          BZF     P23.176
252205                              31,2506   0 0006 1          EXTEND
252206  REF   4  LAST  620          31,2507   6 3134 1          BZMF    R23.10
252207  REF   1                     31,2510   6 3472 0          AD      NEG37
252208                              31,2511   0 0006 1          EXTEND
252209                              31,2512   6 2514 0          BZMF    +2
25221   REF   5  LAST  620          31,2513   0 3134 1          TC      R23.10
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252211 REF 109  LAST  619   31,2514  0 6006 1           TC      INTPRET
2523                        31,2515   53135 0  P23.17   SLOAD   BZE
25231  REF   6  LAST  620   31,2516   00736 0            STARCODE
252315 REF   1               31,2517   62531 1           P23.175
252317                      31,2520   77606 1           PUSH
25232                       31,2521   41335 1           SLOAD   DMP
25233  REF   1              31,2522   23463 1           SPSTX
25234                       31,2523   66150 0           LXA,1   SXA,1
25235  REF 259  LAST  605   31,2524   00155 0           MPAC +1
25236  REF   7  LAST  619   31,2525   00302 0           BESTI           BESTI = 6XSTAR NUMBER
25237                       31,2526   77624 1           CALL
25238  REF   1              31,2527   30000 1           LOWMEMRY        NEEDED TO RETRIEVE STAR VECTOR FROM LOW
25239  REF   2  LAST   94   31,2530   02617 0           STORE   STARSAV2        STORE FOR R53,P23. US(IN P23)=STARSAV2
252395                      31,2531   77776 1  P23.175  EXIT
2527   REF   6  LAST  620   31,2532  3 1752 0  P23.176  CA      HORIZON
2528                        31,2533  0 0006 1           EXTEND
2529   REF   1              31,2534  1 2553 1           BZF     P23.20
2530   REF   1              31,2535  7 3474 1           MASK    BITS4-6
2531   REF   1              31,2536  6 6171 0           AD      -OCT10
2532                        31,2537  0 0006 1           EXTEND
253201 REF   1              31,2540  1 2550 1           BZF     P23.18
253202 REF   2  LAST  621   31,2541  6 6171 0           AD      -OCT10
253203                      31,2542  0 0006 1           EXTEND
253204                      31,2543  1 2545 0           BZF     +2
253205 REF   6  LAST  620   31,2544  0 3134 1           TC      R23.10
2533   REF  34  LAST  620   31,2545  0 5546 0           TC      UPFLAG
2534   REF   1              31,2546   00004 0           ADRES   NORFHOR
2535   REF   1              31,2547  0 2557 1           TC      P23.30
2537   REF  38  LAST  620   31,2550  0 5560 1  P23.18   TC      DOWNFLAG
2538   REF   2  LAST  621   31,2551   00004 0           ADRES   NORFHOR
2539   REF   2  LAST  621   31,2552  0 2557 1           TC      P23.30
2549   REF 110  LAST  621   31,2553  0 6006 1  P23.20   TC      INTPRET
2550                        31,2554   77624 1           CALL
2551   REF   4  LAST  567   31,2555   60143 1           P22SUBR8
2552                        31,2556   77776 1           EXIT
2555   REF 111  LAST  621   31,2557  0 6006 1  P23.30   TC      INTPRET
255505                      31,2560   53135 0           SLOAD   BZE
25551  REF   7  LAST  621   31,2561   00736 0           STARCODE
255515 REF   1              31,2562   34000 0           LDPLANET
2556                        31,2563   77414 0  P23.31   BON     EXIT
2557   REF   2  LAST  620   31,2564   04705 1           SAVECFLG
2558   REF   1              31,2565   62700 1           P23.85
2559   REF   1              31,2566  3 3461 1           CAF     V50N25P
2560   REF 144  LAST  620   31,2567  0 4662 1           TC      BANKCALL
2561   REF   1              31,2570   21045 0           CADR    GOPERF1         GOPERF1 BLANKS OUT R2 AND R3.
2562   REF  27  LAST  620   31,2571  0 4106 1           TC      GOTOPOOH
2563   REF   2  LAST  213   31,2572  0 2576 1           TC      V94ENTER        PROCEED. AUTOCONTROL CMC
2565   REF 112  LAST  621   31,2573  0 6006 1  P23.55   TC      INTPRET
2566                        31,2574   77650 1           GOTO
2567   REF   1              31,2575   62627 0           P23.56
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R2568                VERB 94 BEGINS HERE
 2569   REF 113  LAST  621   31,2576  0 6006 1  V94ENTER TC      INTPRET
 2570                       31,2577   77634 0            RTB
 2571   REF  18  LAST  617   31,2600   45510 1            LOADTIME        READ CLOCK
 2572   REF   8  LAST  587   31,2601   35225 1            STCALL MARKTIME
 2573   REF   1              31,2602   62705 1            POINTAXS        RETURN LOS IN RCLL AND MPAC
 2574                       31,2603   53521 1            MXV     UNIT
 2575   REF  17  LAST  596   31,2604   01736 1            REFSMMAT
 2576   REF   4  LAST  596   31,2605   27357 0            STOVL   POINTVSM
 2577   REF   1              31,2606   23464 0            JCAXIS
 2578   REF  14  LAST  597   31,2607   03351 0            STORE   SCAXIS
 2579                       31,2610   77775 1            EXIT
 2580   REF  39  LAST  621   31,2611  0 5560 1            TC      DOWNFLAG        CLEAR AND GO TO VECPOINT IN R60
 2581   REF   5  LAST  617   31,2612    00124 0           ADRES   3AXISFLG        BIT 6  FLAG 5
 2584   REF   1              31,2613  3 3471 0           CAF     R60ADRS
 2585   REF   3  LAST  201   31,2614  54 374 0           TS      TEMPFLSH
 2586   REF  33  LAST  604   31,2615  0 5412 0           TC      PHASCHNG
 2587                       31,2616    00012 1          OCT     00012
25871   REF 145  LAST  621   31,2617  0 4662 1  R60CALL  TC      BANKCALL
25872   REF   4  LAST  618   31,2620   56000 1           CADR    R60CSM
25873   REF  34  LAST  622   31,2621  0 5412 0           TC      PHASCHNG
25874                       31,2622   04022 0           OCT     04022
 2588   REF 114  LAST  622   31,2623  0 6006 1           TC      INTPRET
 2589                       31,2624   77614 1           BON
 2590   REF   2  LAST  619   31,2625   03307 0                   R57FLAG
 2591   REF   1              31,2626   62631 1                   P23.57          DO NOT REPERFORM R57
 2592                       31,2627   77624 1  P23.56   CALL
 2593   REF   2  LAST  620   31,2630   76401 0                   R57
 2594                       31,2631   43014 0  P23.57   SET     SET
 2595   REF   3  LAST  619   31,2632   04464 0                   V94FLAG
 2596   REF   3  LAST  622   31,2633   03067 0                   R57FLAG
 2597                       31,2634   77624 1           CALL
 2598   REF   3  LAST  566   31,2635   30011 1                   R52
 2608                       31,2636   43014 0           CLEAR   CLEAR
 2609   REF   4  LAST  622   31,2637   04464 1                   V94FLAG
 2610   REF   4  LAST  622   31,2640   03267 1                   R57FLAG
 2611                       31,2641   77776 1  P23.60   EXIT
 2612                       31,2642  0 0004 0           INHINT
 2613   REF  32  LAST  599   31,2643  3 1330 0           CA      MARKSTAT
 2614   REF   6  LAST  420   31,2644  7 5054 1           MASK    LOWIO
 2615   REF   5  LAST  600   31,2645  55'242 0           TS      MARKDATA
 2616                       31,2646  0 0006 1           EXTEND
 2617   REF   6  LAST  622   31,2647  5 1242 1           INDEX   MARKDATA
 2618                       31,2650  3 0001 0           DCA     0
 2619   REF   9  LAST  622   31,2651  53'225 1           DXCH    MARKTIME
 2620   REF   7  LAST  622   31,2652  51'242 1           INDEX   MARKDATA
 2621                       31,2653  3 0005 1           CA      5
 2622   REF   1              31,2654  57'754 0           XCH     TRUNION
 2623                       31,2655  0 0003 1           RELINT
26231   REF 115  LAST  622   31,2656  0 6006 1           TC      INTPRET
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 26232                                  31,2657   76740 0           LXC,1  VLOAD*
 26233  REF   8  LAST  622              31,2660   01242 1                  MARKDATA
 26234                                  31,2661   00002 0                  1,1
 26235  REF   9  LAST  578              31,2662   23676 1           STODL* MARKDOWN +1
 26236                                  31,2663   00001 0                  0,1
 26237  REF  10  LAST  623              31,2664   03675 0           STORE  MARKDOWN
 26238                                  31,2665   77776 1           EXIT
 2624   REF   1                         31,2666   3 3457 1          CAF    V05N71
 2625   REF 146  LAST  622              31,2667   0 4662 1          TC     BANKCALL
 2626   REF  23  LAST  620              31,2670    20720 0          CADR   GOFLASH
 2627   REF  28  LAST  621              31,2671   0 4106 1          TC     GOTOPOOH      TERMINATE
 2628   REF   1                         31,2672   0 2674 0          TC     P23.65        STORE DATA
 2629                                   31,2673   0 2666 0          TC     -5            REDISPLAY
 2630   REF 116  LAST  622              31,2674   0 6006 1  P23.65  TC     INTPRET
 2631                                   31,2675    77414 0          SET    EXIT
 2632   REF   3  LAST  621              31,2676    04465 1                 SAVECFLG
 2633   REF   2  LAST  620              31,2677   0 2452 0          TC     P23.15
 2639                                   31,2700    45014 0  P23.85  CLEAR  CALL
 2640   REF   9  LAST  599              31,2701    02676 1                 RENDWFLG
 2641   REF   2  LAST  622              31,2702    62705 1                 POINTAXS
 2642                                   31,2703    77650 1          GOTO
 2643   REF   1                         31,2704    62771 1                 R23.55
R2644   WE BEGIN CALCULATIONS HERE
R2645   POINTAXIS SUBROUTINE
 2646                                   31,2705    77620 0  POINTAXS STO
 2647   REF   5  LAST  586              31,2706    01150 1                 POINTEX
 2656                                   31,2707    71214 0  R23.05  BON    DLOAD
 2657   REF   8  LAST  614              31,2710    01711 1                 ORBWFLAG
 2658   REF   1                         31,2711    62715 0                 R23.1
 26582  REF   1                         31,2712    03001 0                 WMIDPOS
 26584                                  31,2713    34001 1          STCALL 0
 2659   REF   2  LAST  580              31,2714    56565 1                 INITIALW      INITIALIZE W-MATRIX FIRST PASS IN P23
 2660                                   31,2715    77624 1  R23.1   CALL
 2661   REF   6  LAST  583              31,2716    56343 0                 SETINTG       SETUP FOR CSM INTEGRATION
 2662                                   31,2717    43014 0          BOF    SET
 2663   REF   9  LAST  623              31,2720    01751 0                 ORBWFLAG
 2664   REF   1                         31,2721    62723 0                 R23.2
 2665   REF  12  LAST  610              31,2722    01476 0                 DIMOFLAG
 2666                                   31,2723    45014 0  R23.2   SET    CALL
 2667   REF  10  LAST  623              31,2724    01471 1                 ORBWFLAG
 2668   REF  10  LAST  600              31,2725    27162 1                 INTEGRV       INTEGRATE CSM STATE VEC. TO MARKTIME
 2669                                   31,2726    77776 1          EXIT
 2670   REF  35  LAST  622              31,2727   0 5412 0          TC     PHASCHNG
 2671                                   31,2730    04022 0          OCT    04022
 2672   REF 117  LAST  623              31,2731   0 6006 1          TC     INTPRET
 2673                                   31,2732    77624 1          CALL
 2674   REF   1                         31,2733    63376 0                 RECT,1        PICKUP CSM STATE VECTOR FROM PERM
 2675                                   31,2734    77614 1          BOFF
 2676   REF   1                         31,2735    00365 0                 ZMEASURE      IN SPHERE OF INFLUENCE OF PRIMARY BODY
 2677   REF   1                         31,2736    62750 1                 R23.3
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2678                                31,2737   45145 0          DLOAD  CALL
26781  REF  10  LAST  622           31,2740   01225 0                 MARKTIME
26782  REF   1                     31,2741   54115 0                 LUNPOS
26783                               31,2742   57414 1          BON    VCOMP
26784  REF  16  LAST  609           31,2743   04303 0                 CMOONFLG
26785                               31,2744   62745 0                 +1
26786                               31,2745   77655 1          VAD
26787  REF   2  LAST  121           31,2746   03627 1                 RZC
2679   REF   3  LAST  624           31,2747   03627 1          STORE  RZC
2680                                31,2750   46135 1  R23.3   SLOAD  BHIZ
2681   REF  21  LAST  620           31,2751   02752 0                 LANDMARK        IF LANDMARK = 0, USE HORIZ SUBR
2682   REF   1                     31,2752   62762 0                 R23.4
2683                               31,2753   77614 1          SET
2684   REF   5  LAST  600           31,2754   00462 1                 ERADFLAG
2685                               31,2755   45145 0          DLOAD  CALL
2686   REF  11  LAST  624           31,2756   01225 0                 MARKTIME
2687   REF   4  LAST  607           31,2757   26441 1                 LALOTORV
2688                               31,2760   77650 1          GOTO
2689   REF   1                     31,2761   62764 0                 R23.5
2690                               31,2762   77624 1  R23.4   CALL
2691   REF   1                     31,2763   63136 0                 HORIZ
2693                               31,2764   40251 0  R23.5   VSU    SETPD
2694   REF   4  LAST  624           31,2765   03627 1                 RZC
2695                               31,2766   00001 0                 0
2697                               31,2767   77650 1          GOTO
2698   REF   6  LAST  623           31,2770   01150 1                 POINTEX
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P2699
 2700                          31,2771   41456 0  R23.55  UNIT   PUSH          RCLL IS IN MPAC
 2701                          31,2772   77775 1          VLOAD
 2702                          31,2773   00043 0                 34D           RCLL * RCLL
 2703                          31,2774   24037 0          STOVL  30D           PUSH 30-31 =RCLL*RCLL 32-33=ABVAL RCLL
 2704   REF   2  LAST  121     31,2775   03635 1                 VZC
 2705                          31,2776   54361 1          VXSC   VSR
 2706   REF   1                31,2777   23437 0                 ONE/C
 2707                          31,3000   20620 1                 15D
 2708                          31,3001   77655 1          VAD                  PUSH UP RCLL(UNIT)
 2709                          31,3002   77656 1          UNIT
 2710   REF   2  LAST  121     31,3003   27643 0          STOVL  UCLSTAR
 2711   REF   3  LAST  625     31,3004   03635 1                 VZC
 2712                          31,3005   52342 0          VSR2   VSU
 2713   REF   2  LAST   89     31,3006   02141 1                 VESQ
 2714                          31,3007   54361 1          VXSC   VSR
 2715   REF   2  LAST  625     31,3010   23437 0                 ONE/C
 2716                          31,3011   20616 1                 13D
 2717                          31,3012   53455 0          VAD    UNIT
 2718   REF   1                31,3013   02617 0                 US
 2719   REF   2  LAST  121     31,3014   03651 0          STORE  USSTAR
 2720                          31,3015   72441 0          DOT    SL1
 2721   REF   3  LAST  625     31,3016   03643 0                 UCLSTAR
 2722                          31,3017   77206 0          PUSH   VLOAD         PD 0,1 = USSTAR(DOT)UCLSTAR
 2723   REF   4  LAST  625     31,3020   03643 0                 UCLSTAR
 2724                          31,3021   57561 1          VXSC   VCOMP
 2725                          31,3022   53372 1          VSL1   VAD
 2726   REF   3  LAST  625     31,3023   03651 0                 USSTAR
 2727                          31,3024   77656 1          UNIT
 2728   REF  17  LAST  614     31,3025   27502 0          STOVL  BVECTOR       USSTAR = COSQ(UCLSTAR
 2729   REF  16  LAST  606     31,3026   15335 0                 ZEROVECS
 2730   REF  18  LAST  625     31,3027   03510 0          STORE  BVECTOR +6
 2731   REF  19  LAST  625     31,3030   17516 0          STODL  BVECTOR +12D
 2732                          31,3031   00001 0                 0
 2733                          31,3032   57526 1          ACOS   DCOMP
 2734                          31,3033   71206 0          PUSH   DLOAD
273405 REF  17  LAST  625     31,3034   15335 0                 ZEROVECS
27341                          31,3035   77776 1          EXIT
27342   REF   1                31,3035  3 3450 0          CA     VARSUBL       PUT FIXED INTO ERASABLE FOR MSU
27344   REF  64  LAST  571     31,3037  54 001 1          TS     L             INSTRUCTION COMING UP
 2735   REF   2  LAST  622     31,3040  3 1754 0          CA     TRUNION       REQUIRED TO CHANGE 2:S COMPLEMENT
27351                          31,3041  0 0006 1          EXTEND               TRUNION TO 1:S COMPLEMENT
27352   REF  65  LAST  625     31,3042  20 001 1          MSU    L             TRUNION(2'S)-00000 CONVERTS TRUNION TO
27353   REF 260  LAST  621     31,3043  54 154 0          TS     MPAC          1:S. VARSUBL=00000
27354   REF 118  LAST  623     31,3044  0 6006 1          TC     INTPRET
27355                          31,3045   67206 1          PUSH   SLOAD         PUSH IS DP. WHEN BDSU IS EXECUTED, 2ND
27356   REF   2  LAST  571     31,3046   01343 1                 TRUNBIAS      HALF OF PUSHLIST IS GUARANTEED ZERO FROM
27357                          31,3047   77621 1          BDSU                 DLOAD ZEROVECS ABOVE
 2736                          31,3050   43242 1          SR3    DAD
 2737                          31,3051   41215 1          DAD    DMP
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2738   REF   1                  31,3052   23445 0                TRUN19
2739                            31,3053   00041 1                32D
2740                            31,3054   52405 1          DMP   SL3
2741   REF   2  LAST  576       31,3055   07103 1                PI/4.0
2742                            31,3056   62414 1          BOFF  SL2
2743   REF  17  LAST  624       31,3057   04343 1                CMOONFLG
2744   REF   1                  31,3060   63061 0                R23.51
2745   REF   4  LAST  583       31,3061   17524 1  R23.51  STODL DELTAQ
2746                            31,3062   00037 0                30D             RCLL * RCLL
2747                            31,3063   47005 1          DMP   RTB
2748   REF   1                  31,3064   23454 0                TRUNVAR
2749   REF   2  LAST  582       31,3065   45565 0                TPMODE
27491                           31,3066   77771 0          TAD
27492  REF   2  LAST  625       31,3067   23451 0                VARSUBL
2750   REF  11  LAST  605       31,3070   03526 0          STORE VARIANCE
2751                            31,3071   45014 0          CLEAR CALL
2752   REF   7  LAST  605       31,3072   02666 0                DMENFLG
2753   REF   3  LAST  605       31,3073   75254 0                INCORP1
27531                           31,3074   77624 1          CALL
27532  REF  19  LAST  613       31,3075   56750 0                GRP2PC
2754                            31,3076   51575 1          VLOAD ABVAL
2755   REF  10  LAST  614       31,3077   01265 1                DELTAX +6
2756                            31,3100   60414 0          BOF   SR2             DISPLAY IS 2-27 IF IN LUNAR SPHERE
2757   REF  18  LAST  626       31,3101   04343 1                CMOONFLG
2758   REF   1                  31,3102   63103 0                R23.52
2759   REF  11  LAST  606       31,3103   27504 0  R23.52  STOVL N49DISP +2
2760   REF  11  LAST  626       31,3104   01257 0                DELTAX
2761                            31,3105   77646 0          ABVAL
2762                            31,3106   60414 0          BOF   SR2
2763   REF  19  LAST  626       31,3107   04343 1                CMOONFLG
2764   REF   1                  31,3110   63111 0                R23.53
2765   REF  12  LAST  626       31,3111   03502 0  R23.53  STORE N49DISP
2766                            31,3112   77776 1          EXIT
2767   REF   1                  31,3113   3 3455 0 R23.6   CAF   V6N49
2768   REF 147  LAST  623       31,3114   0 4662 1         TC    BANKCALL
2769   REF   8  LAST  606       31,3115    21057 0         CADR  GOFLASHR
2770   REF  29  LAST  623       31,3116   0 4106 1         TC    GOTOPOOH
2771   REF   1                  31,3117   0 3126 1         TC    R23.7           INCORPORATE DATA
2772   REF  30  LAST  626       31,3120   0 4106 1         TC    GOTOPOOH
2773   REF  21  LAST  606       31,3121   3 5019 0         CAF   BIT3            BLANK OUT R3
2774   REF  10  LAST  606       31,3122   0 5526 0         TC    BLANKET
27741  REF  36  LAST  623       31,3123   0 5412 0         TC    PHASCHNG
27742                           31,3124    00012 1         OCT   00012
2775   REF  74  LAST  606       31,3125   0 5217 0         TC    ENDOFJOB
2776   REF 119  LAST  623       31,3126   0 6006 1 R23.7   TC    INTPRET
2777                            31,3127    45014 0 R23.8   SET   CALL
2778   REF  12  LAST  605       31,3130    00467 1               VEHUPFLG
2779   REF   3  LAST  606       31,3131    75466 1               INCORP2
2780                            31,3132    77776 1         EXIT
2781   REF  31  LAST  626       31,3133   0 4106 1 R23.END TC    GOTOPOOH
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27811  REF  10  LAST  568   31,3134  0 4400 1  R23.10  TC      FALTON
27812  REF   1               31,3135  0 2444 1          TC      P23.06
2783                         31,3136   40220 0  HORIZ   STO     SETPD
2784   REF   1               31,3137   03656 1          SRRETURN
2785                         31,3140   00001 0          0
2786                         31,3141   65345 0          DLOAD   PDDL            PUSH 0-1 = -AYO SCALED BO
2787   REF   1               31,3142   01714 1          -AYO
2788   REF   1               31,3143   01716 0          AXO
2789                         31,3144   63325 0          PDDL    PDVL            PUSH 2-3 = +AX SCALED BO
2790   REF   9  LAST  554    31,3145   15343 1          DPPOSMAX
2791   REF   2  LAST  625    31,3146   02617 0          US
2792                         31,3147   53435 0          VXV     UNIT
2793   REF   5  LAST  624    31,3150   03627 1          RZC
2794   REF   2  LAST  121    31,3151   27621 1          STOVL   UBAR2
2795                         31,3152   53435 0          VXV     UNIT            PUSH UP
2796   REF   3  LAST  627    31,3153   03621 1          UBAR2
2797   REF   2  LAST  121    31,3154   27605 1          STOVL   UBARO
2798   REF   4  LAST  627    31,3155   03621 1          UBAR2
2799                         31,3156   53435 0          VXV     UNIT
2800   REF   3  LAST  627    31,3157   03605 1          UBARO
2801   REF   2  LAST  121    31,3160   03613 0          STORE   UBAR1
2802                         31,3161   50214 0          BON     DOT
2803   REF  13  LAST  620    31,3162   01703 1          LUNAFLAG
2804   REF   1               31,3163   63361 0          HORIZ.6
2805                         31,3164   00001 0          0               UBAR1 DOT UZ
2806   REF   9  LAST  608    31,3165   36156 0          STCALL  ALPHAV +4
2807   REF   1               31,3166   26505 0          GETERAD
2808                         31,3167   65215 1          DAD     PDDL            MPAC HAS RADIUS OF FISHER SLLIPSOID
2809   REF   1               31,3170   01355 0          HORIZALT        PUSH 0-1 = BH SCALED B29
2810   REF   1               31,3171   23441 1          AEARTH
2811                         31,3172   41415 1          DAD     PUSH            PUSH 2-3 = AH B29
2812   REF   2  LAST  627    31,3173   01355 0          HORIZALT
2813                         31,3174   64375 1  HORIZ.1 VLOAD   MXV
2814   REF   6  LAST  627    31,3175   03627 1          RZC             B29
2815   REF   4  LAST  627    31,3176   03605 1          UBARO           B1
2816                         31,3177   63372 1          VSL1    PDVL            PUSH 4-9 = RH(XH,YH,ZH) B29
2817   REF   3  LAST  627    31,3200   02617 0          US
2818                         31,3201   76521 0          MXV     VSL1
2819   REF   5  LAST  627    31,3202   03605 1          UBARO
2820                         31,3203   77725 1          PDDL            PUSH 10-15 = USH B1
2821                         31,3204   00003 1          2               AH
2822                         31,3205   14043 0          STODL   340
2823                         31,3206   00005 1          4               XH
2824                         31,3207   77624 1          CALL
2825   REF   1               31,3210   63365 1          DIVIDE
2826                         31,3211   41257 1          SR*     DMP
2827                         31,3212   20611 0          8D,1            NOW SCALED B9
2828   REF 261  LAST  625    31,3213   00155 0          MPAC
2829                         31,3214   14037 0          STODL   300
2830                         31,3215   00001 0          0
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2831                          31,3216  14043 0        STODL  34D
2832                          31,3217  00007 0               6              YH
2833                          31,3220  77624 1        CALL
2834  REF   2  LAST  627       31,3221  63365 1               DIVIDE
2835                          31,3222  41257 1        SR*    DMP
2836                          31,3223  20611 0               8D,1           B9
2837  REF 262  LAST  627       31,3224  00155 0               MPAC           B18
2838                          31,3225  41415 1        DAD    PUSH           PUSH 16-17 =A SCALED  B18
2839                          31,3226  00037 0               30D
2840                          31,3227  75425 0        DSU    SQRT
2841  REF   1                 31,3230  23447 1               1.0B18
2842                          31,3231  77725 1        PDDL                  PUSH 18-19  SQRT(A-1) B9
2843                          31,3232  00021 1               16D
2844                          31,3233  14043 0        STODL  34D
2845                          31,3234  00005 1               4              XH
2846                          31,3235  77624 1        CALL
2847  REF   3  LAST  628       31,3236  63365 1               DIVIDE
2848                          31,3237  65257 1        SR*    PDDL
2849                          31,3240  20622 0               17D,1          PUSH 20-21 = XH/A B29
2850                          31,3241  00007 0               6              YH
2851                          31,3242  77624 1        CALL
2852  REF   4  LAST  628       31,3243  63365 1               DIVIDE
2853                          31,3244  65257 1        SR*    PDDL
2854                          31,3245  20622 0               17D,1          PUSH 22-23 = YH/A B29
2855                          31,3246  00021 1               16D            A
2856                          31,3247  14043 0        STODL  34D
2857                          31,3250  00023 0               18D            SQRT(A-1)
2858                          31,3251  77624 1        CALL
2859  REF   5  LAST  628       31,3252  63365 1               DIVIDE
2860                          31,3253  77657 0        SR*
2861                          31,3254  20611 0               8D,1
2862                          31,3255  14035 1        STODL  28D
2863                          31,3256  00001 0               0              BH
2864                          31,3257  14043 0        STODL  34D
2865                          31,3260  00003 1               2              AH
2866                          31,3261  77624 1        CALL
2867  REF   6  LAST  628       31,3262  63365 1               DIVIDE
2868                          31,3263  41257 1        SR*    DMP            AH/BH  SCALED  B1
2869                          31,3264  20601 1               0,1
2870                          31,3265  00035 1               28D            SQRT(A-1)/A
2871                          31,3266  72405 0        DMP    SL1
2872                          31,3267  00007 0               6              YH
2873                          31,3270  77725 1        PDDL
2874                          31,3271  00003 1               2              AH
2875                          31,3272  14043 0        STODL  34D
2876                          31,3273  00001 0               0
2877                          31,3274  77624 1        CALL
2878  REF   7  LAST  628       31,3275  63365 1               DIVIDE
2879                          31,3276  41257 1        SR*    DMP            BH/AH  SCALED  B1
2880                          31,3277  20601 1               0,1
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2881                          31,3300  00035 1                 28D             SQRT (A-1)/A
2882                          31,3301  72405 0          DMP    SLI
2883                          31,3302  00005 1                 4               XH
2884                          31,3303  43325 1          PDDL   DAD
2885                          31,3304  00025 0                 20D             XH/A
2886                          31,3305  00031 0                 24D             ALPHA
2887                          31,3306  45325 1          PDDL   DSU
2888                          31,3307  00027 1                 22D             YH/A
2889                          31,3310  00033 1                 26D             BETA
2890                          31,3311  40206 1          PUSH   SETPD
2891                          31,3312  00021 1                 16D
2892                          31,3313  45345 1          DLOAD  DSU
2893                          31,3314  00025 0                 20D             XH/A
2894                          31,3315  00031 0                 24D             ALPHA
2895                          31,3316  43325 1          PDDL   DAD
2896                          31,3317  00027 1                 22D             YH/A
2897                          31,3320  00033 1                 26D             BETA
2898                          31,3321  41525 0          PDDL   PUSH
2899  REF  18  LAST  625      31,3322  15335 0                 ZEROVECS
2900                          31,3323  24041 1          STODL  32D             ZERO THIRD COMP. OF T-0 VECTOR
2901                          31,3324  00035 1                 28D
2902                          31,3325  53451 1          VSU    UNIT
2903                          31,3326  00005 1                 4               RH VECTOR
2904                          31,3327  63241 0          DOT    PDVL            PUSH 22-23 A-SUB-ZERO
2905                          31,3330  00013 0                 10D             USH VECTOR
2906                          31,3331  00021 1                 16D             T1 VECTOR
2907                          31,3332  53451 1          VSU    UNIT
2908                          31,3333  00005 1                 4               RH VECTOR
2909                          31,3334  41441 0          DOT    PUSH            PUSH 24-25 A-SUB-ONE
2910                          31,3335  00013 0                 10D
2911                          31,3336  50021 1          BDSU   BMN
2912                          31,3337  00027 1                 22D             A-SUB-ZERO
2913  REF  1                  31,3340  63347 1                 HORIZ.3
2914                          31,3341  77614 1          BON
2915  REF  3  LAST  621       31,3342  00304 0                 NORFHOR
2916  REF  1                  31,3343  63353 1                 HORIZ.4
2917                          31,3344  52175 0  HORIZ.2 VLOAD  GOTO
2918                          31,3345  00035 1                 28D             T-0 VECTOR
2919  REF  1                  31,3346  63355 1                 HORIZ.5
2920                          31,3347  52014 0  HORIZ.3 BON    GOTO
2921  REF  4  LAST  629       31,3350  00304 0                 NORFHOR
2922  REF  1                  31,3351  63344 1                 HORIZ.2
2923  REF  2  LAST  629       31,3352  63353 1                 HORIZ.4
2924                          31,3353  77775 1  HORIZ.4 VLOAD
2925                          31,3354  00021 1                 16D             T1 VECTOR
2926                          31,3355  76505 0  HORIZ.5 VXM    VSL1
2927  REF  6  LAST  627       31,3356  03605 1                 UBARO
2928                          31,3357  77650 1          GOTO
2929  REF  2  LAST  627       31,3360  03656 1                 SRRETURN
2930                          31,3361  41545 0  HORIZ.6 DLOAD  PUSH
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2931   REF   1                  31,3362   23443 0                  RADMOON
2932                            31,3363   52006 0           PUSH   GOTO
2933   REF   1                  31,3364   63174 0                  HORIZ.1
2934                            31,3365   70501 1  DIVIDE   NORM   SR1
2935   REF  24  LAST  605       31,3366   00047 1                  X1
2936                            31,3367   14045 0           STODL  36D
2937                            31,3370   00043 0                  34D
2938                            31,3371   55301 0           NORM   BODV
2939   REF  16  LAST  613       31,3372   00051 0                  S1
2940                            31,3373   00045 0                  36D
2941                            31,3374   43460 1           XSU,1  RVQ
2942   REF  17  LAST  630       31,3375   00050 1                  S1
2943                            31,3376   77014 1  RECT.1   BOFF   AXT,2          SR TO SET ZMEASURE = 0 IF MEASUREMENT
2944   REF  20  LAST  626       31,3377   04343 1                  CMOONFLG        PLANET AND PRIMARY PLANET ARE THE SAME
2945   REF   1                  31,3400   63410 1                  RECT.3           OTHERWISE = 1
2946                            31,3401   77775 1           DEC    -2
2947                            31,3402   77614 1           BOFF                       VEC. AND SCALE B29 AND B7
2948   REF  14  LAST  627       31,3403   01743 0                  LUNAFLAG
2949   REF   1                  31,3404   63414 0                  RECT.4
2950                            31,3405   52014 0  RECT.2   CLEAR  GOTO
2951   REF   2  LAST  623       31,3406   00265 0                  ZMEASURE
2952   REF   1                  31,3407   63416 1                  RECT.5
2953                            31,3410   43174 1  RECT.3   AXT,2  BOFF
2954                            31,3411   00000 1                  0
2955   REF  15  LAST  630       31,3412   01743 0                  LUNAFLAG
2956   REF   1                  31,3413   63405 0                  RECT.2
2957                            31,3414   77614 1  RECT.4   SET
2958   REF   3  LAST  630       31,3415   00065 1                  ZMEASURE
2959                            31,3416   44575 0  RECT.5   VLOAD  VSR7
2960   REF   3  LAST  609       31,3417   01573 1                  DELTACSM        SCALED B22  OR  B18
2961                            31,3420   53257 1           VSR*   VAD
2962                            31,3421   57176 0                  0,2
2963   REF   3  LAST  609       31,3422   01607 1                  RCVCSM          SCALED B29  OR  B27
2964                            31,3423   77657 0           VSR*
2965                            31,3424   57176 0                  0,2
2966   REF   7  LAST  627       31,3425   27627 1           STOVL  RZC             NOW SCALED B29
2967   REF   1                  31,3426   01601 1                  NUVCSM          SCALED B3  OR  B-1
2968                            31,3427   53702 1           VSR4   VSR*
2969                            31,3430   57176 0                  0,2
2970                            31,3431   53655 1           VAD    VSR*
2971   REF   1                  31,3432   01615 1                  VCVCSM          SCALED B7  OR  B5
2972                            31,3433   57176 0                  0,2
2973   REF   4  LAST  625       31,3434   03635 1           STORE  VZC             NOW SCALED B7
2974                            31,3435   77616 0           RVQ
2975                            31,3436   26305 0  ONE/C    2DEC*  .333564049 E-6 B+21*
2975                            31,3437   05432 1
2977                            31,3440   00302 0  AEARTH   2DEC   6378166 B-29    A AXIS OF EARTH(METERS B-29)
2977                            31,3441   24533 1
2978                            31,3442   00065 1  RADMOON  2DEC   1738090 B-29    RADIUS OF MOON IN METERS
2978                            31,3443   01265 1
```

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2979                          31,3444   01604 1  TRUN19    OCT     01604
29791                         31,3445   00000 1  TRUN19A   OCT     00000
2980                          31,3446   00000 1  1.0B18    2DEC    1.0 B-18
2980                          31,3447   02000 0
29805                         31,3450   00000 1  VARSUBL   DEC     0
298055                        31,3451   01505 0  VARSUBL3  2DEC*   3.4299040 E+6 B-26*
298055                        31,3452   14100 0
29806                         31,3453   00012 1  TRUNVAR   2DEC    2.5 E-9 B+18
29806                         31,3454   27462 1
2981                          31,3455   01461 0  V6N49     VN      0649
2983                          31,3456   01306 0  V05N70    VN      0570
2984                          31,3457   01307 1  V05N71    VN      0571
2985                          31,3460   00077 1  OCT00077  OCT     00077
2986                          31,3461   00202 1  V50N25P   OCT     00202
2987                          31,3462   00006 1  SPSIX     OCT     00006
2988                          31,3463   10464 0  JCAXIS    2DEC    .2688190620     1/2(SIN 32.523 DEG)  TRACK AXIS
2988                          31,3464   12467 1
2989                          31,3465   00000 1           2DEC    0
2989                          31,3466   00000 1
2990                          31,3467   15373 1           2DEC    .4215878460     1/2(COS 32.523 DEG)
2990                          31,3470   11346 0
2991   REF   1                31,3471   62622 0  R60ADRS   CADR    R60CALL +3
2992                          31,3472   77732 1  NEG37     DEC     -37
2993                          31,3473   00700 0  BITS7-9   OCT     700
2994                          31,3474   00070 0  BITS4-6   OCT     70
3007   REF   1                14,2000                    SETLOC  RT53
3008                          14,2000                    BANK
3009                          14,2000   43573 1  LOWMEMRY  VLOAD*  RVQ
3010   REF   1                14,2001   31761 0                    CATLOG.1
301005                        37,2625                    BANK    37
30101  REF   1                16,2000                    SETLOC  P23S1
301013                        16,2000                    BANK
301015                        16,2000    77776 1 LDPLANET EXIT                  KEEP THIS OPEN SUBROUTINE IN EBANK=5
30102  REF   1                16,2001  3 2017 0          CAF     VNPLAN23      BECAUSE STAR IS EBANK=5
301025 REF 148  LAST  626     16,2002  0 4662 1          TC      BANKCALL      LDPLANET ALLOWS VECTOR  TO PLANET TO BE
30103  REF  24  LAST  623     16,2003   20720 0          CADR    GOFLASH       STORED IN STARSAV2 IF STORED STARS ARE
301035 REF  32  LAST  626     16,2004  0 4106 1          TC      GOTOPOOH      NOT VISIBLE.
30104                         16,2005  0 2007 1          TC      +2
301045                        16,2006  0 2001 1          TC      -5
30105  REF 120  LAST  626     16,2007  0 6006 1          TC      INTPRET
301055                        16,2010   77775 1          VLOAD
301056 REF   4  LAST  282     16,2011   03705 0                  STARSAV3
301061                        16,2012   53561 0          VXSC    UNIT
301062 REF   1                16,2013   32433 1                  1/SQR3
301065 REF   3  LAST  621     16,2014   02617 0          STORE   STARSAV2
30107                         16,2015   77650 1          GOTO
301075 REF   1                16,2016   62563 0                  P23.31
30108                         16,2017   01530 0 VNPLAN23 VN      0688
3011                             4622                  BLOCK   02
3012                             4622  0 0006 1 GOTOV56  EXTEND                 P20 TERMINATES BY GOTOV56 INSTEAD OF
```

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3013   REF   1                    4623   3 4626 1            DCA     V856CADR        GOTOPOOH
3014   REF   3  LAST  375         4624   1 5227 1            TCF     SUPDXCHZ
3015   REF   4  LAST  214       E7,1777                      EBANK=  WHOCARES
3016   REF   2  LAST  236         4625    02653 0  V856CADR 2CADR   TRACKTRM
3016                               4626    66107 1
3017   REF   1                    4000                       SETLOC  FFTAG2
3018                               4627                       BANK
3019   REF   1                                               COUNT*  $$/P20
5000                           40,3624                       BANK    40
5001   REF   1                 40,3600                       SETLOC  ENDPINS1
5002                           40,3624                       BANK
5003   REF   1                                               COUNT*  $$/EXTV8
5004   REF 121  LAST  631      40,3624   0 6006 1  V67CALL   TC      INTPRET
5005                           40,3625    77624 1            CALL
5006   REF   1                 40,3626    61701 0                    V67WW
5007                           40,3627    77776 1            EXIT
5008   REF   1                 40,3630   3 3763 0  V06N99DS CAF     V06N99A
5009   REF 149  LAST  631      40,3631   0 4662 1            TC      BANKCALL
5010   REF  13  LAST  519      40,3632    20561 1            CADR    GOXDSPF
5011   REF  30  LAST  618      40,3633   1 5534 1            TCF     ENDEXT
5012   REF   1                 40,3634   0 3636 1            TC      V06N9933
5015   REF   1                 40,3635   0 3630 1            TC      V06N99DS
5016   REF 122  LAST  632      40,3636   0 6006 1  V06N9933  TC      INTPRET
5017                           40,3637    46135 1            SLOAD   BHIZ            IF R3 OF V67 = 0 EXIT
5018   REF   2  LAST  283      40,3640    02325 1                    WWOPT
50181                          40,3641    61644 0                    +3
50182                          40,3642    77650 1            GOTO
50183  REF   1                 40,3643    61646 1                    V6N99INP
5019                           40,3644    77776 1            EXIT
5020   REF  31  LAST  632      40,3645   1 5534 1            TCF     ENDEXT
5021                           40,3646    73150 1  V6N99INP  LXA,1   LXA,2
5022   REF   2  LAST  283      40,3647    02320 1                    WWPOS
5023   REF   2  LAST  283      40,3650    02322 0                    WWVEL
5036                           40,3651    45335 0            SLOAD   DSU
5037   REF   3  LAST  632      40,3652    02325 1                    WWOPT
5038   REF   1                 40,3653    21767 1                    V67DEC2
5039                           40,3654    51030 0            BHIZ    BPL
5040   REF   1                 40,3655    61664 1                    V67WORB
5041   REF   1                 40,3656    61671 0                    V67WMID
5043                           40,3657    67130 1            SXA,1   SXA,2
5044   REF   2  LAST  580      40,3660    02000 0                    WRENDPOS
5045   REF   1                 40,3661    02001 1                    WRENDVEL
5046                           40,3662    77650 1            GOTO
5047   REF   1                 40,3663    61674 0                    V67EXITX
5048                           40,3664    67130 1  V67WORB   SXA,1   SXA,2
5049   REF   2  LAST  600      40,3665    02004 1                    WORBPOS
5050   REF   2  LAST  600      40,3666    02005 0                    WORBVEL
5051                           40,3667    77650 1            GOTO
5052   REF   2  LAST  632      40,3670    61674 0                    V67EXITX
5053                           40,3671    67130 1  V67WMID   SXA,1   SXA,2
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 5054   REF   2  LAST  623   40,3672   03000 1                    WMIDPOS
 5055   REF   1               40,3673   03001 0                    WMIDVEL
 5056                         40,3674   43014 0  V67EXITX CLEAR    CLEAR
 5057   REF  11  LAST  623   40,3675   01671 0                    ORBWFLAG
 5058   REF  10  LAST  623   40,3676   02676 1                    RENDWFLG
 5059                         40,3677   77776 1           EXIT
 5060   REF  32  LAST  632   40,3700  1 5534 1           TCF      ENDEXT
 5061                         40,3701   40020 1  V67WW    STQ      BOV
 5062   REF   8  LAST  609   40,3702   00051 0                    S2
 5063                         40,3703   61704 0                    +1
 5064                         40,3704   77624 1           CALL
 5066   REF  18  LAST  604   40,3705   27442 0                    INITSTALL
 5067                         40,3706   71331 0           SSP      DLOAD
 5068   REF  18  LAST  630   40,3707   00051 0                    S1
 5069                         40,3710   00006 1           DEC      6
 5070   REF  19  LAST  629   40,3711   15335 0                    ZEROVECS
 5071   REF   3  LAST  632   40,3712   02321 0           STORE    WWPOS
 5072   REF   3  LAST  632   40,3713   02323 1           STORE    WWVEL
 50721  REF   4  LAST  632   40,3714   02325 1           STORE    WWOPT
 5073                         40,3715   77770 1           AXT,1
 5074                         40,3716   00044 1           DEC      36
 5075                         40,3717   47573 0  NXPOSVEL VLOAD*   VSQ
 5076   REF  55  LAST  619   40,3720   02445 0                    W +36D,1
 5077                         40,3721   77615 0           DAD
 5078   REF   4  LAST  633   40,3722   02321 0                    WWPOS
 5079   REF   5  LAST  633   40,3723   02321 0           STORE    WWPOS
 5080                         40,3724   47573 0           VLOAD*   VSQ
 5081   REF  56  LAST  633   40,3725   02533 0                    W +900,1
 5082                         40,3726   77615 0           DAD
 5083   REF   4  LAST  633   40,3727   02323 1                    WWVEL
 5084   REF   5  LAST  633   40,3730   02323 1           STORE    WWVEL
 5085                         40,3731   75500 0           TIX,1    SQRT
 5086   REF   1               40,3732   61717 1                    NXPOSVEL
 5087   REF   6  LAST  633   40,3733   16323 1           STODL    WWVEL
 5088   REF   6  LAST  633   40,3734   02321 0                    WWPOS
 5089                         40,3735   77766 0           SQRT
 5090   REF   7  LAST  633   40,3736   02321 0           STORE    WWPOS
 5091                         40,3737   52000 0           BOV      GOTO
 5092                         40,3740   61742 1                    +2
 5093   REF   1               40,3741   61746 0                    V67XXX
 5094                         40,3742   77745 1           DLOAD
 5095   REF  10  LAST  627   40,3743   15343 1                    DPPOSMAX
 5096   REF   8  LAST  633   40,3744   02321 0           STORE    WWPOS
 5097   REF   7  LAST  633   40,3745   02323 1           STORE    WWVEL
 5098                         40,3746   45345 1  V67XXX   DLOAD    DSU
 50981  REF   9  LAST  633   40,3747   02321 0                    WWPOS
 50982  REF   1               40,3750   21765 0                    FT99999
 50983                         40,3751   71240 1           BMN      DLOAD
 50984                         40,3752   61755 1                    +3
 50985  REF   2  LAST  633   40,3753   21765 0                    FT99999
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50986  REF  10  LAST  633   40,3754   02321 0            STORE  WWPOS
50987                       40,3755   66150 0            LXA,1  SXA,1
5099   REF   9  LAST  633   40,3756   00051 0                   S2
5100   REF  11  LAST  566   40,3757   00052 0                   QPRET
5101                        40,3760   77776 1            EXIT
5102   REF  43  LAST  588   40,3761   0 4701 0           TC     POSTJUMP
5103   REF   2  LAST  265   40,3762    27457 1           CADR   INTWAKE
5104   REF  10  LAST  505   E4,1720              WWPOS    =      RANGE
5105   REF   7  LAST  506   E4,1722              WWVEL    =      RRATE
5106   REF  12  LAST  506   E4,1724              WWOPT    =      RTHETA
5107                        40,3763   01543 1    V06N99A  VN     0699
5108                        40,3764   01670 1    FT99999  2DEC   30479 B-19
5108                        40,3765   17000 1
5109                        40,3766   00002 0    V67DEC2  2DEC   2 B-14
5109                        40,3767   00000 1
5110   REF   8  LAST  549   30,2000                       SBANK= LOWSUPER
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0001                          32,2017                    BANK   32

0002  REF   1               35,2000                    SETLOC P30S1
0003                        35,3264                    BANK

0004  REF   8  LAST  565    E7,1625                    EBANK= +MGA

0005  REF   1                                          COUNT  35/P34

0006                        35,3264   77420 1  DISPMGA  STQ    EXIT          USED IN P30

0007  REF   2  LAST   92    35,3265    02370 1                 RGEXIT
0008  REF   2  LAST  481    35,3266  0 3304 0           TC     COMPTGO

0009  REF   2  LAST  481    35,3267  3 4621 0  DISP45   CAF    V16N45
0010  REF 150  LAST  632    35,3270  0 4662 1           TC     BANKCALL
0011  REF   9  LAST  626    35,3271   21057 0           CADR   GOFLASHR
0012  REF  33  LAST  631    35,3272  0 4106 1           TC     GOTOPOOH
0013  REF   1               35,3273  0 3300 1           TC     END45
0014  REF   1               35,3274  0 3267 1           TC     DISP45
0015  REF  37  LAST  626    35,3275  0 5412 0  P30PHS1   TC     PHASCHNG
0016                        35,3276   00014 1           OCT    14
0017  REF  75  LAST  626    35,3277  0 5217 0           TCR    ENDOFJOB
0018  REF 123  LAST  632    35,3300  0 6006 1  END45    TC     INTPRET
0019                        35,3301   52014 0           CLEAR  GOTO
0020  REF   1               35,3302   03664 0                  TIMRFLAG
0021  REF   3  LAST  635    35,3303   02370 1                  RGEXIT

0022                        35,3304  0 0006 1  COMPTGO  EXTEND                 USED TO COMPUTE TTOGO
00221 REF   1               35,3305  23'066 0           QXCH   PHSPRDT6       ** GROUP 6 TEMPORARY USED .. BEWARE **

00222 REF  35  LAST  621    35,3306  0 5546 0           TC     UPFLAG         SET TIMRFLAG
00223 REF   2  LAST  635    35,3307   00155 0           ADRES  TIMRFLAG       BIT 11 FLAG 7
00224 REF 128  LAST  595    35,3310  3 5021 1           CAF    ZERO
00225 REF   1               35,3311  55'145 1           TS     NVWORD1

00227 REF  75  LAST  617    35,3312  3 5017 1           CAF    ONE
00228 REF  22  LAST  539    35,3313  0 5245 1           TC     WAITLIST
00229 REF  27  LAST  531    E7,1412                     EBANK= TIG
0023  REF   3  LAST  219    35,3314   03260 0           2CADR  CLOKTASK
0023                        35,3315   50067 0

00231 REF  11  LAST  619    35,3316  0 5372 1           TC     2PHSCHNG
00232                       35,3317   40036 0           OCT    40036          6.3SPOT FOR CLOKTASK
00233                       35,3320   05024 1           OCT    05024          GROUP 4 CONTINUES HERE
00234                       35,3321   13000 0           OCT    13000

00235 REF   2  LAST  635    35,3322  0 1066 0           TC     PHSPRDT6
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P00239  PROGRAM DESCRIPTION  P30    DATE 3-6-67

R00245  MOD.I BY S. ZELDIN- TO ADD P31 AND AD APT P30 FOR P31 USE.    22DEC67
R0025   FUNCTIONAL DESCRIPTION
R0026   +30(EXTERNAL DELTA-V TARGETTING PROGRAM)
R0027       ACCEPTS ASTRONAUT INPUTS OF TIG,DELV(LV) AND COMPUTES,FOR DISPLAY,
R0028       APOGEE,PERIGEE,DELV(MAG),MGA ASSOCIATED WITH DESIRED MANEUVER

R0029   P31(GENERAL LAMBERT AIMPOINT GUIDANCE)
R00291  A GROUND RULE FOR P31 IS THE ANGLE BETWEEN THE TARGET VECTOR AND
R00292  POSITION VECTOR AT TIG IS NOT 165-195 DEGREES APART
R0030       BASED ON STORED INPUT OF OFFSET TARGET(B+29) AND DELTA T TRANS,AND
R0031       ASTRONAUT ENTRY OF TIG,P31 COMPUTES REQUIRED VELOCITY FOR MANEUVER
R0032       AND,FOR DISPLAY,APOGEE,PERIGEE,DELV(TAG),+MGA ASSOCIATED WITH
R0033       DESIRED MANEUVER

R0034       THE FOLLOWING SUBROUTINES ARE USED IN P30 AND P31
R0035          S30.1 (P30 ONLY)
R0036          S31.1 (P31 ONLY)
R0037          P30/P31 - DISPLAYS TIG
R0038          CNTUP30 - DISPLAYS DELV(LV)
R00381         PARAM30 - DISPLAYS APOGEE,PERIGEE,DELV(MAG),MGA,TIME FROM TIG,
R00382                   MARKS SINCE LAST THRUSTING MANEUVER

R00383  CALLING  SEQUENCE VIA JOB FROM V37

R00384  EXIT VIA V37 CALL OR GOTOPOOH

R00385  OUTPUT FOR POWERED FLIGHT
R00386          VTIG   X
R00387          RTIG    XSEE S30.1
R00388          DELVSIN X
R00389          VGDISP
R003891         RTARG  X
R003892         TPASS4  X SEE S31.1
R003893                X


 0039   REF   1                                              COUNT  35/P30

 003901 REF   1              35,3323  0 3355 1  P30         TC     P30/P31
 003903 REF   1              35,3324  0 3374 1             TC     CNTNUP30
 003905 REF  40  LAST  622   35,3325  0 5560 1             TC     DOWNFLAG      RESET UPDATFLG
 003907 REF  15  LAST  586   35,3326   00027 1             ADRES  UPDATFLG      BIT 7  FLAG 1
 003909 REF 124  LAST  635   35,3327  0 5006 1             TC     INTPRET
 003911                      35,3330   77624 1             CALL
 003913 REF   1              35,3331   63475 1                    S30.1
 003915                      35,3332   77776 1             EXIT
 003919 REF   1              35,3333  0 3404 1             TC     PARAM30
 003921 REF  36  LAST  635   35,3334  0 5546 0             TC     UPFLAG
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003923 REF   3 LAST  529   35,3335   00045 0          ADRES  XDELVFLG      SET XDELVFLG   BIT 8  FLAG 2
003925 REF  34 LAST  635   35,3336  1 4106 0          TCF    GOTOPOOH

003927 REF   2 LAST  636   35,3337  0 3355 1 P31      TC     P30/P31
003929 REF  41 LAST  636   35,3340  0 5560 1          TC     DOWNFLAG
003931 REF  16 LAST  636   35,3341   00027 1          ADRES  UPDATFLG      RESET UPDATFLG  BIT 7 FLAG 1
003932 REF  42 LAST  637   35,3342  0 5560 1          TC     DOWNFLAG
003933 REF   3 LAST  488   35,3343   00156 0          ADRES  NORMSW        RESET NORMSW       BIT 10  FLAG 7
003934 REF 125 LAST  636   35,3344  0 6006 1          TC     INTPRET
003935                     35,3345   77624 1          CALL
003937 REF   1             35,3346   63547 1                 S31.1
003939                     35,3347   77776 1          EXIT
003943 REF   2 LAST  636   35,3350  0 3374 1          TC     CNTNUP30
003945 REF   2 LAST  636   35,3351  0 3404 1          TC     PARAM30
003947 REF  43 LAST  637   35,3352  0 5560 1          TC     DOWNFLAG
003949 REF   4 LAST  637   35,3353   00045 0          ADRES  XDELVFLG      BIT 8  FLAG 2
003951 REF  35 LAST  637   35,3354  1 4106 0          TCF    GOTOPOOH

00396  REF 154 LAST  547   35,3355  56 002 0 P30/P31  XCH    Q
00397  REF   1             35,3356  55'664 0          TS     P30/31RT
0040   REF  37 LAST  636   35,3357  0 5546 0          TC     UPFLAG
00405  REF  17 LAST  637   35,3360   00027 1          ADRES  UPDATFLG      SET UPDATFLG  BIT 7  FLAG 1
0041   REF  38 LAST  637   35,3361  0 5546 0          TC     UPFLAG
00415  REF   5 LAST  586   35,3362   00031 0          ADRES  TRACKFLG      SET TRACKFLG  BIT 5  FLAG 1
0042   REF   1             35,3363  3 3441 0          CAF    V06N33        T OF IGN
0043   REF 151 LAST  635   35,3364  0 4662 1          TC     BANKCALL
0044   REF  10 LAST  635   35,3365   21057 0          CADR   GOFLASHR
0045   REF  36 LAST  637   35,3366  1 4106 0          TCF    GOTOPOOH
00467  REF   2 LAST  637   35,3367  0 1664 1          TC     P30/31RT
0047   REF   3 LAST  637   35,3370  1 3361 1          TCF    P30/P31 +4
0048   REF  38 LAST  635   35,3371  0 5412 0          TC     PHASCHNG
0049                       35,3372   00014 1          OCT    00014
0050   REF  76 LAST  635   35,3373  0 5217 0          TC     ENDOFJOB

00501  REF 155 LAST  637   35,3374  56 002 0 CNTNUP30 XCH    Q
00502  REF   1             35,3375  55'127 0          TS     P30/RET
0051   REF   2 LAST  480   35,3376  3 4620 1          CAF    V06N81
0052   REF 152 LAST  637   35,3377  0 4662 1          TC     BANKCALL
0053   REF  25 LAST  631   35,3400   20720 0          CADR   GOFLASH
0054   REF  37 LAST  637   35,3401  1 4106 0          TCF    GOTOPOOH
0055   REF   2 LAST  637   35,3402  0 1127 1          TC      P30/RET
0056   REF   3 LAST  637   35,3403  1 3376 1          TCF    CNTNUP30 +2
0067   REF 156 LAST  637   35,3404  56 002 0 PARAM30  XCH    Q
00575  REF   3 LAST  637   35,3405  55'664 0          TS     P30/31RT
0068   REF   1             35,3406  3 3442 0          CAF    V06N42
0069   REF 153 LAST  637   35,3407  0 4662 1          TC     BANKCALL
0070   REF  26 LAST  637   35,3410   20720 0          CADR   GOFLASH
0071   REF  38 LAST  637   35,3411  0 4106 1          TC     GOTOPOOH      ON TERMINATION GOTOPOOH
0072   REF   1             35,3412  1 3414 1          TCF    REFTEST       ON PROCEED GO DO REFTEST
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 0073   REF   3  LAST  637   35,3413  1 3406 1           TCF    PARAM30 +2
 0074   REF  22  LAST  564   35,3414  3 5003 1  REFTEST  CAF    BIT13
 0075   REF  38  LAST  588   35,3415  7 0077 0           MASK   STATE +3       REFSMFLAG
 0076                        35,3416  0 0006 1           EXTEND
 0077   REF   1              35,3417  1 3427 1           BZF    NOTSET         REFSMFLAG =0 , THEN BRANCH TO NOTSET
 0078   REF 126  LAST  637   35,3420  0 6006 1           TC     INTPRET
 0079                        35,3421   41575 0           VLOAD  PUSH
 0080   REF   6  LAST  529   35,3422   03646 0                  DELVSIN
 0081                        35,3423   77624 1           CALL
 0082   REF   3  LAST  493   35,3424   10654 1                  GET+MGA
 0084                        35,3425   77650 1           GOTO
 0085   REF   1              35,3426   73433 1                  FLASHMGA
 0086                        35,3427  0 0006 1  NOTSET   EXTEND
 0087   REF   1              35,3430  4 3440 0           DCS    MARSDP
 0088   REF   9  LAST  635   35,3431  53'626 0           DXCH   +MGA           +MGA, +MGA+1  CONTAINS (-00001)
 0089   REF 127  LAST  638   35,3432  0 6006 1           TC     INTPRET
 0090                        35,3433   77624 1  FLASHMGA CALL
 0091   REF   1              35,3434   73264 0                  DISPMGA
 0092                        35,3435   77776 1           EXIT
 00935  REF   4  LAST  637   35,3436  0 1664 1           TC     P30/31RT
 0097                        35,3437   00000 1  MARSDP   OCT    00000          (00000) (16440)  = (+00001)
 0098                        35,3440   35100 0           OCT    35100
A0099                                                                         ( .01 ) DEGREES IN THE LOW ORDER REGISTE
 0100                        35,3441   01441 1  V06N33   VN     0633
 0102                        35,3442   01452 0  V06N42   VN     0642
 0103                        35,3443   04043 1  V16N35   VN     1635
 0104                        35,3444   01455 1  V06N45   VN     0645
```

```
P0105   PROGRAM DESCRIPTION S30.1      DATE 9NOV66

R0106   MOD NO 1          LOG SECTION  P30.P37
R0107   MOD  BY  RAMA AIYAWAR **
R01075  MOD.2 BY S.ZELDIN - TO CORRECT MOD.1 FOR COLOSSUS          29DEC67
R0108   FUNCTIONAL DESCRIPTION
R0109             BASED ON STORED TARGET PARAMETERS(R OF IGNITION(RTIG),V OF
R0110   IGNITION(VTIG).TIME OF IGNITION(TIG).DELV(LV).COMPUTE PERIGEE ALTITUDE
R0111   A+OGEE ALTITUDE AND DELTA-V REQUIRED IN REF. COORDS.(DELVSIN)
R0112   CALLING SEQUENCE
R0113       L    CALL
R0114       L+1          S30.1
R0115   NORMAL EXIT MODE
R0116       AT L+2 OR CALLING SEQUENCE (GOTO L+2)
R0117   SUBROUTINES CALLED
R0118             THISPREC
R0119             PERIAPO
R0120   ALARM OR ABORT EXIT MODES
R0121                NONE
R0122   ERASABLE INITIALIZATION REQUIRED
R0123             TIG       TIME OF IGNITION                    DP      B28CS
R0124             DELVSLV   SPECIFIED DELTA-V IN LOCAL VERT.
R0125                       COORDS. OF ACTIVE VEHICLE AT
R0126                       TIME OF IGNITION                    VCT.    B+7M/CS
R0127   OUTPUT
R0128             RTIG          POSITION AT TIG               VCT.    B+29M
R0129             VTIG          VELOCITY AT TIG               VCT.    B+7M
R0130             HAPO          APOGEE ALT.                   DP      B+29M
R0131             HPER          PERIGEE ALT.                  DP      B+29M
R0132             DELVSIN       DELVSLV IN REF COORDS         VCT.    B+7M/CS
R0133             VGDISP        MAG. OF DELVSIN               DP      B+7M/CS
R0136   DEBRIS QTEMP    TEMP. ERASABLE
R0137          QPRET,MPAC
R0138          PUSHLIST

 0139   REF   1                31,2000                          SETLOC P30S1A
 0140                          31,3475                          BANK

 0141   REF   1                                                 COUNT  35/S30S

 0142                          31,3475   71220 1  S30.1         STQ    DLOAD
 0143   REF   4  LAST  558     31,3476   03657 0                        QTEMP
 0144   REF  28  LAST  635     31,3477   03413 1                        TIG             TIME IGNITION SCALED AT 2(+28)CS
 0145   REF  32  LAST  607     31,3500   34041 0                STCALL  TDEC1
 0146   REF   4  LAST  517     31,3501   27071 1                        THISPREC        ENCKE ROUTINE FOR

 0147                          31,3502   67175 0                VLOAD  SXA,2
 0148   REF  17  LAST  596     31,3503   00007 0                       VATT
 01485  REF  11  LAST  537     31,3504   03746 1                       RTX2
 0149   REF   2  LAST  123     31,3505   27640 0                STOVL  VTIG
```

```
0150   REF  20  LAST  596   31,3506   00001 0            RATT
0151   REF   3  LAST  123   31,3507   03632 0     STORE  RTIG
0152   REF  25  LAST  557   31,3510   03540 0     STORE  RACT3
0153                        31,3511   53435 0     VXV    UNIT
0154   REF   3  LAST  639   31,3512   03640 0            VTIG
0155   REF   9  LAST  479   31,3513   36617 1     STCALL UNRM
0156   REF   3  LAST  477   31,3514   72666 1            LOMAT
0157                        31,3515   61375 1     VLOAD  VXM
0158   REF   4  LAST  175   31,3516   03405 0            DELVSLV
0159                        31,3517   00001 0            0
0160                        31,3520   66172 0     VSL1   SXA,1
0161   REF   9  LAST  555   31,3521   03745 1            RTX1
0162   REF   7  LAST  638   31,3522   03646 0     STORE  DELVSIN
0163                        31,3523   77646 0     ABVAL
0164   REF   4  LAST  282   31,3524   27773 1     STOVL  VGDISP        MAG DELV
0165   REF   4  LAST  640   31,3525   03632 0            RTIG
0166                        31,3526   53315 0     PDVL   VAD
0167   REF   8  LAST  640   31,3527   03646 0            DELVSIN
0168   REF   4  LAST  640   31,3530   03640 0            VTIG
0169                        31,3531   77624 1     CALL
0170   REF   3  LAST  529   31,3532   45153 1            PERIAPO1
0171                        31,3533   77624 1     CALL
0172   REF   3  LAST  529   31,3534   45263 1            SHIFTR1
0172                        31,3535   77624 1     CALL
0172   REF   3  LAST  522   31,3536   46754 0            MAXCHK
0173   REF   2  LAST  279   31,3537   16366 0     STODL  HPER          PERIGEE ALT B+29
0174                        31,3540   00005 1            4D
0175                        31,3541   77624 1     CALL
0176   REF   4  LAST  640   31,3542   45263 1            SHIFTR1
0176                        31,3543   77624 1     CALL
0176   REF   4  LAST  640   31,3544   46754 0            MAXCHK
0177   REF   3  LAST  279   31,3545   36364 0     STCALL HAPO          APOGEE ALT B+29
0178   REF   5  LAST  639   31,3546   03657 0            QTEMP
```

```
P0181   S31.1  PROGRAM DESCRIPTION                    28DEC67
R0182   MOD.1 BY S.ZELDIN

R0183   S31.1 COMPUTES DELV IN REF AND LV COORDS,MAG OF DELV,INTERCEPT TIME,
R0184   APOGEE AND PERIGEE ALT FOR REQUIRED MANEUVER

R0185   CALLING SEQUENCE
R0186           L       CALL
R0187         L +1            S31.1

R0188   NORMAL EXIT MODE
R0189           AT L +2 OF CALLING SEQUENCE(GOTO L+2)
R0190   SUBROUTINES CALLED
R0191            AGAIN
R0192            PERIAPO1
R0193            SHIFTR1
R0194            MIDGIM
R0195   NO ALARM OR ABORT MODES
R0196   INPUT
R0197            DELLT4          DP  +28
R0198            TIG             DP  +28
R01981           RTARG           VCT +29
R01982  OUTPUT
R01983           DELVLVC         VCT +7
R01984           VGDISP          DP  +7
R01985           HAPO            DP  +29
R01986           HPER            DP  +29
R01987           TPASS4          DP  +28
R01988  DEBRIS  - QTEMP
 0200                           31,3547   71220 1  S31.1     STO     DLOAD
 0201   REF   6  LAST  640     31,3550   03657 0             QTEMP
 0202   REF  29  LAST  639     31,3551   03413 1             TIG
 0203   REF  33  LAST  639     31,3552   34041 0           STCALL TDEC1
 0204   REF   1                31,3553   61651 1             AGAIN           RETURNS RTX2,RTX1,RATT,VATT,VIPRIME
 0205                           31,3554   63375 0           VLOAD  PDVL       DELVEET3
 0206   REF   5  LAST  640     31,3555   03632 0             RTIG
 0207   REF  12  LAST  558     31,3556   03612 1             VIPRIME
 0208                           31,3557   77624 1           CALL
 0209   REF   4  LAST  640     31,3560   45153 1             PERIAPO1
 0210                           31,3561   77624 1           CALL
 0211   REF   5  LAST  640     31,3562   45263 1             SHIFTR1
 02115                          31,3563   77624 1           CALL
 02116  REF   5  LAST  640     31,3564   46754 0             MAXCHK
 0212   REF   3  LAST  640     31,3565   16366 0           STODL  HPER       B29
 0213                           31,3566   00005 1             4D
 0214                           31,3567   77624 1           CALL
 0215   REF   8  LAST  641     31,3570   45263 1             SHIFTR1
 02155                          31,3571   77624 1           CALL
 02156  REF   6  LAST  641     31,3572   46754 0             MAXCHK
 0216   REF   4  LAST  640     31,3573   26364 1           STOVL  HAPO       B29
```

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```
0217   REF  14  LAST  555   31,3574   03646 0              DELVEET3
02175                       31,3575   00001 0      STORE   0
0218                        31,3576   45014 0      SET     CALL
0219   REF   6  LAST  555   31,3577   01072 0              AVFLAG
0220   REF   1              31,3600   10647 0              MIDGIM        GET DELVLVC B7 FORDISPLAY
0221                        31,3601   77646 0      ABVAL
0222   REF   5  LAST  640   31,3602   17773 1      STODL   VGDISP        B+7 FOR DISPLAY
0223   REF   8  LAST  555   31,3603   03423 1              DELLT4
0224                        31,3604   77615 0      DAD
0225   REF  30  LAST  641   31,3605   03413 1              TIG
0226   REF   9  LAST  477   31,3606   37656 0      STCALL  TPASS4        FOR S40.1
0227   REF   7  LAST  641   31,3607   03657 0              QTEMP
```

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P0327   SUBROUTINE NAME:      DELRSPL                                          (CONTINUATION OF V 82 IN CSM IF P11 ACTI
R0329   TRANSFERRED COMPLETELY FROM SUNDISK, P30S REV 33. 9 SEPT 67.
R0330   MOD NO:  0            MOD BY:  ZELDIN              DATE:
R0331   MOD NO:  1            MOD BY:  RR BAIRNSFATHER     DATE:  11 APR 67
R0332   MOD NO:  2            MOD BY:  RR BAIRNSFATHER     DATE:  12 MAY 67    ADD UR.RT CALC WHEN BELOW 300K FT
R0334   MOD NO:  2.1          MOD BY:  RR BAIRNSFATHER     DATE: 5 JULY 67     FIX ERROR IN MOD. 2.
R0336   MOD NO:  3            MOD BY:  RR BAIRNSFATHER     DATE:  12 JUL 67    CHANGE SIGN OF DISPLAYED ERROR.
R0337   MOD 4                 MOD BY   S.ZELDIN            DATE  3 APRIL 68    CHANGE EQUATIONS FOR L/D=.18 WHICH REPLA
R0338   FUNCTION:             CALCULATE (FOR DISPLAY ON CALL) AN APPROXIMATE    MEASURE OF IN-PLANE SPLASH DOWN
R0340                         ERROR. IF THE FREE-FALL TRANSFER ANGLE TO 300K FT  ABOVE PAD RADIUS IS POSITIVE:
R0342                         SPLASH ERROR= -RANGE TO TARGET + FREE-FALL TRANSFER ANGLE + ESTIMATED ENTRY ANGLE.
R0344                         THE TARGET LOCATION AT ESTIMATED TIME OF IMPACT IS USED.  IF THE FREE-FALL TRANSFER
R0346                         ANGLE IS NEGATIVE:  SPLASH ERROR= -RANGE TO TARGET
R0347                         THE PRESENT TARGET LOCATION IS USED.
R0348   CALLING SEQUENCE      CALLED AFTER SR30.1 IF IN CSM AND IF P11 OPERATING (UNDER CONTROL OF V82)
R0349   SUBROUTINES CALLED: VGAMCALC, TFF/TRIG, LALOTORV.
R0350   EXIT                 RETURN DIRECTLY TO V 82 PROG. AT SPLRET
R0351   ERASABLE INITIALIZATION   LEFT BY SR30.1 AND V82GONI
R0352   OUTPUT:  RSP-RREC  RANGE IN REVOLUTIONS                               DSKY DISPLAY IN N. MI.
R0354   DEBRIS:  QPRET, POLO ...POL7 ,POL10

R03541          THETA(1)
R0355
0356                        32,2017                         BANK    32
0357    REF  1              32,2000                         SETLOC  DELRSPL1
0358                        32,2017                         BANK
0359    REF  1                                              COUNT*  $$/P30          PROGRAMS: P30 EXTERNAL DELTA V

0360                        32,2017   00011 1  DELRSPL      STORE   80
0361                        32,2020   45244 1               BPL     DSU
0362    REF  1              32,2021   64067 1                       CANTOO          GONE PAST 300K FT ALT
0363    REF  1              32,2022   16326 1                       1BITOP
0364                        32,2023   45000 0               BOV     CALL
0365    REF  2 LAST  543    32,2024   64067 1                       CANTOO          POSMAX INDICATES NO 300K FT SOLUTION.
0366    REF  1              32,2025   55051 0                       VGAMCALC        +GAMMA(REV) IN PMAC,V300 MAG(8-7)=PDL 0
0367                        32,2026   45006 0               PUSH    CALL
0368    REF  1              32,2027   56631 0                       TFF/TRIG
0369                        32,2030   77624 1               CALL
0370    REF  1              32,2031   64075 1                       AUGEKUGL
0371                        32,2032   65525 0               PDDL    ACOS            T ENTRY PDL 6
0372    REF  1              32,2033   00017 1                       CDELF/2
0373                        32,2034   77615 0               DAD
0374                        32,2035   00005 1                       4
0375    REF  2 LAST   91    32,2036   26350 0  GETARG       STOVL   THETA(1)
0376    REF  7 LAST  441    32,2037   03401 1                       LAT(SPL)
0377    REF  7 LAST  537    32,2040   15104 0               STODL   LAT
0378    REF 11 LAST  613    32,2041   15335 0                       HI6ZEROS
0379    REF  6 LAST  610    32,2042   15110 0               STODL   ALT             ALT=0  = LAT +4
0381    REF  5 LAST  510    32,2043   01205 1                       PIPTIME
```

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 0382                                32,2044   71214 0           BON     DLOAD
 0383   REF   4  LAST  508           32,2045   03711 0                   V37FLAG
 03831                               32,2046   64050 0                   +2
 03832  REF   6  LAST  518           32,2047   02325 1                   TSTART82
 03833                               32,2050   43225 0           DSU     DAD
 03834                               32,2051   00011 1                   BD
 0384                                32,2052   45014 0           CLEAR   CALL
 0385   REF   6  LAST  624           32,2053   00662 0                   ERADFLAG
 0386   REF   5  LAST  624           32,2054   26441 1                   LALOTORV        R RECOV. IN ALPHAV AND MPAC

 0387                                32,2055   63256 0           UNIT    PDVL
 0388   REF  14  LAST  522           32,2056   02327 0                   RONE
 03881                               32,2057   50256 0           UNIT    DOT
 0389                                32,2060   65552 0           SL1     ARCCOS
 0390                                32,2061   77621 1           BDSU                    ERROR = THETA EST - THETA TARG
A0391                                                                   NEGATIVE NUMBER SIGNIFIES THAT WILL FALL SHORT.
A0392                                                                   POSITIVE NUMBER SIGNIFIES THAT WILL OVERSHOOT.
 0393   REF   3  LAST  643           32,2062   02350 0                   THETA4(1)
 0394   REF   2  LAST  280           32,2063   36356 1  DELRDONE STCALL  RSP-RREC        DOWNRANGE RECOVERY RANGE ERROR    /360
 03941  REF   1                      32,2064   27455 0                   INTWAKEO
 03942                               32,2065   77624 1           CALL
 0395   REF   1                      32,2066   46653 0                   SPLRET
 0396                                32,2067   65345 0  CANTDO   DLOAD   PDDL            INITIALIZE ERASE TO DOT TARGET AND UR
A0397                                                                   FOR RANGE ANGLE.
 0398   REF   7  LAST  608           32,2070   15333 0                   HIDPHALF        TO PDL 0 FOR DEN IN DDV.
 0399   REF  12  LAST  643           32,2071   15335 0                   HI6ZEROS
 0400                                32,2072   77606 1           PUSH                    ZERO TO PDL 2 FOR PHI ENTRY
 0401                                32,2073   34011 0           STCALL  BD
 0402   REF   1                      32,2074   64036 0                   GETARG          GO SET RSP-RREC =0

 0405                                32,2075   77775 1  AUGEKUGL VLOAD
 0406   REF   1                      32,2076   24256 0                   X1CON -2
 0407   REF  25  LAST  630           32,2077   14045 0           STODL   X1 -2
 0408                                32,2100   00001 0                   0
 0409                                32,2101   50025 0           DSU     BMN
 0410   REF   1                      32,2102   24250 0                   V(21K)
 0411   REF   1                      32,2103   64130 1                   LOOPSET
 0412                                32,2104   65060 1           XSU,1   XCHX,2
 0413   REF  19  LAST  633           32,2105   00050 1                   S1
 0414   REF  26  LAST  644           32,2106   00046 0                   X1
 0415                                32,2107   45324 0           XCHX,2  DSU
 0416   REF  20  LAST  644           32,2110   00050 1                   S1
 0417   REF   1                      32,2111   24236 0                   V(3K)
 0418                                32,2112   65040 0           BMN     XCHX,2
 0419   REF   2  LAST  644           32,2113   64130 1                   LOOPSET
 0420   REF  21  LAST  644           32,2114   00050 1                   S1
 0421                                32,2115   50025 0           DSU     BMN
 0422   REF   1                      32,2116   24246 1                   V(4K)
 0423   REF   3  LAST  644           32,2117   64130 1                   LOOPSET
 0424                                32,2120   65124 0           XCHX,2  XCHX,2
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0425   REF  22  LAST  644   32,2121   00050 1                    S1
0426   REF  27  LAST  644   32,2122   00046 0                    X1
0427                        32,2123   50025 0          DSU       BMN
0428   REF   1              32,2124   24232 1                    V(400)
0429   REF   4  LAST  644   32,2125   64130 1                    LOOPSET
0430                        32,2126   77730 0          SXA,1
0431   REF  23  LAST  645   32,2127   00050 1                    S1
0432                        32,2130   52110 0 LOOPSET  INCR,1    GOTO
0433                        32,2131   00001 0          DEC       1
0434   REF   1              32,2132   64135 1                    K1K2LOOP
0435                        32,2133   77730 0 K2CALC   SXA,1
0436   REF  24  LAST  645   32,2134   00050 1                    S1
0437                        32,2135   44745 1 K1K2LOOP DLOAD     DSU*
0438                        32,2136   00001 0                    0
0439   REF   1              32,2137   24245 1                    V(32K) +1,1
0440                        32,2140   42603 1          DMP*      DAD*
0441   REF   1              32,2141   24231 1                    YK1K2 +1,1
0442   REF   1              32,2142   24215 1                    CK1K2 +1,1
0443                        32,2143   60125 1          PDDL      TIX,1
0444                        32,2144   00003 1                    2
0445   REF   1              32,2145   64133 1                    K2CALC
0446                        32,2146   55225 1          DSU       BDDV
04461                       32,2147   40006 0          PUSH      BOV              PHI ENTRY PDL 4D
04462  REF   1              32,2150   64173 0                    MAXPHI
044625                      32,2151   45240 0          BMN       DSU
044626 REF   2  LAST  645   32,2152   64173 0                    MAXPHI
04463  REF   1              32,2153   24200 0                    MAXPHIC
04464                       32,2154   77644 1          BPL
04465  REF   3  LAST  645   32,2155   64173 0                    MAXPHI
0447                        32,2156   45345 1 PHICALC  DLOAD     DSU
0448                        32,2157   00001 0                    0
0449   REF   1              32,2160   24256 0                    V(26K)
0450                        32,2161   71244 0          BPL       DLOAD
0451   REF   1              32,2162   64170 0                    TGR26
0452   REF   1              32,2163   24252 1                    TLESS26
0453                        32,2164   77671 1          DDV
0454                        32,2165   00001 0                    0
0455                        32,2166   43405 1 TENT     DMP       RVQ
0456                        32,2167   00005 1                    4D
0457                        32,2170   52145 0 TGR26    DLOAD     GOTO
0458   REF   1              32,2171   24254 1                    TGR26CON
0459   REF   1              32,2172   64166 1                    TENT

04591                       32,2173   65345 0 MAXPHI   DLOAD     PDDL
04592  REF   2  LAST  645   32,2174   24200 0                    MAXPHIC
045925                      32,2175   77650 1          GOTO
04593  REF   1              32,2176   64156 1                    PHICALC
04594                       32,2177   02755 1 MAXPHIC  2DEC      .09259298        2000 NM FOR MAXIMUM PHI ENTRY
04594                       32,2200   01307 1
```

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 0460   REF   2 LAST  643 TO  646:   114   114*          COUNT* $$/P30

A0461                                                                BELOW
A0462                                                <<<< TABLE IS INDEXED. KEEP IN ORDER >>>

 0463                      32,2201   00013 0            2DEC   7.07304526 E-4  5500
 0463                      32,2202   22652 0
 0464                      32,2203   00005 1            2DEC   3.08641975 E-4  2400
 0464                      32,2204   01642 0
 0465                      32,2205   00005 1            2DEC   3.08641975 E-4  2400
 0465                      32,2206   01642 0
 0466                      32,2207   77556 1            2DEC   -8.8888888 E-3  -3.2
 0466                      32,2210   53522 1
 0467                      32,2211   00055 1            2DEC   2.7777777 E-3   1
 0467                      32,2212   20266 1
 0468                      32,2213   00155 0  CK1K2     2DEC   6.6666666 E-3   2.4
 0468                      32,2214   07202 0
 0469                      32,2215   00000 1            2DEC   0               0
 0469                      32,2216   00000 1
 0470                      32,2217   77730 0            2DEC*  -1.86909989 E-5 B7*      -.443
 0470                      32,2220   71525 0
 0471                      32,2221   00000 1            2DEC   0
 0471                      32,2222   00000 1
 0472                      32,2223   04445 0            2DEC*  1.11639691 E-3 B7*       .001225
 0472                      32,2224   10102 0
 0473                      32,2225   03726 1            2DEC*  9.56911636 E-4 B7*       .00105
 0473                      32,2226   31201 0
 0474                      32,2227   01040 1  YK1K2     2DEC*  2.59733157 E-4 B7*            .000285
 0474                      32,2230   26313 1
 0475                      32,2231   00234 1  V(400)    2DEC   1.2192 B-7
 0475                      32,2232   01660 0
 0476                      32,2233   25254 0  V(28K)    2DEC   85.344 B-7
 0476                      32,2234   01014 0
 0477                      32,2235   02222 1  V(3K)     2DEC   9.144 B-7
 0477                      32,2236   15646 1
 0478                      32,2237   22223 1  V(24K)    2DEC   73.152 B-7
 0478                      32,2240   16457 0
 0479                      32,2241   25254 0            2DEC   85.344 B-7
 0479                      32,2242   01014 0
 0480                      32,2243   30304 0  V(32K)    2DEC   97.536 B-7
 0480                      32,2244   23351 1
 0481                      32,2245   03030 1  V(4K)     2DEC   12.192 B-7
 0481                      32,2246   22335 1
 0482                      32,2247   20000 0  V(21K)    2DEC   64.000 B-7
 0482                      32,2250   00000 1
 0483                      32,2251   00033 1  TLESS26   2DEC*  5.70146588 E7 B-35*    8660PHI/V
 0483                      32,2252   05763 0
 0484                      32,2253   00053 1  TGR26CON  2DEC   7.2 E5 B-28      PHI/3
 0484                      32,2254   36200 0
 0485                      32,2255   23637 1  V(26K)    2DEC   79.248 B-7       26000
 0485                      32,2256   27636 1
```

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```
 0486                          32,2257    00012 1  XICON     DEC     10
 0487                          32,2260    00010 0             DEC     8
 0488                          32,2261    00006 1             DEC     6
A0489                                                    <<<< TABLE IS INDEXED. KEEP IN ORDER >>>
A0490                                                                ABOVE
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P0491 ..... AVFLAGA/P .....

R0492 SUBROUTINES USED

R0493 UPFLAG
R0494 DOWNFLAG

```
 0496  REF   2  LAST  484      4000                        SETLOC P30SUBS
 0497                           4627                        BANK
 0498  REF  21  LAST  559   E4,1770                        EBANK= SUBEXIT
 0499                          4627  0 0006 1  AVFLAGA     EXTEND                  AVFLAG = CSM
 0500  REF  22  LAST  648      4630  23'770 0              QXCH   SUBEXIT
 0501  REF  44  LAST  637      4631  0 5560 1              TC     DOWNFLAG
 0502  REF   7  LAST  642      4632   00050 1              ADRES  AVFLAG          BIT 5  FLAG 2
 05025 REF   4  LAST  570      4633  3 5060 1              CAF    EBANK7
 05026 REF  30  LAST  575      4634  54 003 0              TS     EBANK
 05027 REF   2  LAST  175   E7,1424                        EBANK= ECSTEER
 0503  REF  23  LAST  638      4635  3 5003 1              CAF    BIT13
 0504  REF   3  LAST  648      4636  55'424 0              TS     ECSTEER          SET ECSTEER = 1
 05045 REF   1                  4637  3 5005 1              CAF    EBANK4
 05046 REF  31  LAST  648      4640  54 003 0              TS     EBANK
 05047 REF  23  LAST  648   E4,1770                        EBANK= SUBEXIT
 0505  REF  24  LAST  648      4641  0 1770 0              TC     SUBEXIT
 0506                          4642  0 0006 1  AVFLAGP     EXTEND                  AVFLAG = LEM
 0507  REF  25  LAST  648      4643  23'770 0              QXCH   SUBEXIT
 0508  REF  39  LAST  637      4644  0 5546 0              TC     UPFLAG
 0509  REF   8  LAST  648      4645   00050 1              ADRES  AVFLAG          BIT 5  FLAG 2
 05091 REF  26  LAST  648      4646  0 1770 0              TC     SUBEXIT
 0510                          4647  0 0006 1  P20FLGON    EXTEND
 0511  REF  27  LAST  648      4650  23'770 0              QXCH   SUBEXIT
 05111 REF  40  LAST  648      4651  0 5546 0              TC     UPFLAG
 05112 REF   6  LAST  637      4652   00031 0              ADRES  TRACKFLG
 05113 REF  41  LAST  648      4653  0 5546 0              TC     UPFLAG
 05114 REF  18  LAST  637      4654   00027 1              ADRES  UPDATFLG
 0512  REF  28  LAST  648      4655  0 1770 0              TC     SUBEXIT          DP      B4
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P0010   COELLIPTIC SEQUENCE INITIATION (CSI) PROGRAMS (P32 AND P72)

R0011   MOD NO -1        LOG SECTION - P32-P35, P72-P75
R0012   MOD BY WHITE.P  DATE  1JUNE67

R0013   PURPOSE

R0014           (1) TO CALCULATE PARAMETERS ASSOCIATED WITH THE FOLLOWING
R0015               CONCENTRIC FLIGHT PLAN MANEUVERS - THE CO-ELLIPTIC SEQUENCE
R0016               INITIATION (CSI) MANEUVER AND THE CONSTANT DELTA ALTITUDE
R0017               (CDH) MANEUVER.

R0018           (2) TO CALCULATE THESE PARAMETERS BASED UPON MANEUVER DATA
R0019               APPROVED AND KEYED INTO THE DSKY BY THE ASTRONAUT.

R0020           (3) TO DISPLAY TO THE ASTRONAUT AND THE GROUND DEPENDENT VARIABLES
R0021               ASSOCIATED WITH THE CONCENTRIC FLIGHT PLAN MANEUVERS FOR
R0022               APPROVAL BY THE ASTRONAUT/GROUND.

R0023           (4) TO STORE THE CSI TARGET PARAMETERS FOR USE BY THE DESIRED
R0024               THRUSTING PROGRAM.

R0025   ASSUMPTIONS

R0026           (1) AT A SELECTED TPI TIME THE LINE OF SIGHT BETWEEN THE ACTIVE
R0027               AND PASSIVE VEHICLES IS SELECTED TO BE A PRESCRIBED ANGLE (E)
R0028               FROM THE HORIZONTAL PLANE DEFINED BY THE ACTIVE VEHICLE
R00285              POSITION.

R0029           (2) THE TIME BETWEEN CSI IGNITION AND CDH IGNITION MUST BE
R0030               COMPUTED TO BE GREATER THAN 10 MINUTES FOR SUCCESSFUL
R0031               COMPLETION OF THE PROGRAM.

R0032           (3) THE TIME BETWEEN CDH IGNITION AND TPI IGNITION MUST BE
R0033               COMPUTED TO BE GREATER THAN 10 MINUTES FOR SUCCESSFUL
R0034               COMPLETION OF THE PROGRAM.

R0035           (4) CDH DELTA V IS SELECTED TO MINIMIZE THE VARIATION OF THE
R0036               ALTITUDE DIFFERENCE BETWEEN THE ORBITS.

R0037           (5) CSI BURN IS DEFINED SUCH THAT THE IMPULSIVE DELTA V IS IN THE
R0038               HORIZONTAL PLANE DEFINED BY THE ACTIVE VEHICLE POSITION AT CSI
R00385              IGNITION.

R0039           (6) THE PERICENTER ALTITUDE OF THE ORBIT FOLLOWING CSI AND CDH
R0040               MUST BE GREATER THAN 35,000 FT (LUNAR ORBIT) OR 85 NM (EARTH
R0041               ORBIT) FOR SUCCESSFUL COMPLETION OF THIS PROGRAM.

R0042           (7) THE CSI AND CDH MANEUVERS ARE ORIGINALLY ASSUMED TO BE
R0043               PARALLEL TO THE PLANE OF THE CSM ORBIT.  HOWEVER CREW
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MODIFICATION OF DELTA V (LV) COMPONENTS MAY RESULT IN AN OUT-OF-PLANE CSI MANEUVER.

(8) STATE VECTOR UPDATES BY P27 ARE DISALLOWED DURING AUTOMATIC STATE VECTOR UPDATING INITIATED BY P20 (SEE ASSUMPTION 10).

(9) COMPUTED VARIABLES MAY BE STORED FOR LATER VERIFICATION BY THE GROUND. THESE STORAGE CAPABILITIES ARE NORMALLY LIMITED ONLY TO THE PARAMETERS FOR ONE THRUSTING MANEUVER AT A TIME EXCEPT FOR CONCENTRIC FLIGHT PLAN MANEUVER SEQUENCES.

(10) THE RENDEZVOUS RADAR MAY OR MAY NOT BE USED TO UPDATE THE LM OR CSM STATE VECTORS FOR THIS PROGRAM. IF RADAR USE IS DESIRED THE RADAR WAS TURNED ON AND LOCKED ON THE CSM BY PREVIOUS SELECTION OF P20. RADAR SIGHTING MARKS WILL BE MADE AUTOMATICALLY APPROXIMATELY ONCE A MINUTE WHEN ENABLED BY THE TRACK AND UPDATE FLAGS (SEE P20). THE RENDEZVOUS TRACKING MARK COUNTER IS ZEROED BY THE SELECTION OF P20 AND AFTER EACH THRUSTING MANEUVER.

(11) THE ISS NEED NOT BE ON TO COMPLETE THIS PROGRAM.

(12) THE OPERATION OF THE PROGRAM UTILIZES THE FOLLOWING FLAGS -

ACTIVE VEHICLE FLAG - DESIGNATES THE VEHICLE WHICH IS DOING RENDEZVOUS THRUSTING MANEUVERS TO THE PROGRAM WHICH CALCULATES THE MANEUVER PARAMETERS. SET AT THE START OF EACH RENDEZVOUS PRE-THRUSTING PROGRAM.

FINAL FLAG - SELECTS FINAL PROGRAM DISPLAYS AFTER CREW HAS COMPLETED THE FINAL MANEUVER COMPUTATION AND DISPLAY CYCLE.

EXTERNAL DELTA V STEERING FLAG - DESIGNATES THE TYPE OF STEERING REQUIRED FOR EXECUTION OF THIS MANEUVER BY THE THRUSTING PROGRAM SELECTED AFTER COMPLETION OF THIS PROGRAM.

(13) IT IS NORMALLY REQUIRED THAT THE ISS BE ON FOR 1 HOUR PRIOR TO A THRUSTING MANEUVER.

(14) THIS PROGRAM IS SELECTED BY THE ASTRONAUT BY DSKY ENTRY -

P32 IF THIS VEHICLE IS ACTIVE VEHICLE.

P72 IF THIS VEHICLE IS PASSIVE VEHICLE.

INPUT

(1) TCSI TIME OF THE CSI MANEUVER

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R0112          (2) NN       NUMBER OF APSIDAL CROSSINGS THRU WHICH THE ACTIVE
R0113                       VEHICLE ORBIT CAN BE ADVANCED TO OBTAIN THE CDH
R0114                       MANEUVER POINT
R0115          (3) ELEV     DESIRED LOS ANGLE AT TPI
R0116          (4) TTPI     TIME OF THE TPI MANEUVER
R0130   OUTPUT

R0131          (1) TRKMKCNT NUMBER OF MARKS
R0132          (2) TTOGO    TIME TO GO
R0133          (3) +MGA     MIDDLE GIMBAL ANGLE
R0134          (4) DIFFALT  DELTA ALTITUDE AT CDH
R0135          (5) T1TOT2   DELTA TIME FROM CSI TO CDH
R0136          (6) T2TOT3   DELTA TIME FROM CDH TO TPI
R0137          (7) DELVLVC  DELTA VELOCITY AT CSI - LOCAL VERTICAL COORDINATES
R0138          (8) DELVLVC  DELTA VELOCITY AT CDH - LOCAL VERTICAL COORDINATES

R0139   DOWNLINK

R01391         (1) TCSI     TIME OF THE CSI MANEUVER
R01392         (2) TCDH     TIME OF THE CDH MANEUVER
R01393         (3) TTPI     TIME OF THE TPI MANEUVER
R01394         (4) TIG      TIME OF THE CSI MANEUVER
R01395         (5) DELVEET1 DELTA VELOCITY AT CSI - REFERENCE COORDINATES
R01396         (6) DELVEET2 DELTA VELOCITY AT CDH - REFERENCE COORDINATES
R01397         (7) DIFFALT  DELTA ALTITUDE AT CDH
R01398         (8) NN       NUMBER OF APSIDAL CROSSINGS THRU WHICH THE ACTIVE
R01399                      VEHICLE ORBIT CAN BE ADVANCED TO OBTAIN THE CDH
R0140                       MANEUVER POINT
R01401         (9) ELEV     DESIRED LOS ANGLE AT TPI

R01402  COMMUNICATION TO THRUSTING PROGRAMS

R01403         (1) TIG      TIME OF THE CSI MANEUVER
R01404         (2) RTIG     POSITION OF ACTIVE VEHICLE AT CSI - BEFORE ROTATION
R01405                      INTO PLANE OF PASSIVE VEHICLE
R01406         (3) VTIG     VELOCITY OF ACTIVE VEHICLE AT CSE - BEFORE ROTATION
R01407                      INTO PLANE OF PASSIVE VEHICLE
R01408         (4) DELVSIN  DELTA VELOCITY AT CSI - REFERENCE COORDINATES
R01409         (5) DELVSAB  MAGNITUDE OF DELTA VELOCITY AT CSI
R0141          (6) XDELVFLG SET TO INDICATE EXTERNAL DELTA V VG COMPUTATION

R0150   SUBROUTINES USED

R0151          AVFLAGA
R0152          AVFLAGP
R01525         P20FLGON
R0153          VARALARM
R0154          BANKCALL
R0155          GOFLASH
R0156          GOTOPOOH
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R01562          VNPOOH
R01564          GOFLASHR
R0157           BLANKET
R0158           ENDOFJOB
R0159           SELECTMU
R0160           ADVANCE
R0161           INTINT
R0162           PASSIVE
R0163           CSI/A
R0164           S32/33.1
R0165           DISDVLVC
R0166           VN1645

 0400                                   35,3445                         BANK    35
 0401   REF    1                       04,2000                         SETLOC  CSI/COH1
 0402                                   04,3303                         BANK
 0403   REF   29  LAST  648            E4,1770                         EBANK=  SUBEXIT
 0404   REF    1                                                       COUNT   357/P3272

 0500   REF    6  LAST  559            04,3303  0 4627 0  P32          TC      AVFLAGA
 0502   REF    1                       04,3304  0 3306 1               TC      P32STRT
 0503   REF    6  LAST  559            04,3305  0 4642 0  P72          TC      AVFLAGP
 050304 REF  128  LAST  638            04,3306  0 6006 1  P32STRT      TC      INTPRET
 050305                                04,3307   77745 1               DLOAD
 050306 REF    3  LAST  488            04,3310   11566 1                       ZEROVEC
 050307 REF    8  LAST  559            04,3311   03754 1               STORE   CENTANG
 050308                                04,3312   77776 1               EXIT
 05031  REF    1                       04,3313  0 3331 0               TC      P32/P72A
 05032                                 04,3314   77734 1  ALMXITA      SXA,2
 05033  REF    1                       04,3315   03664 0                       CSIALRM
 05034                                 04,3316   77740 1  ALMXIT       LXC,1
 05035  REF    2  LAST  652            04,3317   03664 0                       CSIALRM
 05038                                 04,3320   77533 1               SLOAD*  EXIT
 05039  REF    1                       04,3321   15653 0                       ALARM/T8 -1,1
 0504   REF  263  LAST  628            04,3322  3 0154 1               CA      MPAC
 05041  REF    2  LAST  158            04,3323  0 5764 1               TC      VARALARM
 05042  REF    3  LAST  561            04,3324  3 5050 1               CAF     V05N09
 05043  REF  154  LAST  637            04,3325  0 4662 1               TC      BANKCALL
 05044  REF   27  LAST  637            04,3326   20720 0               CADR    GOFLASH
 05045  REF   39  LAST  637            04,3327  0 4106 1               TC      GOTOPOOH
 05046                                 04,3330  0 3324 1               TC      -4
 0505   REF    6  LAST  559            04,3331  0 4647 0  P32/P72A     TC      P20FLGON
 05051  REF  129  LAST  652            04,3332  0 6006 1               TC      INTPRET
 0506                                  04,3333   77745 1               DLOAD
 05061  REF    4  LAST  652            04,3334   11566 1                       ZEROVEC
 05062  REF    6  LAST  527            04,3335   03766 0               STORE   NN
 05063                                 04,3336   77776 1               EXIT
 0507   REF    1                       04,3337  3 4656 0               CAF     V06N11          TCSI
 0508   REF    7  LAST  559            04,3340  0 4575 1               TC      VNPOOH
 0509   REF    3  LAST  560            04,3341  3 4615 1               CAF     V06N55          NN, ELEV(RGLOS)
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0510   REF 155  LAST  652   04,3342  0 4662 1          TC      BANKCALL
0511   REF  28  LAST  652   04,3343    20720 0         CADR    GOFLASH
0512   REF  40  LAST  652   04,3344  0 4106 1          TC      GOTOPOOH
0513                        04,3345  0 3347 1          TC      +2
0514                        04,3346  0 3341 1          TC      -5
0518   REF   4  LAST  559   04,3347  3 4614 0          CAF     V06N37          TTPI
0519   REF   8  LAST  652   04,3350  0 4575 1          TC      VNPOOH
0520   REF 130  LAST  652   04,3351  0 6006 1          TC      INTPRET
0521                        04,3352    77745 1         DLOAD
0522   REF   3  LAST  271   04,3353    02637 1                 TCSI
0523   REF  31  LAST  642   04,3354    37413 0         STCALL  TIG
0524   REF   5  LAST  530   04,3355    10712 1                 SELECTMU
0525                        04,3356    77624 1  P32/P72B CALL
0526   REF   1              04,3357    76645 1                 ADVANCE
0527                        04,3360    77201 1         SETPD   VLOAD
0528                        04,3361    00001 0                 0D
0529   REF   1              04,3362    03512 1                 VPASS1
0530                        04,3363    65315 0         PDVL    PDDL
0531   REF   2  LAST  129   04,3364    03756 0                 RPASS1
0532   REF   4  LAST  653   04,3365    02637 1                 TCSI
0533                        04,3366    65325 0         PDDL    PDDL
0534   REF  14  LAST  555   04,3367    03663 1                 TTPI
0535   REF   2  LAST  559   04,3370    11630 1                 2PISC
0536                        04,3371    41512 1         SL2     PUSH
05365                       04,3372    77624 1         CALL
0537   REF   3  LAST  477   04,3373    72705 0                 INTINT
0538                        04,3374    77624 1         CALL
0539   REF   3  LAST  498   04,3375    45247 1                 PASSIVE
0540                        04,3376    77624 1         CALL
0541   REF   1              04,3377    15704 0                 CSI/A
0542                        04,3400    43014 0  P32/P72C BON     SET
0543   REF   7  LAST  529   04,3401    01311 0                 FINALFLG
0544   REF   1              04,3402    11404 1                 P32/P72D
0545   REF  19  LAST  648   04,3403    00470 1                 UPDATFLG
0546                        04,3404    52145 0  P32/P72D DLOAD  GOTO
0547   REF   2  LAST  281   04,3405    02547 0                 T1TOT2
05475  REF   1              04,3406    30002 0                 P32/P72E
05476  REF   1              14,2000                 SETLOC  CSI/CDH3
05477                       14,2002                 BANK
0548   REF   3  LAST  653   14,2002    02547 0  P32/P72E STORE   T1TOT2
0549                        14,2003    51025 1         DSU     BPL
0550   REF   1              14,2004    15652 1                 60MIN
0551   REF   2  LAST  653   14,2005    30002 0                 P32/P72E
0552                        14,2006    52145 0         DLOAD   GOTO
0553   REF   2  LAST  281   14,2007    03656 1                 T2TOT3
05535  REF   1              14,2010    11407 1                 P32/P72F
05536  REF   2  LAST  652   04,2000                 SETLOC  CSI/CDH1
05537                       04,3407                 BANK
0554   REF   3  LAST  653   04,3407    03656 1  P32/P72F STORE   T2TOT3
0555                        04,3410    51025 1         DSU     BPL
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0556   REF   2  LAST  653   04,3411   15652 1                60MIN
0557   REF   2  LAST  653   04,3412   11407 1                P32/P72F
0558                        04,3413   77776 1        EXIT
0559   REF   1              04,3414  3 4660 0        CAF    V06N75
0560   REF   9  LAST  653   04,3415  0 4575 1        TC     VNPOOH
0561   REF 131  LAST  653   04,3416  0 6006 1        TC     INTPRET
0562                        04,3417   45175 0        VLOAD  CALL
0563   REF   3  LAST  171   04,3420   02445 0                DELVEET1
0566   REF   1              04,3421   73457 0                S32/33.1
0567   REF   4  LAST  654   04,3422   26445 0        STOVL  DELVEET1
05671  REF   1              04,3423   02453 1                RACT2
05672  REF   2  LAST  101   04,3424   26541 0        STOVL  RACT1
0568   REF   2  LAST  171   04,3425   03667 0                DELVEET2
0569                        04,3426   45170 0        AXT,1  CALL
05691                       04,3427   01522 0        VN     0682
0572   REF   1              04,3430   76625 1                DISDVLVC
0573                        04,3431   77745 1        DLOAD
05731  REF  15  LAST  653   04,3432   03663 1                TTPI
05732  REF   1              04,3433   36641 1        STCALL TTPIO
0574   REF   5  LAST  529   04,3434   73002 1                VN1645
0575                        04,3435   77650 1        GOTO
0576   REF   1              04,3436   11356 1                P32/P72B
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P1010   CONSTANT DELTA HEIGHT (CDH) PROGRAMS (P33 AND P73)

R1011   MOD NO -1        LOG SECTION - P32-P35, P72-P75
R1012   MOD BY WHITE.P   DATE  1JUNE67
R1013   PURPOSE

R1014           (1) TO CALCULATE PARAMETERS ASSOCIATED WITH THE CONSTANT DELTA
R1015               ALTITUDE MANEUVER (CDH).

R1016           (2) TO CALCULATE THESE PARAMETERS BASED UPON MANEUVER DATA
R1017               APPROVED AND KEYED INTO THE DSKY BY THE ASTRONAUT.

R1018           (3) TO DISPLAY TO THE ASTRONAUT AND THE GROUND DEPENDENT VARIABLES
R1019               ASSOCIATED WITH THE CDH MANEUVER FOR APPROVAL BY THE
R1020               ASTRONAUT/GROUND.

R1021           (4) TO STORE THE CDH TARGET PARAMETERS FOR USE BY THE DESIRED
R1022               THRUSTING PROGRAM.

R1023   ASSUMPTIONS

R1024           (1) THIS PROGRAM IS BASED UPON PREVIOUS COMPLETION OF THE
R1025               CO-ELLIPTIC SEQUENCE INITIATION (CSI) PROGRAM (P32/P72).
R1026           THERFORE -

R1027           (A) AT A SELECTED TPI TIME (NOW IN STORAGE) THE LINE OF SIGHT
R1028               BETWEEN THE ACTIVE AND PASSIVE VEHICLES WAS SELECTED TO BE
R1029               A PRESCRIBED ANGLE (E) (NOW IN STORAGE) FROM THE
R1030               HORIZONTAL PLANE DEFINED BY THE ACTIVE VEHICLE POSITION.

R1031           (B) THE TIME BETWEEN CSI IGNITION AND CDH IGNITION WAS
R1032               COMPUTED TO BE GREATER THAN 10 MINUTES.

R1033           (C) THE TIME BETWEEN CDH IGNITION AND TPI IGNITION WAS
R1034               COMPUTED TO BE GREATER THAN 10 MINUTES.

R1035           (D) THE VARIATION OF THE ALTITUDE DIFFERENCE BETWEEN THE
R1036               ORBITS WAS MINMIZED.

R1037           (E) CSI BURN WAS DEFINED SUCH THAT THE IMPULSIVE DELTA V WAS
R1038               IN THE HORIZONTAL PLANE DEFINED BY ACTIVE VEHICLE

R10385              POSITION AT CSI IGNITION.

R1039           (F) THE PERICENTER ALTITUDES OF THE ORBITS FOLLOWING CSI AND
R1040               CDH WERE COMPUTED TO BE GREATER THAN 35,000 FT FOR LUNAR
R1041               ORBIT OR 85 NM FOR EARTH ORBIT.

R1042           (G) THE CSI AND CDH MANEUVERS WERE ASSUMED TO BE PARALLEL TO
R1043               THE PLANE OF THE PASSIVE VEHICLE ORBIT.  HOWEVER, CREW
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MODIFICATION OF DELTA V (LV) COMPONENTS MAY HAVE RESULTED IN AN OUT-OF-PLANE MANEUVER.

(2) STATE VECTOR UPDATES BY P27 ARE DISALLOWED DURING AUTOMATIC STATE VECTOR UPDATING INITIATED BY P20 (SEE ASSUMPTION 4).

(3) COMPUTED VARIABLES MAY BE STORED FOR LATER VERIFICATION BY THE GROUND. THESE STORAGE CAPABILITES ARE NORMALLY LIMITED ONLY TO THE PARAMETERS FOR ONE THRUSTING MANEUVER AT A TIME EXCEPT FOR CONCENTRIC FLIGHT PLAN MANEUVER SEQUENCES.

(4) THE RENDEZVOUS RADAR MAY OR MAY NOT BE USED TO UPDATE THE LM OR CSM STATE VECTORS FOR THIS PROGRAM. IF RADAR USE IS DESIRED THE RADAR WAS TURNED ON AND LOCKED ON THE CSM BY PREVIOUS SELECTION OF P20. RADAR SIGHTING MARKS WILL BE MADE AUTOMATICALLY APPROXIMATELY ONCE A MINUTE WHEN ENABLED BY THE TRACK AND UPDATE FLAGS (SEE P20). THE RENDEZVOUS TRACKING MARK COUNTER IS ZEROED BY THE SELECTION OF P20 AND AFTER EACH THRUSTING MANEUVER.

(5) THE ISS NEED NOT BE ON TO COMPLETE THIS PROGRAM.

(6) THE OPERATION OF THE PROGRAM UTILIZES THE FOLLOWING FLAGS -

ACTIVE VEGICLE FLAG - DESIGNATES THE VEHICLE WHICH IS DOING RENDEZVOUS THRUSTING MANEUVERS TO THE PROGRAM WHICH CALCULATES THE MANEUVER PARAMETERS. SET AT THE START OF EACH RENDEZVOUS PRE-THRUSTING PROGRAM.

FINAL FLAG - SELECTS FINAL PROGRAM DISPLAYS AFTER CREW HAS COMPLETED THE FINAL MANEUVER COMPUTATION AND DISPLAY CYCLE.

EXTERNAL DELTA V STEERING FLAG - DESIGNATES THE TYPE OF STEERING REQUIRED FOR EXECUTION OF THIS MANEUVER BY THE THRUSTING PROGRAM SELECTED AFTER COMPLETION OF THIS PROGRAM.

(7) IT IS NORMALLY REQUIRED THAT THE ISS BE ON FOR 1 HOUR PRIOR TO A THRUSTING MANEUVER.

(8) THIS PROGRAM IS SELECTED BY THE ASTRONAUT BY DSKY ENTRY -

P33 IF THIS VEHICLE IS ACTIVE VEHICLE.

P73 IF THIS VEHICLE IS PASSIVE VEHICLE.

INPUT

(1) ITPIO TIME OF THE TPI MANEUVER - SAVED FROM P32/P72

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R1112          (2) ELEV     DESIRED LOS ANGLE AT TPI - SAVED FROM P32/P72
R1113          (3) TCDH     TIME OF THE CDH MANEUVER

R1130   OUTPUT

R1131          (1) TRKMKCNT NUMBER OF MARKS
R1132          (2) TTOGO    TIME TO GO
R1133          (3) +MGA     MIDDLE GIMBAL ANGLE
R1134          (4) DIFFALT  DELTA ALTITUDE AT CDH
R1135          (5) T2TOT3   DELTA TIME FROM CDH TO COMPUTED TPI
R1136          (6) NOMTPI   DELTA TIME FROM NOMINAL TPI TO COMPUTED TPI
R1137          (7) DELVLVC  DELTA VELOCITY AT CDH - LOCAL VERTICAL COORDINATES

R1139   DOWNLINK

R11391         (1) TCDH     TIME OF THE CDH MANEUVER
R11392         (2) TTPI     TIME OF THE TPI MANEUVER
R11393         (3) TIG      TIME OF THE CDH MANEUVER
R11394         (4) DELVEET2 DELTA VELOCITY AT CDH - REFERENCE COORDINATES
R11395         (5) DIFFALT  DELTA ALTITUDE AT CDH
R11396         (6) ELEV     DESIRED LOS ANGLE AT TPI
R11402  COMMUNICATION TO THRUSTING PROGRAMS

R11403         (1) TIG      TIME OF THE CDH MANEUVER
R11404         (2) RTIG     POSITION OF ACTIVE VEHICLE AT CDH - BEFORE ROTATION
R11405                      INTO PLANE OF PASSIVE VEHICLE
R11406         (3) VTIG     VELOCITY OF ACTIVE VEHICLE AT CDH - BEFORE ROTATION
R11407                      INTO PLANE OF PASSIVE VEHICLE
R11408         (4) DELVSIN  DELTA VELOCITY AT CDH - REFERENCE COORDINATES
R11409         (5) DELVSAB  MAGNITUDE OF DELTA VELOCITY AT CDH
R1141          (6) XDELVFLG SET TO INDICATE EXTERNAL DELTA V VG COMPUTATION

R1150   SUBROUTINES USED

R1151          AVFLAGA
R1152          AVFLAGP
R11525         P20FLGON
R1153          VNPOOH
R1154          SELECTMU
R1155          ADVANCE
R1156          CDHMVR
R1157          INTINT3P
R1158          ACTIVE
R1159          PASSIVE
R1160          S33/34.1
R1161          ALARM
R1162          BANKCALL
R1163          GOFLASH
R1164          GOTOPOOH
R1166          S32/33.1
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R1167 VN1645

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 1499   REF   1                                          COUNT  35/P3373

 1500   REF   7  LAST  652   04,3437  0 4627 0  P33      TC     AVFLAGA
 1502   REF   1               04,3440  0 3442 0          TC     P33/P73A
 1503   REF   7  LAST  652   04,3441  0 4542 0  P73      TC     AVFLAGP
 1505   REF   7  LAST  652   04,3442  0 4647 0  P33/P73A TC     P20FLGON
 15051  REF   1               04,3443  3 4657 1          CAF    V06N13          TCDH
 1506   REF  10  LAST  654   04,3444  0 4575 1          TC     VNPOOH
 1507   REF 132  LAST  654   04,3445  0 6006 1          TC     INTPRET
 1508                        04,3446  77745  1          DLOAD
 15081  REF   2  LAST  654   04,3447  02641  0                 TTPIO
 15082  REF  16  LAST  654   04,3450  17663  1          STODL  TTPI
 1509   REF   4  LAST  271   04,3451  02635  0                 TCDH
 1510   REF  32  LAST  653   04,3452  37413  0          STCALL TIG
 1511   REF   6  LAST  653   04,3453  10712  1                 SELECTMU
 1512                        04,3454  77624  1  P33/P73B CALL
 1513   REF   2  LAST  653   04,3455  76645  1                 ADVANCE
 1514                        04,3456  77624  1          CALL
 1515   REF   1               04,3457  13230  1                 CDHMVR
 1516                        04,3460  77201  1          SETPD  VLOAD
 1517                        04,3461  00001  0                 0D
 1518   REF  10  LAST  555   04,3462  03546  0                 VACT3
 1519                        04,3463  45115  0          PDVL   CALL
 1520   REF   2  LAST  654   04,3464  02453  1                 RACT2
 1521   REF   1               04,3465  63671  1                 INTINT3P
 1522                        04,3466  77624  1          CALL
 1523   REF   3  LAST  498   04,3467  45237  0                 ACTIVE
 1524                        04,3470  77201  1          SETPD  VLOAD
 1525                        04,3471  00001  0                 0D
 1526   REF   2  LAST  101   04,3472  02617  0                 VPASS2
 1527                        04,3473  45115  0          PDVL   CALL
 1528   REF   2  LAST  101   04,3474  02625  1                 RPASS2
 1529   REF   2  LAST  658   04,3475  63671  1                 INTINT3P
 1530                        04,3476  77624  1          CALL
 1531   REF   4  LAST  653   04,3477  45247  1                 PASSIVE
 1532                        04,3500  43145  0          DLOAD  SET
 1533   REF   5  LAST  652   04,3501  11566  1                 ZEROVEC
 1534   REF   8  LAST  556   04,3502  03461  1                 ITSWICH
 1535   REF   7  LAST  479   04,3503  36364  0          STCALL NOMTPI
 1536   REF   2  LAST  464   04,3504  72216  1                 S33/34.1
 1537                        04,3505  77454  1          BZE    EXIT
 1538   REF   1               04,3506  24000  1                 P33/P73C
 1539   REF  26  LAST  561   04,3507  0 5650 1          TC     ALARM
 1540                        04,3510  00611  1          OCT    611
 1541   REF   4  LAST  652   04,3511  3 5050 1          CAF    V05N09
 1542   REF 156  LAST  653   04,3512  0 4662 1          TC     BANKCALL
 1543   REF  29  LAST  653   04,3513  20720  0          CADR   GOFLASH
 1544   REF  41  LAST  653   04,3514  0 4106 1          TC     GOTOPOOH
```

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1545                                 04,3515  0 3517 1           TC      +2
1546   REF   2  LAST  658            04,3516  0 3442 0           TC      P33/P73A
1547   REF 133  LAST  658            04,3517  0 6006 1           TC      INTPRET
1548                                 04,3520   77745 1           DLOAD
1549   REF   6  LAST  658            04,3521   11566 1                   ZEROVEC
1550   REF   8  LAST  658            04,3522   36364 0           STCALL  NOMTPI
15501  REF   2  LAST  658            04,3523   24000 1                   P33/P73C
15502  REF   1                       12,2000                     SETLOC  CSI/CDH2
15503                                12,2000                     BANK

1551                                 12,2000   43014 0 P33/P73C  BON     SET
1552   REF   8  LAST  653            12,2001   01311 0                   FINALFLG
1553   REF   1                       12,2002   24004 0                   P33/P73D
1554   REF  20  LAST  653            12,2003   00470 1                   UPDATFLG
1557                                 12,2004   43345 1 P33/P73D  DLOAD   DAD
1558   REF   9  LAST  659            12,2005   02364 1                   NOMTPI
1559   REF  17  LAST  658            12,2006   03563 1                   TTPI
1560   REF  18  LAST  659            12,2007   03663 1           STORE   TTPI
1561                                 12,2010   52025 1           DSU     GOTO
1562   REF   5  LAST  658            12,2011   02635 0                   TCDH
15621  REF   1                       12,2012   11524 1                   P33/P73E
15622  REF   3  LAST  653            04,2000                     SETLOC  CSI/CDH1
15623                                04,3524                     BANK

1563                                 04,3524   51025 1 P33/P73F  DSU     BPL
1564   REF   3  LAST  654            04,3525   15652 1                   60MIN
1565   REF   2  LAST  659            04,3526   11524 1                   P33/P73E
1566                                 04,3527   77615 0           DAD
1567   REF   4  LAST  659            04,3530   15652 1                   60MIN
1568   REF   4  LAST  653            04,3531   16547 0           STODL   T1TOT2
1569   REF  19  LAST  659            04,3532   03663 1                   TTPI
1570                                 04,3533   41425 1           DSU     PUSH
1571   REF   3  LAST  658            04,3534   02641 0                   TTPIO
1572                                 04,3535   45246 0 P33/P73F  ABS     DSU
1573   REF   5  LAST  659            04,3536   15652 1                   60MIN
1574                                 04,3537   43244 1           BPL     DAD
1575   REF   1                       04,3540   11535 1                   P33/P73F
15751  REF   6  LAST  659            04,3541   15652 1                   60MIN
15753                                04,3542   45565 0           SIGN    STADR
15755  REF   4  LAST  653            04,3543   74121 0           STORE   T2TOT3
1576                                 04,3544   77776 1           EXIT
1577   REF   2  LAST  654            04,3545  3 4660 0           CAF     V06N75
1578   REF  11  LAST  658            04,3546  0 4575 1           TC      VNPOOH
1579   REF 134  LAST  659            04,3547  0 6006 1           TC      INTPRET
1580                                 04,3550   45175 0           VLOAD   CALL
1581   REF   3  LAST  654            04,3551   03667 0                   DELVEET2
1584   REF   2  LAST  654            04,3552   73457 0                   S32/33.1
1585   REF   4  LAST  659            04,3553   37667 1           STCALL  DELVEET2
1589   REF   6  LAST  654            04,3554   73002 1                   VN1645
1590                                 04,3555   77650 1           GOTO
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L P32-P33, P72-P73 USER'S PAGE NO. 12 E4 S3

1591 REF 1 04,3556 11454 1 P33/P73B

L   P32-P33, P72-P73   USER'S PAGE NO. 13   E4 S3

P3800   ..... AVFLAGA/P .....

P4600 ..... DISDVLVC .....

R4650 SUBROUTINES USED

R4651 S32/33.X
R4652 VNPOOH

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 4698   REF   1              37,2000                        SETLOC  CDHTAG3
 4699                        37,2625                        BANK

 4700   REF  15  LAST  493   37,2625   03405 0  DISDVLVC    STORE   DELVLVC
 4701                        37,2626   45020 1              STQ     CALL
 4702   REF  19  LAST  553   37,2627   01340 1                      NORMEX
 47021  REF   1              37,2630   26231 0                      S32/33.X
 47022                       37,2631   64375 1              VLOAD   MXV
 47023  REF  16  LAST  662   37,2632   03405 0                      DELVLVC
 47024                       37,2633   00001 0                      0D
 470241                      37,2634   66172 0              VSLI    SXA,1
 470243 REF   8  LAST  560   37,2635   02365 0                      VERBNOUN
 47025  REF  17  LAST  662   37,2636   03405 0              STORE   DELVLVC
 47026                       37,2637   77776 1              EXIT
 4703   REF   9  LAST  562   37,2640   3 1765 1             CA      VERBNOUN
 4704   REF  12  LAST  659   37,2641   0 4575 1             TC      VNPOOH
 4705   REF 135  LAST  659   37,2642   0 6006 1             TC      INTPRET
 4706                        37,2643   77650 1              GOTO
 4707   REF  20  LAST  662   37,2644   01340 1                      NORMEX
 4900   REF   2  LAST  133     4000                         SETLOC  FFTAG12
 49001                         4656                         BANK

 4901                          4656   01413 0  V06N11      VN      0611
 4902                          4657   01415 0  V06N13      VN      0613
 4903                          4660   01513 1  V06N75      VN      0675

 4904                          4661   01462 0  V06N50      VN      0650
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P5000   ..... CSI/A     .....

R5150   SUBROUTINES USED

R5152           VECSHIFT
R5153           TIMETHET
R5154           PERIAPO
R5155           SHIFTR1
R5156           INTINT2C
R5157           CDHMVR
R5158           PERIAPO1
R5159           INTINT
R5160           ACTIVE

 5400                           34,3763                         BANK   34
 5401   REF   1                 06,2000                         SETLOC CSIPROG
 5402                           06,3651                         BANK
 5403   REF  30  LAST  652      E4,1770                         EBANK= SUBEXIT
 5404   REF   1                                                 COUNT  34/CSI

 5405                           06,3651   00025 0  60MIN        2DEC   360000
 5405                           06,3652   37100 1
 5406                           06,3653   00600 1  ALARM/TB OCT    00600          NO 1
 5407                           06,3654   00601 0           OCT    00601          2
 5408                           06,3655   00602 0           OCT    00602          3
 5409                           06,3656   00603 1           OCT    00603          4
 5410                           06,3657   00604 0           OCT    00604          5
 5411                           06,3660   00605 1           OCT    00605          6
 5412                           06,3661   00606 1           OCT    00606          7
 5413                           06,3662   00000 1  LOOPMX   2DEC   16
 5413                           06,3663   00020 0
 5414                           06,3664   00003 1  INITST   2DEC   .03048 B-7          INITIAL DELOV = 10 FPS
 5414                           06,3665   34661 1
 5415                           06,3666   00606 1  DVMAX1   2DEC   3.0480 B-7          MAXIMUM DV1 = 1000 FPS
 5415                           06,3667   04467 0
 5416                           06,3670   00601 0  DVMAX2   2DEC   3.014472 B-7                        989 FPS
 5416                           06,3671   33216 1
 5417                           06,3672   10000 0  1DP82    2DEC   1.0B-2
 5417                           06,3673   00000 1
 5418                           06,3674   00000 1  1DP828   2DEC   1
 5418                           06,3675   00001 0
 5420                           06,3676   00000 1  EPSILN1  2DEC   .0003048 B-7        .1 FPS
 5420                           06,3677   01177 1
 5422                           06,3700   77754 1  FIFPSDP  2DEC   -.152400 B-7        50  FPS
 5422                           06,3701   57611 0
 5424                           06,3702   00116 1  DELMAX1  2DEC   .6096000 B-7        200 FPS
 5424                           06,3703   00730 0
54241  REF   4  LAST  485       35,2000                         SETLOC CSI/CDH
54242                          35,3445                         BANK
54243                          35,3445   00004 0  PMINE    2DEC   157420 B-29     84 NM.   - MUST BE 8 WORDS BEFORE PMINM
54243                          35,3446   31566 0
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54244                          35,3447   00002 0  NICKELDP 2DEC    .021336 B-7      7 FPS
54244                          35,3450   27311 1
54245                          35,3451   00003 1  INITSTI  2DEC    .03048 B-7       INITIAL DELDV = 10 FPS
54245                          35,3452   34661 1
5425                           35,3453   00000 1  ONETHTH  2DEC    .0001 B-3
5425                           35,3454   05433 0
5426                           35,3455   00000 1  PMINM    2DEC    10668 B-29       35000 FT - MUST BE 8 WORDS AFTER PMINE.
5426                           35,3456   12326 0
5498   REF   2  LAST  663      06,2000                    SETLOC   CSIPROG
5499                           06,3704                    BANK

5500                           06,3704   43014 0  CSI/A    CLEAR    SET             INITIALIZE INDICATORS
5501   REF   1                 06,3705   05660 1                    S32.1F1         DVT1 HAS EXCEEDED MAX INDICATOR
5502   REF   1                 06,3706   05461 1                    S32.1F2         FIRST PASS FOR NEWTON ITERATION INDICATR
5503                           06,3707   43014 0             CLEAR  SET
5504   REF   1                 06,3710   05662 0                    S32.1F3A        00=1ST 2 PASSES 2ND CYCLE 01=FIRST CYCLE
5505   REF   1                 06,3711   05463 0                    S32.1F3B        10=2ND CYCLE 11=50FPS STAGE 2ND CYCLE
5506                           06,3712   77745 1             DLOAD
5507   REF   7  LAST  659      06,3713   11566 1                    ZEROVEC
5508   REF   2  LAST  129      06,3714   03764 1             STORE  LOOPCT
5509   REF   3  LAST  652      06,3715   03665 1             STORE  CSIALRM
5510                           06,3716   77201 1  CSI/B    SETPD    VLOAD
5511                           06,3717   00001 0                    0D
5512   REF   3  LAST  654      06,3720   02541 0                    RACT1
5513                           06,3721   41445 1  ABVAL    PUSH     RA1                                  B29 PL02D
5514                           06,3722   70501 1  NORM     SR1
5515   REF  12  LAST  602      06,3723   00050 1                    X2                              B29-N2+ B1 PL04D
5516                           06,3724   51515 1  PDVL     ABVAL
5517   REF  11  LAST  553      06,3725   03554 0                    RPASS3
5518                           06,3726   55301 0  NORM     BDDV     RA1/RP3                              B1 PL02D
5519   REF  28  LAST  645      06,3727   00047 1                    X1
5520                           06,3730   53664 0  XSU,2    SR*                                          B2
5521   REF  29  LAST  664      06,3731   00046 0                    X1
5522                           06,3732   57175 0                    1,2
5523                           06,3733   41215 1  DAD      DMP      (1+(RA1/RP3))RA1        B29+B2=B31 PL00D
5524   REF   1                 06,3734   15673 1                    1DPB2
5525                           06,3735   65301 0  NORM     PDDL                                         PL02D
5526   REF  30  LAST  664      06,3736   00047 1                    X1
5527   REF   3  LAST  494      06,3737   03750 0                    RTMU
5528                           06,3740   56342 1  SR1      DDV                             B38-B31= B7 PL00D
5529                           06,3741   75457 0  SL*      SQRT                                         B7
5530                           06,3742   20172 1                    0 =7,1
5531                           06,3743   53515 0  PDVL     UNIT                                         PL02D
5532   REF   4  LAST  664      06,3744   02541 0                    RACT1
5533                           06,3745   47315 0  PDVL     VXV
5534   REF   2  LAST  101      06,3746   02611 0                    UP1
5535                           06,3747   77656 1  UNIT                UNIT(URP1 X UVP1 X URA1) = UH1
5536                           06,3750   72441 0  DOT      SL1      VA1 . UH1                            B7
5537   REF   2  LAST  129      06,3751   03504 0                    VACT1
5538                           06,3752   45421 1  BDSU     STADR                                        PL00D
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5539   REF  2 LAST 129   06,3753  60315 0          STODL  DELVCSI
5540   REF  1            06,3754  15665 0          INITST          10 FPS
5541   REF  2 LAST 129   06,3755  03464 1          STORE  DELDV
5542                     06,3756  43345 1 CSI/B1   DLOAD  DAD             IF LOOPCT = 16
5543   REF  3 LAST 664   06,3757  03764 1          LOOPCT
5544   REF  1            06,3760  15675 1          IDPB28
5545   REF  4 LAST 665   06,3761  03764 1          STORE  LOOPCT
5546                     06,3762  77025 0          DSU    AXT,2
5547   REF  1            06,3763  15663 0          LOOPMX
5548                     06,3764  00006 1          6
5549                     06,3765  52044 0          BPL    GOTO
5550   REF  1            06,3766  63642 1          SCNDSOL
55501  REF  1            06,3767  24013 0          CSI/B2

55502  REF  1            12,2000                   SETLOC CSIPROG2
55503                    12,2013                   BANK

5551                     12,2013  77601 0 CSI/B2   SETPD
5552                     12,2014  00001 0          OD
5553                     12,2015  51545 1          DLOAD  ABS
5554   REF  3 LAST 665   12,2016  03462 1          DELVCSI
5555                     12,2017  50025 0          DSU    BMN
5556   REF  1            12,2020  15667 1          DVMAX1
5557   REF  1            12,2021  45267 0          CSI/B23
5558                     12,2022  43174 1          AXT,2  BON
5559                     12,2023  00007 0          7
5560   REF  2 LAST 664   12,2024  05700 0          S32.1F1
5561   REF  2 LAST 665   12,2025  63642 1          SCNDSOL
5562                     12,2026  43014 0          BOFF   BON
5563   REF  2 LAST 664   12,2027  05742 0          S32.1F3A
5564   REF  1            12,2030  24033 1          CSI/B22         FLAG 3 NEQ 3
5565   REF  2 LAST 664   12,2031  05703 0          S32.1F3B
5566   REF  3 LAST 665   12,2032  63642 1          SCNDSOL
5567                     12,2033  71214 0 CSI/B22  SET    DLOAD
5568   REF  3 LAST 665   12,2034  05460 0          S32.1F1
5569   REF  1            12,2035  15671 0          DVMAX2
5570                     12,2036  77765 0          SIGN
5571   REF  4 LAST 665   12,2037  03462 1          DELVCSI
5572   REF  5 LAST 665   12,2040  37462 0          STCALL DELVCSI
55721  REF  2 LAST 665   12,2041  45267 0          CSI/B23

55722  REF  1            22,2000                   SETLOC CSIPROG3
55723                    22,3267                   BANK

5573                     22,3267  41575 0 CSI/B23  VLOAD  PUSH
5574   REF  5 LAST 664   22,3270  02541 0          RACT1
5575                     22,3271  63258 0          UNIT   PDVL
5576   REF  3 LAST 664   22,3272  02611 0          UP1
5577                     22,3273  53435 0          VXV    UNIT            UNIT(URP1 X UVP1 X URA1) = UH1
5578                     22,3274  76561 1          VXSC   VSL1
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5579   REF   6  LAST  665   22,3275   03462 1                 DELVCSI
5580   REF   5  LAST  654   22,3276   02445 0          STORE  DELVEET1
5581                        22,3277   40055 0          VAD    BOV
5582   REF   3  LAST  664   22,3300   03504 0                 VACT1
5583   REF   1               22,3301   45302 1                 CSI/B23D
5584   REF   2  LAST  129   22,3302   37474 1 CSI/B23D STCALL VACT4
5585   REF   1               22,3303   45253 1                 VECSHIFT
5586   REF  10  LAST  558   22,3304   26746 0          STOVL  VVEC
5587                        22,3305   77614 1          SET
5588   REF   4  LAST  553   22,3306   03466 0                 RVSW
5589   REF   6  LAST  556   22,3307   26657 1          STOVL  RVEC
5590   REF   1               22,3310   05426 1                 SN359+
5591   REF   7  LAST  554   22,3311   36732 1          STCALL SNTH            ALSO CSTH
5592   REF   5  LAST  554   22,3312   24744 0                 TIMETHET
5593                        22,3313   72142 0          SR1    LXA,1
5594   REF  10  LAST  640   22,3314   03745 1                 RTX1
5595   REF   1               22,3315   37472 1          STCALL HAPPA1
5596   REF   2  LAST  556   22,3316   45163 1                 PERIAPO
5597                        22,3317   77624 1          CALL
5598   REF   7  LAST  641   22,3320   45263 1                 SHIFTR1
5599   REF   2  LAST  129   22,3321   17460 0          STODL  POSTCSI
5600   REF   9  LAST  652   22,3322   03754 1                 CENTANG
560001                      22,3323   52054 1          BZE    GOTO
560002                      22,3324   45326 1                 +2
560003 REF   1               22,3325   47145 1                 CIRCL
560004                      22,3326   77745 1          DLOAD
560005 REF   2  LAST   96   22,3327   02754 0                 ECC
5601                        22,3330   50025 0          DSU    BMN
5602   REF   1               22,3331   33454 1                 ONETHTH
5603   REF   2  LAST  666   22,3332   47145 1                 CIRCL
5604                        22,3333   45145 0          DLOAD  CALL
5605   REF   1               22,3334   00041 1                 R1
5606   REF   8  LAST  666   22,3335   45263 1                 SHIFTR1
5607                        22,3336   60201 1          SETPD  NORM
5608                        22,3337   00003 1                 2D
5609   REF  31  LAST  664   22,3340   00047 1                 X1
5610                        22,3341   50315 0          PDVL   DOT                                    PL04D
5611   REF   6  LAST  665   22,3342   02541 0                 RACT1
5612   REF   3  LAST  666   22,3343   03474 0                 VACT4
5613                        22,3344   56246 1          ABS    DDV
5614                        22,3345   00003 1                 02D            (/RDOTV/)/R1           B36-B29= B7
5615                        22,3346   45257 0          SL*    DSU
5616                        22,3347   20201 0                 0,1
5617   REF   1               22,3350   33450 0                 NICKELD9
5618                        22,3351   71240 1          BMN    DLOAD
5619   REF   3  LAST  666   22,3352   47145 1                 CIRCL
5620   REF   2  LAST   96   22,3353   02742 1                 P
5621                        22,3354   45312 0          SL2    DSU
5622   REF   1               22,3355   33502 0                 1DTE82         1.8.2
5623                        22,3356   14017 1          STODL  14D
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5624   REF   3  LAST  494   22,3357   03752 1                  RTSR1/MU
5625                       22,3360   56342 1          SR1     DDV          (1/ROOTMU)/R1      B-16-B29 = B-45 PL02D
5626                       22,3361   41325 0          PDDL    DMP
5627   REF   3  LAST  666   22,3362   02742 1                  P
5628   REF   2  LAST  666   22,3363   00041 1                  R1
5629                       22,3364   77624 1          CALL
5630   REF   9  LAST  666   22,3365   45263 1                  SHIFTR1
5631                       22,3366   72412 0          SL4     SL1
5632                       22,3367   41366 1          SQRT    DMP          ((P/MU)**.5)/R1    B14+B-45 = B-31 PL02D
5633                       22,3370   52414 1          BOFF    SL3
5634   REF  21  LAST  630   22,3371   04343 1                  CMOONFLG
5635   REF   1              22,3372   45373 1                  CSI/B3
5636                       22,3373   50315 0  CSI/B3  PDVL    DOT
5637   REF   7  LAST  666   22,3374   02541 0                  RACT1
5638   REF   4  LAST  666   22,3375   03474 0                  VACT4
5639   REF   2  LAST  129   22,3376   03502 0          STORE   RDOTV
5640                       22,3377   77646 0          ABS
5641                       22,3400   41301 0          NORM    DMP          ((P/MU)**.5)RDOTV/R1               PL02D
5642   REF  13  LAST  664   22,3401   00050 1                  X2
5643                       22,3402   53660 1          XSU,1   SL*                        B-31+B36-B3= B2
5644   REF  14  LAST  667   22,3403   00047 1                  X2
5645                       22,3404   20204 0                  3,1
5646                       22,3405   14015 0          STODL   12D
5647   REF  20  LAST  633   22,3406   15335 0                  ZEROVECS
5648                       22,3407   00021 1          STORE   16D
5649                       22,3410   53575 0          VLOAD   UNIT
5650                       22,3411   00015 0                  12D
5651   REF   8  LAST  666   22,3412   26732 0          STOVL   SNTH                ALSO STORES CSTH AND 0
5652   REF   8  LAST  667   22,3413   02541 0                  RACT1
5653                       22,3414   75315 1          PDVL    SIGN
5654   REF   5  LAST  667   22,3415   03474 0                  VACT4
5655   REF   3  LAST  667   22,3416   03502 0                  RDOTV
5656                       22,3417   45076 1          VCOMP   CALL
5657   REF   2  LAST  666   22,3420   45253 1                  VECSHIFT
5658   REF  11  LAST  666   22,3421   26746 0          STOVL   VVEC
5659                       22,3422   77614 1          SETGO
5660   REF   5  LAST  666   22,3423   03425 1                  RVSW
56601  REF   1              22,3424   47134 1                  CSINEXT

566015                     22,3425   77776 1  SN359+  2DEC    -.000086601
566015                     22,3426   62460 1
566016                     22,3427   17777 0  CS359+  2DEC    +.499999992
566016                     22,3430   37775 0
56602  REF   1              23,2000                   SETLOC  CSIPROG4
56603                      23,3134                   BANK

5661   REF   7  LAST  666   23,3134   36657 0  CSINEXT STCALL  RVEC
5662   REF   6  LAST  666   23,3135   24744 0                  TIMETHET
5663                       23,3136   51125 0          PDDL    BPL
5664   REF   4  LAST  667   23,3137   03502 0                  RDOTV
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5665   REF   1                  23,3140   47151 1                NTP/2
5666                            23,3141   45345 1          DLOAD DSU
5667   REF   2  LAST  666       23,3142   03472 0                HAFPA1
5668                            23,3143   52006 0          PUSH  GOTO
5669   REF   2  LAST  668       23,3144   47151 1                NTP/2
5670                            23,3145   71201 1   CIRCL  SETPD DLOAD
5671                            23,3146   00001 0                OOD
5672   REF  21  LAST  667       23,3147   15335 0                ZEROVECS
5673                            23,3150   77606 1          PUSH
5674                            23,3151   41345 0   NTP/2  DLOAD DMP
5675   REF   7  LAST  652       23,3152   03766 0                NN
5676   REF   3  LAST  668       23,3153   03472 0                HAFPA1
5677                            23,3154   45261 0          SL    DSU
5678                            23,3155   20217 1                14D
5679                            23,3156   77615 0          DAD
5680   REF   5  LAST  653       23,3157   02637 1                TCSI
5681   REF   6  LAST  659       23,3160   02635 0          STORE TCDH
5682                            23,3161   77021 1          BDSU  AXT,2
5683   REF  20  LAST  659       23,3162   03663 1                TTPI
5684                            23,3163   00005 1                5D
5685                            23,3164   40240 0          BMN   SETPD
5686   REF   4  LAST  665       23,3165   63642 1                SCNDSOL
5687                            23,3166   00001 0                OD
5688                            23,3167   63375 0          VLOAD PDVL
5689   REF   6  LAST  667       23,3170   03474 0                VACT4
5690   REF   9  LAST  667       23,3171   02541 0                RACT1
5691                            23,3172   77624 1          CALL
5692   REF   1                  23,3173   63662 0                INTINT2C
5693   REF   3  LAST  658       23,3174   26453 1          STOVL RACT2
5694   REF  18  LAST  639       23,3175   00007 0                VATT
5695   REF   2  LAST  101       23,3176   26533 0          STOVL VACT2
5696   REF   2  LAST  653       23,3177   03512 1                VPASS1
5697                            23,3200   63201 1          SETPD PDVL
5698                            23,3201   00001 0                OD
5699   REF   3  LAST  653       23,3202   03756 0                RPASS1
56991                           23,3203   77650 1          GOTO
569915 REF   1                  23,3204   22256 0                CSINEXT1

56992  REF   1                  11,2000                  SETLOC CSIPROG5
56993                           11,2256                  BANK

5700                            11,2256   77624 1   CSINEXT1 CALL
5701   REF   2  LAST  668       11,2257   63662 0                INTINT2C
5702   REF   3  LAST  658       11,2260   26625 1          STOVL RPASS2
5703   REF  19  LAST  668       11,2261   00007 0                VATT
5704   REF   3  LAST  658       11,2262   36617 1          STCALL VPASS2
5705   REF   2  LAST  658       11,2263   13230 1                CDHMVR
5706                            11,2264   40375 1          VLOAD SETPD
5707   REF   4  LAST  668       11,2265   02453 1                RACT2
5708                            11,2266   00001 0                OD
```

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5709                                    11,2267   45115 0           PDVL    CALL
5710   REF  11  LAST  658               11,2270   03546 0                   VACT3
5711   REF   5  LAST  641               11,2271   45153 1                   PERIAPO1
5712                                    11,2272   77624 1           CALL
5713   REF  10  LAST  667               11,2273   45263 1                   SHIFTR1
5714   REF   3  LAST  129               11,2274   27472 0           STOVL   POSTCOH
5715   REF  12  LAST  669               11,2275   03546 0                   VACT3
5716                                    11,2276   63201 1           SETPD   PDVL
5717                                    11,2277   00001 0                   0D
5718   REF   5  LAST  668               11,2300   02453 1                   RACT2
5719                                    11,2301   65325 0           PDDL    PDDL
5720   REF   7  LAST  668               11,2302   02635 0                   TCOH
5721   REF  21  LAST  668               11,2303   03663 1                   TTPI
5722                                    11,2304   62525 1           PDDL    SL2
5723   REF   3  LAST  653               11,2305   11630 1                   2PISC
5724                                    11,2306   45006 0           PUSH    CALL
5725   REF   4  LAST  653               11,2307   72705 0                   INTINT
5726                                    11,2310   77624 1           CALL
5727   REF   4  LAST  658               11,2311   45237 0                   ACTIVE
5728                                    11,2312   77745 1           DLOAD
5738   REF   9  LAST  472               11,2313   03744 0                   ELEV
5739                                    11,2314   73401 0           SETPD   SINE
5740                                    11,2315   00007 0                   6D
5741                                    11,2316   53515 0           PDVL    UNIT
5742   REF  26  LAST  640               11,2317   03540 0                   RACT3
5743                                    11,2320   00001 0           STORE   00D             URA3 AT 00D
5744                                    11,2321   47315 0           PDVL    VXV             PL14D,PL08D
5745   REF   4  LAST  665               11,2322   02611 0                   UP1
5746                                    11,2323   77656 1           UNIT
5747                                    11,2324   71525 0           PDDL    COSINE          UNIT(URA3XUVA3XURA3) = UH3      B1 PL14D
5748   REF  10  LAST  669               11,2325   03744 0                   ELEV
5749                                    11,2326   45561 1           VXSC    STADR           (COSLOS)(UH3)                  B2 PL08D
5750                                    11,2327   43754 0           STCALL  18D                       PLUS
57501  REF   1                         11,2330   16517 0                   CSINEXT2

57502  REF   1                         07,2000                     SETLOC  CSIPROG6
57503                                  07,2517                     BANK

5751                                   07,2517   74345 0 CSINEXT2  DLOAD   VXSC            (SINLOS)(URA3) = U             B2 PL00D
5752                                   07,2520   76455 1           VAD     VSL1
5753                                   07,2521   00023 0                   18D                                            B1
5754                                   07,2522   50206 0           PUSH    DOT                                                PL06D
5755   REF  27  LAST  669              07,2523   03540 0                   RACT3           (U . RA3) = TEMP1      B1 +B29=B30
5756                                   07,2524   41552 0           SL1     PUSH                                       B29 PL09D
5757                                   07,2525   72316 0           DSQ     TLOAD           TEMP1**2                   B58
5758   REF 264  LAST  652              07,2526   00155 0                   MPAC
5759                                   07,2527   50315 0           PDVL    DOT                                                PL11D
5760   REF  28  LAST  669              07,2530   03540 0                   RACT3
5761   REF  29  LAST  669              07,2531   03540 0                   RACT3
5762                                   07,2532   57551 1           TLOAD   DCOMP           RA3.RA3
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5763   REF 265  LAST  669   07,2533   00155 0                MPAC
5764                        07,2534   50315 0          PDVL  DOT          RP3.RP3                    858 PL14D
5765   REF  12  LAST  664   07,2535   03554 0                RPASS3
5766   REF  13  LAST  670   07,2536   03554 0                RPASS3                                      PL11D
5767                        07,2537   76371 0          TAD   TAD          TEMP1**2+RA3.RA3+RP3.RP3=TEMP2      PL08D
5768                        07,2540   71244 0          BPL   DLOAD
5769   REF   1              07,2541   16557 1                K1ORK2
5770   REF   5  LAST  665   07,2542   03764 1                LOOPCT
5771                        07,2543   77025 0          DSU   AXT,2
5772   REF   2  LAST  665   07,2544   15675 1                1DPB28
5773                        07,2545   00001 0                1D
5774                        07,2546   77654 0          BZE
5775   REF   1              07,2547   11314 1                ALMXITA
5776                        07,2550   70545 1          DLOAD SR1
5777   REF   3  LAST  665   07,2551   03464 1                DELDV
5778   REF   4  LAST  670   07,2552   03464 1          STORE DELDV
5779                        07,2553   77621 1          BDSU
5780   REF   2  LAST  129   07,2554   03470 1                DVPREV
5781   REF   7  LAST  666   07,2555   37462 0          STCALL DELVCSI
5782   REF   1              07,2556   15756 1                CSI/B1
5783                        07,2557   41566 1  K1ORK2  SQRT  PUSH         TEMP3 = TEMP2**.5          829 PL10D
5784                        07,2560   45276 0          DCOMP DSU
5785                        07,2561   00007 0                060          -TEMP1-TEMP3 =K2 AT 10D
5786                        07,2562   14013 0          STODL 10D                                        PL08D
5787                        07,2563   45425 0          DSU   STADR                                      PL06D
5788                        07,2564   77762 1          STORE 12D          -TEMP1+TEMP3 =K1 AT 12D
5789                        07,2565   77646 0          ABS
5790                        07,2566   14017 1          STODL 14D
5791                        07,2567   00013 0                10D
5792                        07,2570   45246 0          ABS   DSU
5793                        07,2571   00017 1                14D
5794                        07,2572   71240 1          BMN   DLOAD
5795   REF   1              07,2573   50002 0                K2.
5796                        07,2574   00015 0                12D
5797                        07,2575   34013 1          STCALL 10D         K EQUALS K1
57971  REF   2  LAST  670   07,2576   50002 0                K2.

57972  REF   1              24,2000                  SETLOC CSIPROG7
57973                       24,2002                  BANK

5798                        24,2002   77745 1  K2.     DLOAD
5799                        24,2003   00013 0                10D
5800                        24,2004   76561 1          VXSC  VSL1
5801                        24,2005   53455 0          VAD   UNIT         V=RA3+KU  UNIT                 B1
5802   REF  30  LAST  669   24,2006   03540 0                RACT3
5803                        24,2007   53515 0          PDVL  UNIT                                       PL06D
5804   REF  14  LAST  670   24,2010   03554 0                RPASS3
5805                        24,2011   53515 0          PDVL  UNIT                                       PL12D
5806   REF  11  LAST  553   24,2012   03562 0                VPASS3
5807                        24,2013   63235 0          VXV   PDVL         UVP3 X URP3                  PL18D
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5808                                24,2014  00007 0                 06D
5809                                24,2015  00007 0                 06D
5810                                24,2016  50235 0          VXV    DOT
5811                                24,2017  00001 0                 00D
5812                                24,2020  77626 0          STAOR                                          PL12D
5813                                24,2021  53762 1          STOVL  12D      (URP3XV).(UVP3XURP3)=TEMP       PL06D
5814                                24,2022  72441 0          DOT    SL1                                     PL00D
5815                                24,2023  75326 1          ARCCOS SIGN
5816                                24,2024  00015 0                 12D                              B0
5817                                24,2025  41542 1          SR1    PUSH     GAMMA=SIGN(TEMP)ARCOS(UNITV.URP3)  PL02D
5818                                24,2026  71214 0          BDN    DLOAD
5819  REF   2  LAST  664             24,2027  05701 1                 S32.1F2
5820  REF   1                       24,2030  50065 1                 FRSTPAS
5821                                24,2031  00001 0                 00D      NOT THE FIRST PASS OF A CYCLE
5822                                24,2032  65225 1          DSU    PDDL     GAMMA-GAMPREV                   B1 PL04D
5823  REF   2  LAST  129             24,2033  03466 0                 GAMPREV
5824  REF   8  LAST  670             24,2034  03462 1                 DELVCSI
5825                                24,2035  60225 1          DSU    NORM                                    B7
5826  REF   3  LAST  670             24,2036  03470 1                 DVPREV
5827  REF  32  LAST  666             24,2037  00047 1                 X1
5828                                24,2040  65265 0          BDDV   PDDL     (GAM-GAMPREV)/(DV-DVPREV)   B-6+N1 PL06D
5829                                24,2041  00003 1                 02D             = SLOPE
5830  REF   9  LAST  671             24,2042  03462 1                 DELVCSI
5831  REF   4  LAST  671             24,2043  03470 1          STORE  DVPREV
5832                                24,2044  43014 0          BOFF   BOFF
5833  REF   3  LAST  665             24,2045  05742 0                 S32.1F3A
5834  REF   1                       24,2046  20307 1                 THRDCHK
5835  REF   3  LAST  665             24,2047  05743 1                 S32.1F3B
5836  REF   2  LAST  671             24,2050  20307 1                 THRDCHK
5837                                24,2051  41345 0          DLOAD  DMP
5838                                24,2052  00003 1                 02D
5839  REF   3  LAST  671             24,2053  03466 0                 GAMPREV
5840                                24,2054  71244 0          BPL    DLOAD
5841  REF   1                       24,2055  20314 0                 FIFTYFPS
5842  REF   1                       24,2056  33452 1                 INITST1
5843                                24,2057  77765 0          SIGN
5844  REF   5  LAST  670             24,2060  03464 1                 DELDV
5845  REF   6  LAST  671             24,2061  03464 1          STORE  DELDV
5846                                24,2062  43014 0          SET    CLEAR
5847  REF   4  LAST  671             24,2063  05462 1                 S32.1F3A
5848  REF   4  LAST  671             24,2064  05663 1                 S32.1F3B
5849                                24,2065  77745 1  FRSTPAS DLOAD
5850                                24,2066  00001 0                 00D
5851  REF   4  LAST  671             24,2067  17466 0          STODL  GAMPREV
5852  REF  10  LAST  671             24,2070  03462 1                 DELVCSI
5853  REF   5  LAST  671             24,2071  37470 0          STCALL DVPREV
58531 REF   1                       24,2072  20302 1                 CSINEXT3

58532 REF   1                       10,2000                  SETLOC CSIPROGB
58533                               10,2302                  BANK
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5854                                10,2302   43025 1  CSINEXT3 DSU     CLEAR
5855  REF   7  LAST  671           10,2303   03464 1                   DELDV
5856  REF   3  LAST  671           10,2304   05661 0                   S32.1F2
5857  REF  11  LAST  671           10,2305   37462 0           STCALL  DELVCSI
5858  REF   2  LAST  670           10,2306   15756 1                   CSI/B1
5859                                10,2307   43014 0  THRDCHK  BON     BON
5860  REF   5  LAST  671           10,2310   05702 1                   S32.1F3A
5861  REF   1                     10,2311   20333 0                   NEWTN
5862  REF   5  LAST  671           10,2312   05703 0                   S32.1F3B
5863  REF   2  LAST  672           10,2313   20333 0                   NEWTN
5864                                10,2314   75345 1  FIFTYFPS DLOAD   SIGN
5865  REF   1                     10,2315   15701 0                   FIFPSOP
5866                                10,2316   00005 1                   04D
5867                                10,2317   77765 0           SIGN
5868  REF   5  LAST  671           10,2320   03466 0                   GAMPREV
5869  REF   8  LAST  672           10,2321   03464 1           STORE   DELDV
5870                                10,2322   43275 0           DCOMP   DAD
5871  REF  12  LAST  672           10,2323   03462 1                   DELVCSI
5872  REF  13  LAST  672           10,2324   17462 1           STODL   DELVCSI
5873                                10,2325   00001 0                   00D
5874                                10,2326   43014 0           SET     SET
5875  REF   6  LAST  672           10,2327   05463 0                   S32.1F3B
5876  REF   6  LAST  672           10,2330   05462 1                   S32.1F3A
5877  REF   6  LAST  672           10,2331   37466 1           STCALL  GAMPREV
5878  REF   2  LAST  665           10,2332   24013 0                   CSI/B2
5879                                10,2333   60345 0  NEWTN    DLOAD   NORM
5880                                10,2334   00005 1                   04D
5881  REF  15  LAST  667           10,2335   00050 1                   X2
5882                                10,2336   54065 0           BDDV    XSU,1
5883                                10,2337   00001 0                   00D
5884  REF  16  LAST  672           10,2340   00047 1                   X2
5885                                10,2341   77657 0           SR*
5886                                10,2342   20601 1                   0,1
5887  REF   9  LAST  672           10,2343   17464 1           STODL   DELDV
5888                                10,2344   00001 0                   00D
5889  REF   7  LAST  672           10,2345   03466 0           STORE   GAMPREV
5890                                10,2346   51545 1           DLOAD   ABS
5891  REF  10  LAST  672           10,2347   03464 1                   DELDV
5892                                10,2350   45206 1           PUSH    DSU                                    PL09D
5893  REF   1                     10,2351   15677 0                   EPSILN1
5894                                10,2352   71240 1           BMN     DLOAD
5895  REF   1                     10,2353   20370 1                   CSI/SOL
5896                                10,2354   50025 0           DSU     BMN
5897  REF   1                     10,2355   15703 1                   DELMAX1
5898  REF   1                     10,2356   20363 0                   CSISTEP
5899                                10,2357   75345 1           DLOAD   SIGN
5900  REF   2  LAST  672           10,2360   15703 1                   DELMAX1
5901  REF  11  LAST  672           10,2361   03464 1                   DELDV
5902  REF  12  LAST  672           10,2362   03464 1           STORE   DELDV
5903                                10,2363   45345 1  CSISTEP  DLOAD   DSU
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5904   REF  14  LAST  672   10,2364   03462 1                    DELVCSI
5905   REF  13  LAST  672   10,2365   03464 1                    DELDV
5906   REF  15  LAST  673   10,2366   37462 0           STCALL   DELVCSI
5907   REF   3  LAST  672   10,2367   15756 1                    CSI/B1
5908                        10,2370   77145 1  CSI/SOL  DLOAD   AXT,2
5909   REF   3  LAST  666   10,2371   03460 0                    POSTCSI
5910                        10,2372   00002 0                    2
5911                        10,2373   52150 1           LXA,1    GOTO
5912   REF  11  LAST  666   10,2374   03745 1                    RTX1
59121  REF   1              10,2375   63610 0                    CSINEXT4

59122  REF   1              31,2000                    SETLOC   CSIPROG9
59123                       31,3610                    BANK

5913                        31,3610   50023 0  CSINEXT4 DSU*    BMN
5914   REF   1              31,3611   33444 0                    PMINE -2,1
5915   REF   5  LAST  668   31,3612   63642 1                    SCNDSOL
5916                        31,3613   71374 1           AXT,2    DLOAD
5917                        31,3614   00003 1                    3
5918   REF   4  LAST  669   31,3615   03472 0                    POSTCDH
5919                        31,3616   50023 0           DSU*     BMN
5920   REF   2  LAST  673   31,3617   33444 0                    PMINE -2,1
5921   REF   6  LAST  673   31,3620   63642 1                    SCNDSOL
5922                        31,3621   45345 1           DLOAD    DSU
5923   REF   8  LAST  669   31,3622   02635 0                    TCDH
5924   REF   6  LAST  668   31,3623   02637 1                    TCSI
5925   REF   5  LAST  659   31,3624   02547 0           STORE    T1TOT2
5926                        31,3625   45374 0           AXT,2    DSU
5927                        31,3626   00004 0                    4
5928   REF   2  LAST  459   31,3627   36146 1                    600SEC
5929                        31,3630   77040 0           BMN      AXT,2
5930   REF   7  LAST  673   31,3631   63642 1                    SCNDSOL
5931                        31,3632   00005 1                    5
5932                        31,3633   45345 1           DLOAD    DSU
5933   REF  22  LAST  669   31,3634   03663 1                    TTPI
5934   REF   9  LAST  673   31,3635   02635 0                    TCDH
5935   REF   5  LAST  659   31,3636   03656 1           STORE    T2TOT3
5936                        31,3637   51025 1           DSU      BPL
5937   REF   3  LAST  673   31,3640   36146 1                    600SEC
5938   REF   1              31,3641   11400 0                    P32/P72C
5939                        31,3642   43014 0  SCNDSOL  BON      BOFF
5940   REF   7  LAST  672   31,3643   05702 1                    S32.1F3A
5941   REF   1              31,3644   11316 0                    ALMXIT
5942   REF   7  LAST  672   31,3645   05743 1                    S32.1F38
5943   REF   2  LAST  673   31,3646   11316 0                    ALMXIT
5944                        31,3647   71334 0           SXA,2    DLOAD
5945   REF   4  LAST  664   31,3650   03664 0                    CSIALRM
5946   REF  22  LAST  668   31,3651   19335 0                    ZEROVECS
5947                        31,3652   43014 0           CLEAR    SET
5948   REF   4  LAST  665   31,3653   05660 1                    S32.1F1
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5949   REF   4  LAST  672   31,3654   05461 1              S32.1F2
5950                       31,3655   43014 0       CLEAR  CLEAR
5951   REF   8  LAST  673   31,3656   05662 0              S32.1F3A
5952   REF   8  LAST  673   31,3657   05663 1              S32.1F3B
5953   REF   6  LAST  670   31,3660   37764 0       STCALL LOOPCT
5954   REF   1              31,3661   15716 0              CSI/B
```

P6000 ..... ADVANCE .....

R6050 SUBROUTINES USED

R6051 PRECSET
R6052 ROTATE

```
 6098   REF   2  LAST  662   37,2000                        SETLOC  COHTAG3
 6099                       37,2645                        BANK

 6100                       37,2645   71220 1  ADVANCE     STQ     DLOAD
 6101   REF  31  LAST  663   37,2646   02370 1              SUBEXIT
 6102   REF  33  LAST  658   37,2647   03413 1              TIG
 6103   REF  34  LAST  641   37,2650   34041 0              STCALL  TDEC1
 6104   REF   5  LAST  531   37,2651   45215 0              PRECSET
 6105                       37,2652   77214 0              SET     VLOAD
 61055  REF   5  LAST  637   37,2653   01067 1              XDELVFLG
 6106   REF  12  LAST  670   37,2654   03562 0              VPASS3
 6107   REF   4  LAST  668   37,2655   02617 0              STORE   VPASS2
 6108   REF   3  LAST  668   37,2656   27512 1              STOVL   VPASS1
 6109   REF  15  LAST  670   37,2657   03554 0              RPASS3
 6110   REF   4  LAST  668   37,2660   02625 1              STORE   RPASS2
 6111   REF   4  LAST  668   37,2661   03756 0              STORE   RPASS1
 6112                       37,2662   47256 0              UNIT    VXV
 6113   REF   4  LAST  675   37,2663   03512 1              VPASS1
 6114                       37,2664   77656 1              UNIT
 6115   REF   5  LAST  669   37,2665   26611 0              STOVL   UP1
 6116   REF  31  LAST  670   37,2666   03540 0              RACT3
 6117   REF   6  LAST  641   37,2667   37632 1              STCALL  RTIG
 6118   REF   1              37,2670   13220 0              ROTATE
 6119   REF   6  LAST  669   37,2671   02453 1              STORE   RACT2
 6120   REF  10  LAST  668   37,2672   26541 0              STOVL   RACT1
 6121   REF  13  LAST  669   37,2673   03546 0              VACT3
 6122   REF   5  LAST  640   37,2674   37640 1              STCALL  VTIG
 6123   REF   2  LAST  675   37,2675   13220 0              ROTATE
 6124   REF   3  LAST  568   37,2676   02533 0              STORE   VACT2
 6125   REF   4  LAST  666   37,2677   37504 1              STCALL  VACT1
 6126   REF  32  LAST  675   37,2700   02370 1              SUBEXIT
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P6200 ..... ROTATE .....

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6298  REF  1                 05,2000                    SETLOC CDHTAG
6299                         05,3220                    BANK

6300                         05,3220   41406 0  ROTATE  PUSH   PUSH
6301                         05,3221   74241 0          DOT    VXSC
6302  REF  6  LAST  675      05,3222   02611 0                 UP1
6303  REF  7  LAST  676      05,3223   02611 0                 UP1
6304                         05,3224   51352 1          VSL2   BVSU
6305                         05,3225   63256 0          UNIT   PDVL
6306                         05,3226   74246 1          ABVAL  VXSC
6307                         05,3227   43572 0          VSL1   RVQ
```

P7000 ..... INTINTNA .....

```
 7098   REF   1                31,2000                        SETLOC  COHTAG2
 7099                          31,3662                        BANK

 7100                          31,3662   65325 0  INTINT2C  PDDL    PDDL
 7101   REF   7  LAST  673     31,3663   02637 1             TCSI
 7102   REF  10  LAST  673     31,3664   02635 0             TCDH
 7103                          31,3665   41525 0           PDDL    PUSH
 7104   REF   3  LAST  475     31,3666   33107 1             TWOPI
 7105                          31,3667   77650 1           GOTO
 7106   REF   5  LAST  669     31,3670   72705 0             INTINT
 7107                          31,3671   65325 0  INTINT3P  PDDL    PDDL
 7108   REF  11  LAST  677     31,3672   02635 0             TCDH
 7109   REF  23  LAST  673     31,3673   03663 1             TTPI
 7110                          31,3674   41525 0           PDDL    PUSH
 7111   REF  23  LAST  673     31,3675   15335 0             ZEROVECS
 7112                          31,3676   77650 1           GOTO
 7113   REF   6  LAST  677     31,3677   72705 0             INTINT
```

P7400 ..... S32/33.1 .....

R7450 SUBROUTINES USED

R7451 S32/33.X

```
 7498   REF   5  LAST  663   35,2000                        SETLOC CSI/CDH
 7499                        35,3457                        BANK

 7500                        35,3457   76020 1  S32/33.1 STO    AXT,1
 75001  REF  33  LAST  675   35,3460   02370 1             SUBEXIT
 75002                       35,3461   01521 0          VN     0681
 75003                       35,3462   77624 1          CALL
 75004  REF   2  LAST  654   35,3463   76625 1                 DISDVLVC
 7501                        35,3464   77624 1          CALL
 7502   REF   2  LAST  662   35,3465   26231 0                 S32/33.X
 7503                        35,3466   61375 1          VLOAD  VXM
 7504   REF  18  LAST  662   35,3467   03405 0                 DELVLVC
 7505                        35,3470   00001 0                 0D
 75051                       35,3471   77772 0          VSL1
 7506   REF   9  LAST  640   35,3472   03646 0          STORE  DELVSIN
 7507                        35,3473   51406 1          PUSH   ABVAL
 7508   REF   2  LAST  123   35,3474   27654 0          STOVL  DELVSAB
 7509                        35,3475   77650 1          GOTO
 7510   REF  34  LAST  678   35,3476   02370 1                 SUBEXIT
```

P7800 ..... S32/33.X .....

```
 7898   REF   1                 13,2000                        SETLOC  COMTAGS
 7899                           13,2231                        BANK

 7900                           13,2231   77201 1  S32/33.X    SETPD   VLOAD
 7901                           13,2232   00007 0              6D
 7902   REF   8  LAST  676      13,2233   02611 0              UP1
 7903                           13,2234   63276 1      VCOMP   PDVL
 7904   REF   11 LAST  675      13,2235   02541 0              RACT1
 7905                           13,2236   57456 1      UNIT    VCOMP
 7906                           13,2237   47206 0      PUSH    VXV
 7907   REF   9  LAST  679      13,2240   02611 0              UP1
 7908                           13,2241   77772 0      VSL1
 7909                           13,2242   00001 0      STORE   OD
 7910                           13,2243   77616 0      RVQ
```

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P8000 ..... CDHMVR .....

R8050 SUBROUTINES USED

R8051 VECSHIFT
R8052 TIMETHET
R8053 SHIFTR1

```
 8098   REF   2  LAST  676   05,2000                    SETLOC  CDHTAG
 8099                        05,3230                    BANK

 8100                        05,3230   77220 1  CDHMV*  STQ     VLOAD
 8101   REF  35  LAST  678   05,3231   02370 1          SUBEXIT
 8102   REF   7  LAST  675   05,3232   02453 1          RACT2
 8103                        05,3233   53406 0  PUSH    UNIT
 8104   REF   1              05,3234   27546 0  STOVL   UNVEC              UR SUB A
 8105   REF   5  LAST  675   05,3235   02625 1          RPASS2
 8106                        05,3236   50256 0  UNIT    DOT
 8107   REF   2  LAST  680   05,3237   03546 0          UNVEC
 8108                        05,3240   72406 0  PUSH    SL1
 8109   REF   7  LAST  554   05,3241   16734 0  STODL   CSTH
 8110                        05,3242   65316 0  DSQ     PDDL
 8111   REF   1              05,3243   23756 1          DP1/4
 8112                        05,3244   45302 1  SR2     DSU
 8113                        05,3245   72566 1  SQRT    SL1
 8114                        05,3246   57515 1  PDVL    VCOMP
 8115                        05,3247   77635 1  VXV
 8116   REF   6  LAST  680   05,3250   02625 1          RPASS2
 8117                        05,3251   65241 0  DOT     PDDL
 8118   REF  10  LAST  679   05,3252   02611 0          UP1
 8119                        05,3253   45565 0  SIGN    STADR
 8120   REF   9  LAST  667   05,3254   51045 1  STOVL   SNTH
 8121   REF   7  LAST  680   05,3255   02625 1          RPASS2
 8122                        05,3256   49115 0  PDVL    CALL
 8123   REF   5  LAST  675   05,3257   02617 0          VPASS2
 8124   REF   3  LAST  667   05,3260   45253 1          VECSHIFT
 8125   REF  12  LAST  667   05,3261   26746 0  STOVL   VVEC
 8126                        05,3262   77614 1  CLEAR
 8127   REF   6  LAST  667   05,3263   03666 1          RVSW
 8128   REF   8  LAST  667   05,3264   36657 0  STCALL  RVEC
 8129   REF   7  LAST  667   05,3265   24744 0          TIMETHET
 8130                        05,3266   53754 1  LXA,2   VSL*
 8131   REF  12  LAST  639   05,3267   03746 1          RTX2
 8132                        05,3270   57576 1          0,2
 8133                        05,3271   00023 0  STORE   18D
 8134                        05,3272   76441 1  DOT     SL1R
 8135   REF   3  LAST  680   05,3273   03546 0          UNVEC
 8136                        05,3274   51515 1  PDVL    ABVAL              OD = V SUB PV
 8137                        05,3275   63257 1  SL*     PDVL
 8138                        05,3276   57576 1          0,2
```

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```
8139  REF   8 LAST  680   05,3277   02453 1            RACT2
8140                      05,3300   65246 1      ABVAL PDDL          2D = LENGTH OF R SUB A
8141                      05,3301   77625 0      DSU
8142                      05,3302   00003 1            02D
8143  REF   4 LAST  281   05,3303   16633 0      STODL DIFFALT       DELTA H IN METERS          B+29
8144  REF   2 LAST   96   05,3304   02744 1            RIA
8145                      05,3305   65301 0      NORM  PDDL          2 - R V**/MU                        04D
8146  REF  33 LAST  671   05,3306   00047 1            XI
8147  REF   3 LAST  667   05,3307   00041 1            RI
8148                      05,3310   77624 1      CALL
8149  REF  11 LAST  669   05,3311   45263 1            SHIFTR
8150                      05,3312   56362 0      SR1R  DDV
8151                      05,3313   41457 1      SL*   PUSH
8152                      05,3314   20174 1            0 -5,1
8153                      05,3315   65225 1      DSU   PDDL          A SUB A                    B+29     04D
8154  REF   5 LAST  681   05,3316   02633 0            DIFFALT
8155                      05,3317   56302 0      SR2   DDV           A SUB P                  B+31
8156                      05,3320   00005 1            04D                                    B+2
8157                      05,3321   75406 1      PUSH  SQRT              A SUB P/A SUB A        06D
8158                      05,3322   41275 1      DMPR  DMP
8159                      05,3323   00007 0            06D
8160                      05,3324   00001 0            000
8161                      05,3325   65272 0      SL3R  PDDL          V SUB AV METERS/CS         B+7      08D
8162                      05,3326   00003 1            02D           R SUB A MAGNITUDE    B+29
8163                      05,3327   65301 0      NORM  PDDL
8164  REF  34 LAST  681   05,3330   00047 1            X1
8165  REF   4 LAST  664   05,3331   03750 0            RTMU
8166                      05,3332   56342 1      SR1   DDV           2MU  B+38
8167                      05,3333   65257 1      SL*   PDDL              2 MU/R SUBAA     B+14     10D
8168                      05,3334   20174 1            0 -5,1
8169                      05,3335   00005 1            04D           ASUBA                      B+29
8170                      05,3336   65301 0      NORM  PDDL
8171  REF  17 LAST  672   05,3337   00050 1            X2
8172  REF   5 LAST  681   05,3340   03750 0            RTMU
8173                      05,3341   56342 1      SR1   DDV
8174                      05,3342   44257 1      SL*   BDSU
8175                      05,3343   57604 1            0 -6,2        2U/R - U/A   B+14 (METERS/CS)SQ
8176                      05,3344   63525 0      PDDL  DSQ                                              10D
8177                      05,3345   00011 1            08D
8178                      05,3346   75421 1      BDSU  SQRT
8179                      05,3347   47315 0      PDVL  VXV           SQRT(MU(2/R SUB A-1/A SUB A)-VSUBA2)10D
8180  REF  11 LAST  680   05,3350   02611 0            UP1
8181  REF   4 LAST  680   05,3351   03546 0            UNVEC
8182                      05,3352   74256 0      UNIT  VXSC
8183                      05,3353   00013 0            10D
8184                      05,3354   74315 0      PDVL  VXSC
8185  REF   5 LAST  681   05,3355   03546 0            UNVEC
8186                      05,3356   00011 1            08D
8187                      05,3357   76455 1      VAD   VSL1
8188                      05,3360   77626 0      STADR
```

```
8189   REF  14  LAST  675   05,3361   74231 1        STORE  VACT3
8190                       05,3362   77651 0        VSU
8191   REF   4  LAST  675   05,3363   02533 0               VACT2
8199   REF   5  LAST  659   05,3364   37667 1        STCALL DELVEET2      DELTA VCDH - REFERENCE COORDINATES
8200   REF  36  LAST  680   05,3365   02370 1               SUBEXIT
```

P8201 ..... COMPTGO .....

R8202 SUBROUTINES USED

R8203 CLOKTASK
R8204 2PHSCHNG

```
 8205                          35,3477                 BANK   35
 8206   REF   6  LAST  678     35,2000                 SETLOC CSI/CDH
 8207                          35,3477                 BANK

 8208   REF  14  LAST  560     E4,1767                 EBANK= RTRN

 8209   REF   2 LAST  468 TO  487:   515   515*        COUNT* $$/P3575
```

R1000 PROGRAM DESCRIPTION **P40CSM**

```
1129  REF  16  LAST  280   E6,1466                          EBANK=  DAPDATR1
1130                       31,3700                          BANK    31
1131  REF   1              24,2000                          SETLOC  P40S
1132                       24,2073                          BANK

1133  REF   1                                               COUNT   24/P40

1134  REF  45  LAST  648   24,2073  0 5560 1  P40CSM        TC      DOWNFLAG
1135  REF   1              24,2074   00023 0                ADRES   ENG2FLAG

1136  REF 136  LAST  662   24,2075  0 6006 1                TC      INTPRET
1137                       24,2076   43135 1                SLOAD   BOFF
1138  REF   4  LAST  648   24,2077   03425 1                        ECSTEER         IS THIS AN EXTERNAL DELTA V BURN
1139  REF   6  LAST  675   24,2100   01347 0                        XDELVFLG
1140  REF   1              24,2101   50104 1                        P40S/C          NO   CSTEER = ECSTEER
1141                       24,2102   77745 1                DLOAD                   YES  CSTEER = ZERO
1142  REF  13  LAST  644   24,2103   15335 0                        HI6ZEROS
1143  REF   3  LAST  171   24,2104   17703 0  P40S/C        STODL   CSTEER
1144  REF   1              24,2105   10411 1                        FENG            SET UP THRUST FOR P40 20,000 LBS
1145  REF   2  LAST  124   24,2106   17727 0  P40S/F        STODL   F               P41 ENTERS HERE
1146  REF  34  LAST  675   24,2107   03413 1                        TIG             ORIGINAL TIG MAY BE SLIPPED BY P40S/SV
1147  REF   2  LAST  117   24,2110   03450 0                STORE   NOMTIG          SET ORIGINAL TIME OF IGNITION FOR S40.9

1148                       24,2111   77776 1                EXIT
1149  REF 157  LAST  658   24,2112  0 4662 1                TC      BANKCALL
1150  REF   4  LAST  617   24,2113   17653 1                CADR    R02BOTH         IMU STATUS CHECK

1151  REF 137  LAST  684   24,2114  0 6006 1  P40PVA        TC      INTPRET
1152                       24,2115   77624 1                CALL
1153  REF   1              24,2116   34020 1                        S40.1           COMPUTE VGTIG,UT
1154                       24,2117   77624 1                CALL
1155  REF   1              24,2120   51574 0                        S40.2,3         COMPUTE PREFERRED ATTITUDE
1156                       24,2121   77414 0                SET     EXIT
1157  REF   1              24,2122   01073 1                        PFRATFLG
1158  REF   2  LAST  203   24,2123  0 2303 0  P40SXTY       TCR     SETMINDB -1     NARROW DEADBAND FOR MANEUVER (EBANK6)
1159                       24,2124  0 0003 1                RELINT
1160  REF 158  LAST  684   24,2125  0 4662 1                TC      BANKCALL
1161  REF   5  LAST  622   24,2126   58000 1                CADR    R60CSM          ATTITUDE MANEUVER
1162  REF  76  LAST  635   24,2127  4 5017 0                CS      ONE             FOR UPDATEVG
1163  REF   2  LAST  107   24,2130   55742 0                TS      NBRCYCLS
1164  REF  42  LAST  648   24,2131  0 5546 0                TC      UPFLAG
1165  REF   3  LAST  635   24,2132   00155 0                ADRES   T1MRFLAG        ALLOW CLOCKTASK

1166  REF   1              24,2133  0 2326 1                TC      P41/P40
1167  REF   1              24,2134  0 2343 1                TC      P41/DSP         P41

1168  REF   1              24,2135  3 2425 0  P40TTOG       CAF     V06N40          INITIALIZE FOR CLOCKTASK WHICH IS CALLED
```

```
 1169   REF   2  LAST  635   24,2136  55'145 1          TS      NVWORD1         BELOW

 1170   REF 138  LAST  684   24,2137  0 6006 1          TC      INTPRET
 1171                        24,2140   51575 1          VLOAD   ABVAL           FOR R2
 1172   REF   5  LAST  173   24,2141   03721 0                  VGTIG
 1173   REF   6  LAST  642   24,2142   17773 1          STODL   VGDISP
 11731  REF  14  LAST  684   24,2143   15335 0                  HI6ZEROS
 11732  REF   4  LAST  282   24,2144   03426 1          STORE   DVTOTAL
 1174                        24,2145   77776 1          EXIT

 1175                        24,2146  0 0006 1          EXTEND
 1176   REF   1              24,2147  3 3061 0          DCA     STEERADS        SET FOR UPDATEVG AND TEST FOR STEERING
 1177   REF   3  LAST   79   24,2150  53'223 1          DXCH    AVEGEXIT        AFTER AVERAGE G

 1178   REF   1              24,2151  3 2420 0 P40GMB   CAF     P40CKLS2        (4.1 PROTECTION)
 1179   REF 159  LAST  684   24,2152  0 4662 1          TC      BANKCALL
 1180   REF   2  LAST  621   24,2153   21045 0          CADR    GOPERF1
 1181   REF   1              24,2154  1 2275 1          TCF     POST41          V34
 1182   REF   1              24,2155  1 2435 0          TCF     TST,TRIM        V33
 1183   REF  37  LAST  585   24,2156  4 5017 0 TRIMONLY CS      BIT1            SET MRKRTEMP FOR GIMBAL TRIM  (-1)
 1184   REF   1              24,2157  55'445 1   +1     TS      MRKRTMP         ENTRY FROM TST,TRIM

 1185   REF 129  LAST  635   24,2160  3 5021 1          CAF     ZERO            SET CNTR  +0 FOR RESTART LOGIC IN S40.6
 1186   REF   1              24,2161  55'447 0          TS      CNTR                 +0 SAYS NORMAL ENTRY.
A1187                                                                            +1 (PRE40.6) SAYS RESTART ENTRY

 1188   REF  77  LAST  684   24,2162  3 5017 1          CAF     ONE
 1189   REF  23  LAST  635   24,2163  0 5245 1          TC      WAITLIST
 1190   REF  17  LAST  684   E6,1466                    EBANK=  DAPDATR1
 1191   REF   1              24,2164   02252 0          2CADR   S40.6
 1191   REF   1              24,2165   40066 0
 1192   REF   2  LAST  685   24,2166  11'445 1          CCS     MRKRTMP         TEST TO FIND TIME TO WAIT FOR GIMBALTEST
 1193   REF   1              24,2167  3 2417 1          CAF     18SEC            PLUS, DELAY FOR 18 SECONDS
 1194                        24,2170  1 2172 0          TCF     +2              HOLE
 1195   REF   1              24,2171  3 3064 0          CAF     5SEC            DELAY FOR TRIM ONLY TASK
 1196   REF 160  LAST  685   24,2172  0 4662 1          TC      BANKCALL
 1197   REF   9  LAST  586   24,2173   01732 0          CADR    DELAYJOB
 1198   REF  12  LAST  635   24,2174  0 5372 1          TC      2PHSCHNG
 1199                        24,2175   40026 1          OCT     40026           6.2 = PRE40.6(-0CS), CLOKTASK(100CS)
 1200                        24,2176   00234 1          OCT     00234           4.23 = P40S/SV (PRIO12)
 1201   REF  78  LAST  685   24,2177  3 5017 1 P40S/RS  CAF     ONE
 1202   REF  24  LAST  685   24,2200  0 5245 1          TC      WAITLIST        P41/SOP
 1203   REF  35  LAST  684   E7,1412                    EBANK=  TIG
 1204   REF   4  LAST  635   24,2201   03260 0          2CADR   CLOKTASK
 1204                        24,2202   50067 0

 1205                        24,2203  0 0003 1          RELINT

 1206   REF   1              24,2204  0 3366 1 P40S/SV  TCR     E7SETTER        JOB, 4.23 PRETECTS, PRIO12
 1207   REF  36  LAST  685   E7,1412                    EBANK=  TIG
```

```
1208   REF 139  LAST  685   24,2205  0 6006 1           TC      INTPRET
1209                        24,2206   45345 1           DLOAD   DSU
1210   REF  37  LAST  685   24,2207   03413 1                   TIG
1211   REF   1              24,2210   10416 0                   SEC29.96
1212   REF  35  LAST  675   24,2211   00041 1           STORE   TDEC1

1213                        24,2212   77624 1           CALRB                   RETURN IN BASIC
1214   REF   1              24,2213   27553 1                   MIDTOAV1
1215                        24,2214  1 2216 1           TCF     +2
1216   REF   1              24,2215  0 2237 0           TC      P40SNEWM        INTEGRATION TIME GREATER THAN ALLOWED
1217                        24,2216  0 0006 1  P40SET   EXTEND
1218   REF 266  LAST  670   24,2217  3 0155 0           DCA     MPAC            DELTA TIME TO PREREAD (INT.INIT.)
1219   REF   9  LAST  216   24,2220  53'673 0           DXCH    P40TMP
1223                        24,2221  0 0006 1           EXTEND
1224   REF   1              24,2222  4 3064 1           DCS     5SECDP          FOR TTGBLNK
1225   REF  10  LAST  686   24,2223  21'673 0           DAS     P40TMP
1226                        24,2224  0 0006 1           EXTEND
1227   REF  11  LAST  686   24,2225  3 1673 1           DCA     P40TMP
1228   REF   2  LAST  424   24,2226  0 5342 1           TC      LONGCALL
1229   REF  38  LAST  686   E7,1412                     EBANK=  TIG
1230   REF   3  LAST  215   24,2227   02437 0           2CADR   TIGBLNK
1230                        24,2230   50067 0
1231   REF  39  LAST  637   24,2231  0 5412 0           TC      PHASCHNG
1232                        24,2232   20214 1           OCT     20214           4.21 = TIGBLNK (P40TMP CS)

1233   REF  77  LAST  637   24,2233  1 5217 1           TCF     ENDOFJOB
1234   REF 161  LAST  685   24,2234  0 4662 1  P40BLNKR TC      BANKCALL
1235   REF   4  LAST  536   24,2235   20703 1           CADR    CLEANDSP        REMOVE RESIDUE
1236   REF  78  LAST  686   24,2236  1 5217 1           TCF     ENDOFJOB
12362  REF  39  LAST  686   E7,1412                     EBANK=  TIG
1237                        24,2237  0 0006 1  P40SNEWM EXTEND
1238   REF   5  LAST  306   24,2240  3 1246 0           DCA     PIPTIME1
1239   REF  40  LAST  686   24,2241  53'413 1           DXCH    TIG             SET NEW TIG FOR 06 40
1240                        24,2242  0 0006 1           EXTEND
1241   REF   2  LAST  686   24,2243  3 2416 0           DCA     SEC29.96
1242   REF  41  LAST  686   24,2244  21'413 1           DAS     TIG
1243   REF   1              24,2245  1 2216 1           TCF     P40SET          FOR LONGCALL OF TIG-30( OR -35)

1244   REF  18  LAST  685   E6,1466                     EBANK=  DAPDATR1
1245   REF   1              24,2246  3 2426 0  POSTBURN CAF     V16N40
1246   REF 162  LAST  686   24,2247  0 4662 1           TC      BANKCALL
1247   REF   1              24,2250   20704 0           CADR    REFLASH
1248   REF   2  LAST  685   24,2251  1 2275 1           TCF     POST41          V34 GO FINISH
1249   REF   1              24,2252  1 2254 1           TCF     P40RCS          PROCEED
1250   REF   2  LAST  215   24,2253  1 2246 1           TCF     POSTBURN        RECYCLE
1252                        24,2254  0 0006 1  P40RCS   EXTEND                  V99N40 ENTERS HERE ON A P40 BYPASS SPS
1253   REF   1              24,2255  3 2462 0           DCA     ACADN85
1254   REF   4  LAST  685   24,2256  53'223 1           DXCH    AVEGEXIT
1255   REF   2  LAST  539   24,2257  3 5042 1           CAF     2SECS           WAIT FOR CALCN85 VIA AVEGEXIT
1256   REF 163  LAST  686   24,2260  0 4662 1           TC      BANKCALL
```

```
 1257   REF  10  LAST  685   24,2261   01732 0            CADR    DELAYJOB

 1258   REF   3  LAST  684   24,2262   0 2303 0  P40MINDB TCR     SETMINDB -1
 1259                       24,2263   0 0003 1            RELINT
 1260   REF  40  LAST  686   24,2264   0 5412 0  TIGNOW   TC      PHASCHNG
 12602                      24,2265    05024 1            OCT     05024           TYPE C GROUP 4 BELOW FOR NOUN 85
 12604                      24,2266    20000 0            OCT     20000           PRIO 20
 12606  REF   1             24,2267   3 2424 1            CAF     V16N85B
 1261   REF 164  LAST  686   24,2270   0 4662 1            TC      BANKCALL
 1262   REF   2  LAST  686   24,2271    20704 0            CADR    REFLASH
 1263   REF   3  LAST  686   24,2272   1 2275 1            TCF     POST41          FINISH P40/P41
 1264   REF   4  LAST  687   24,2273   1 2275 1            TCF     POST41          V03 PROCEED WITH REST OF THE CLEAN-UP
 1265   REF   1             24,2274   1 2264 1            TCF     TIGNOW          V32 NOT GSOP RESPONSE BUT REDISPLAY N85

 1267                       24,2275   0 0006 1  POST41   EXTEND
 1268   REF   1             24,2276   3 2460 1            DCA     SERVCADR
 1269   REF   5  LAST  686   24,2277   53'223 1            DXCH    AVEGEXIT
 1271   REF  42  LAST  658   24,2300   1 4106 0            TCF     GOTOPOOH


 1272                       24,2301    00056 1  MINDB    DEC     46
 1273                       24,2302    00707 1  MAXDB    DEC     455
 12732  REF  19  LAST  686   E6,1466                     EBANK=  DAPDATR1
 1274                       24,2303   0 0004 0    -1      INHINT
 1275   REF  13  LAST  593   24,2304   3 0032 0  SETMINDB CA      CDUX            ROUTINE FOR SETTING
 1276   REF   4  LAST  172   24,2305   55'572 1            TS      THETADX         THE MINIMUM DEADBAND
 1277                       24,2306   0 0006 1            EXTEND                  IN AUTOPILOT
 1278   REF   5  LAST  573   24,2307   3 0034 0            DCA     CDUY
 1279   REF   2  LAST  109   24,2310   53'574 1            DXCH    THETADY
 1280   REF   1             24,2311   3 2301 1            CA      MINDB           SHOULD BE CALLED UNDER
 1281   REF   2  LAST  110   24,2312   55'655 1            TS      ADB             INTERRUPT INHIBITED
 1282   REF  23  LAST  515   24,2313   4 5014 0            CS      BIT4            EBANK = E6
 1283   REF  20  LAST  687   24,2314   7 1466 0            MASK    DAPDATR1
 1284   REF  21  LAST  687   24,2315   55'466 0            TS      DAPDATR1
 1285   REF 157  LAST  637   24,2316   0 0002 0            TC      Q

 12852  REF  22  LAST  687   E6,1466                     EBANK=  DAPDATR1
 1286                       24,2317   0 0004 0    -1      INHINT
 1287   REF   1             24,2320   3 2302 1  SETMAXDB CA      MAXDB           ROUTINE FOR SETTING
 1288   REF   3  LAST  687   24,2321   55'655 1            TS      ADB             THE MAXIMUM DEADBAND IN AUTOPILOT
 1289   REF  23  LAST  687   24,2322   4 1466 0            CS      DAPDATR1
 1290   REF  24  LAST  687   24,2323   7 5014 0            MASK    BIT4            SHOULD BE CALLED UNDER
 1291   REF  24  LAST  687   24,2324   27'466 0            ADS     DAPDATR1        INTERRUPT INHIBITED
 1292   REF 158  LAST  687   24,2325   0 0002 0            TC      Q               EBANK = E6
```

P1293 PROGRAM DESCRIPTION **P41CSM**

```
 1352  REF   1                 27,2000                        SETLOC P40S2
 1353                          27,2614                        BANK

 1354  REF  25  LAST  687      E6,1466                        EBANK= DAPDATR1
 1355  REF   1                                                COUNT  24/P41

 1356  REF  43  LAST  684      27,2614  0 5546 0  P41CSM      TC     UPFLAG
 1357  REF   2  LAST  684      27,2615   00023 0              ADRES  ENG2FLAG        SET FOR RCS

 1358  REF 140  LAST  686      27,2616  0 6006 1              TC     INTPRET
 1359                          27,2617   77745 1              DLOAD
 1360  REF  15  LAST  685      27,2620   15335 0                     HI6ZEROS       FOR P41 CSTEER =0
 1361  REF   4  LAST  684      27,2621   03703 0              STORE  CSTEER

 1362                          27,2622   43145 0              DLOAD  BON
 1363  REF   1                 27,2623   10413 0                     FRCS2          2JET THRUST FOR S40.1
 1364  REF   1                 27,2624   00700 0                     NJETSFLG
 1365  REF   1                 27,2625   50106 0                     P40S/F         NJETS = 1 2-JET
 1366                          27,2626   52015 1              DAD    GOTO           NJETS = 0  4-JET
 1367  REF   2  LAST  688      27,2627   10413 0                     FRCS2
 1368  REF   2  LAST  688      27,2630   50106 0                     P40S/F

13685  REF   2  LAST  684      24,2000                        SETLOC P40S
13686                          24,2326                        BANK

 1369  REF  12  LAST  520      24,2326  4 1011 1  P41/P40     CS     MODREG
 1370  REF  79  LAST  685      24,2327  7 5017 0              MASK   ONE            P41EXITS AT CALL LOC +1
 1371                          24,2330  0 0006 1              EXTEND
 1372                          24,2331  1 2333 1              BZF    +2              P41
 1373  REF 159  LAST  687      24,2332  24 002 0              INCR   Q               P40 EXITS AT CALL LOC +2
 1374  REF 160  LAST  688      24,2333  0 0002 0              TC     Q

 1375  REF   3  LAST  425      24,2334  3 3002 0  TTG/0       CAF    PRIO20          TASK (4.4 PROTECTS IN P41)
 1376  REF  18  LAST  585      24,2335  0 5134 1              TC     NOVAC
 1377  REF  26  LAST  688      E6,1466                        EBANK= DAPDATR1
 1378  REF   2  LAST  687      24,2336   02264 0              2CADR  TIGNOW
 1378                          24,2337   50066 1

 1379  REF  46  LAST  684      24,2340  0 5560 1  P40CLK      TC     DOWNFLAG
 1380  REF   4  LAST  684      24,2341   00155 0              ADRES  TIMRFLAG

 1382  REF  27  LAST  588      24,2342  1 5324 0              TCF    TASKOVER

 1383  REF   1                 24,2343  3 2423 0  P41/DSP     CAF    V06N85B         SET UP FOR NONFLASH V 06 N85 BY CLOCKJOB
 1384  REF   3  LAST  685      24,2344  55'145 1              TS     NVWORD1

 1385  REF 141  LAST  688      24,2345  0 6006 1              TC     INTPRET
```

```
 1386                          24,2346   77624 1           CALL                COMPUTE
 1387  REF   1                 24,2347   50370 0                 P40CNV85            VGTIG IN CTRL COORDS
 1388                          24,2350   77776 1           EXIT
 1389                          24,2351  0 0006 1           EXTEND              DO CONTROL COORD CALCULATION AFTER AVEG
 1390  REF   2  LAST  686      24,2352  3 2462 0           DCA     ACADN85
 1391  REF   6  LAST  687      24,2353  53'223 1           DXCH    AVEGEXIT
 1392  REF  13  LAST  685      24,2354  0 5372 1           TC      2PHSCHNG
 1393                          24,2355   40036 0           OCT     40036       6.3=CLOKTASK(100CS)
 1394                          24,2356   00234 1           OCT     234         4.23=P40S/SV(PRIO12)

 1395  REF   1                 24,2357  1 2177 0           TCF     P40S/RS
 1396  REF   2  LAST  687      24,2360  3 2424 1 P41REDSP  CAF     V16N85B     ENTER FROM P41 SIDE OF TIGAVEG
 1397  REF   4  LAST  688      24,2361  55'145 1           TS      NVWORD1      REDISPLAY NONFLASHING
 1398  REF   3  LAST  686      24,2362  3 2416 0           CAF     SEC29.96 +1
 1399  REF  25  LAST  685      24,2363  0 5245 1           TC      WAITLIST
 1400  REF  27  LAST  688      E6,1466                     EBANK=  DAPDATR1
 1401  REF   2  LAST  214      24,2364   02334 1           2CADR   TTG/O
 1401                          24,2365   50066 1
 1402  REF  22  LAST  626      24,2366  4 5015 1           CS      BIT3        4.4 = TTG/O(2996CS), PRECHECK(-0CS)
 1403  REF   1                 24,2367  1 2566 1           TCF     TTGPHS
 1404                          24,2370   40220 0 P40CNV85   STQ     SETPD
 1405  REF   2  LAST  124      24,2371   03730 0                   QTEMP1
 1406                          24,2372   00001 0                   0
 1407                          24,2373   41575 0           VLOAD   PUSH
 1408  REF   1                 24,2374   03721 0                   VGPREV      EQUALS VGTIG (TARGETTING INPUT)
 1409                          24,2375   77624 1           CALL
 1410  REF   1                 24,2376   45431 0                   S41.1
 1411  REF   6  LAST  282      24,2377   37665 0           STCALL  VGBODY
 1412  REF   3  LAST  689      24,2400   03730 0                   QTEMP1

14122  REF  28  LAST  689      E6,1466                     EBANK=  DAPDATR1
 1413  REF 142  LAST  688      24,2401  0 6006 1 CALCN85   TC      INTPRET
 1414                          24,2402   77624 1           CALL
 1415  REF   1                 24,2403   51104 0                   UPDATEVG    NEW VG, S40.8(+MAYBE S40.9)
 1416                          24,2404   77624 1           CALL
 1417  REF   2  LAST  689      24,2405   50370 0                   P40CNV85    COMPUTE VGBODY
 1418                          24,2406   77776 1           EXIT
 1419  REF   1                 24,2407  0 3215 1           TC      SERVXT
 1420                          24,2410   02217 1 FENG      2DEC    9.1188544 B-7   SPS THRUST (20500LBS), SC.AT B+7 NEWT/E4
 1420                          24,2411   06650 1
 1421                          24,2412   00013 0 FRCS2     2DEC    .087437837 B-7  RCS ULLAGE (199.6COS10 LBS), SC.AT
 1421                          24,2413   06112 0
A1422                                                                   B+7 NEWTONS/E+4
 1423                          24,2414   04700 1 SEC24.96  DEC     2496
 1424                          24,2415   00000 1 SEC29.96  2DEC    2998
 1424                          24,2416   05664 0
 1425                          24,2417   03410 1 180SEC    DEC     1800
 1426                          24,2420   00204 1 P40CKLS2  OCT     204
 1427                          24,2421   37730 1 40CST5    OCT     37730       40 CS FOR THE T5 CLOCK
 1428  REF   4  LAST  385        4377              OCT12   =       TEN
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 1429                                  24,2422   04123 0  V1683     VN     1683
 1430                                  24,2423   01525 1  V06N85B   VN     0685
 1431                                  24,2424   04125 0  V16N85B   VN     1685
 1432                                  24,2425   01450 1  V06N40    VN     0640
 1434                                  24,2426   04050 0  V16N40    VN     1640
 1435                                  24,2427   00027 1  OCT27/24  OCT    27
 1436                                  24,2430   00053 1  OCT53     OCT    53
 1437                                  24,2431   00035 1  OCT35     OCT    35
 1438  REF  29  LAST  689              E6,1466                     EBANK= DAPDATR1
 1439  REF   4  LAST  261              24,2432   03153 0  T5IDL24   2CADR  T5IDLOC
 1439                                  24,2433   12066 1
 1440                                  24,2434   00026 0  3MDOT     DEC    86.8175796 B-16 3SEC MASS LOSS (63.8 LBS/SEC), SC.AT
A1441                                                                      B+16 KG/SEC  (NOTE, EMDOT IS PAD-LOADED,
A1442                                                                      BUT 3MDOT IS NOT A CRITICAL QUANTITY, SO
A1443                                                                      IT CAN REMAIN IN FIXED MEMORY)
 1445  REF  38  LAST  685              24,2435   3 5017 1  TST,TRIM CAF    BIT1                SET UP FOR GIMB DRIVE TEST AND TRIM (+1)
 1446  REF   1                        24,2436   1 2157 1            TCF    TRIMONLY +1
 1447  REF   2  LAST  685              24,2437   3 3064 0  TIGBLNK   CAF    5SEC                CALL TIGAVEG IN FIVE SEC AT TIG-30
 1448  REF  26  LAST  689              24,2440   0 5245 1            TC     WAITLIST
 1449  REF  42  LAST  686              E7,1412                     EBANK= TIG
 1450  REF   2  LAST  215              24,2441    02555 0          2CADR  TIGAVEG
 1450                                  24,2442    50067 0
 1451  REF 130  LAST  685              24,2443   3 5021 1            CAF    ZERO                DISABLE HERE, NOT IN P40BLNKR
 1452  REF   5  LAST  689              24,2444   55'145 1            TS     NVWORD1

 1453  REF   4  LAST  571              24,2445   3 5066 1            CAF    PRIO14
 1454  REF  19  LAST  688              24,2446   0 5134 1            TC     NOVAC
 1455  REF  43  LAST  690              E7,1412                     EBANK= TIG
 1456  REF   1                        24,2447    02234 0          2CADR  P40BLNKR            DONT PROTECT-RESTARTS BLANK DSKY
 1456  REF   1                        24,2450    50067 0
 1457  REF   3  LAST  226              24,2451   4 4362 0            CS     OCT37               4.37 = TIGAVEG (500CS)
 1458  REF   2  LAST  437              24,2452   0 4114 1  P40TSK    TC     NEWPHASE
 1459                                  24,2453    00004 0          OCT    4
 1460  REF  28  LAST  688              24,2454   0 5324 1            TC     TASKOVER

 1461  REF  44  LAST  690              E7,1412                     EBANK= TIG
 1462  REF   1                        24,2455    02511 0  ACADN83  2CADR  CALCN83
 1462  REF   1                        24,2456    50067 0
 1463  REF  45  LAST  690              E7,1412                     EBANK= TIG
 1464  REF   1                        24,2457    03227 0  SERVCADR 2CADR  SERVEXIT
 1464  REF   1                        24,2460    76067 1
 1465  REF  30  LAST  690              E6,1466                     EBANK= DAPDATR1
 1466  REF   1                        24,2461    02401 0  ACADN85  2CADR  CALCN85
 1466  REF   1                        24,2462    50066 1
```

P1467 PROGRAM DESCRIPTION **P47CSM**

```
 1508   REF   1                                          COUNT  24/P47

 1509   REF  46  LAST  690   E7,1412                     EBANK= TIG
 1510   REF 165  LAST  687   24,2463  0 4662 1  P47CSM  TC     BANKCALL        IMU STATUS CHECK
 1511   REF   5  LAST  684   24,2464   17653 1          CADR   R02BOTH
 1512   REF 143  LAST  689   24,2465  0 6006 1          TC     INTPRET
 1513                        24,2466   77624 1          CALRB
 1514   REF   1              24,2467   27543 0                 MIDTOAV2
 1515   REF 267  LAST  686   24,2470  30 155 0          CAE    MPAC +1         DELTA TIME TO RPEREAD (LESS THAN 1000
 1516   REF  12  LAST  686   24,2471  55'672 1          TS     P40TMP               CS, WITH A TPAGREE, INT.INIT.)
 1517   REF  27  LAST  690   24,2472  0 5245 1          TC     WAITLIST
 1518   REF  47  LAST  691   E7,1412                     EBANK= TIG
 1519   REF   2  LAST  216   24,2473   02500 0          2CADR  TIGON           TIGON IS REQUIRED TO MATHCHTAT AND AVEG
 1519                        24,2474   50067 0

 1520   REF  41  LAST  687   24,2475  0 5412 0          TC     PHASCHNG
 1521                        24,2476   40574 0          OCT    40574           A, 4.57 = TIGON (P40TMP CS)
 1522   REF  79  LAST  686   24,2477  1 5217 1          TCF    ENDOFJOB

15222   REF  13  LAST  691   E7,1672                     EBANK= P40TMP
 1523                        24,2500  0 0006 1  TIGON   EXTEND
 1524   REF   1              24,2501  3 2456 1          DCA    ACADNB3
 1525   REF   7  LAST  689   24,2502  53'223 1          DXCH   AVEGEXIT
 1526   REF   9  LAST  593   24,2503  3 4371 0          CAF    PRIO30          FORCE ZEROING OF N83 BEFORE SERVICER
 1527   REF  20  LAST  690   24,2504  0 5134 1          TC     NOVAC
 1528   REF  48  LAST  691   E7,1412                     EBANK= TIG
 1529   REF   2  LAST  214   24,2505   02534 1          2CADR  P47BODY
 1529                        24,2506   50067 0
 1530   REF  27  LAST  588   24,2507  4 5016 1          CS     BIT2            4.2 = PRECHECK (-OCS), P47BODY (PRIO30)
 1531   REF   2  LAST  689   24,2510  1 2566 1          TCF    TTGPHS


 1532   REF  49  LAST  691   E7,1412                     EBANK= TIG
 1533   REF 144  LAST  691   24,2511  0 6006 1  CALCN83  TC     INTPRET
15333                        24,2512   77601 0          SETPD                   SET UP PUSHLIST FOR S41.1
15336                        24,2513   00001 0                  0
 1534                        24,2514   53375 0          VLOAD  VAD
 1535   REF   1              24,2515   03665 1                 DELVCTL
 1536   REF   1              24,2516   03433 0                 DELVREF
 1537   REF   1              24,2517   03460 0          STORE  DV47TEMP        FOR COPYCYCLE BELOW
 1538                        24,2520   45006 0          PUSH   CALL
 1539   REF   2  LAST  689   24,2521   45431 0                 S41.1
 1540   REF   6  LAST  282   24,2522   37675 1          STCALL DELVIMU
 1541   REF   2  LAST  540   24,2523   70542 0                 S11.1           CALC. VI, H, HDOT FOR NOUN 62
 1542                        24,2524   77776 1          EXIT
 1543   REF  42  LAST  691   24,2525  0 5412 0          TC     PHASCHNG
 1544                        24,2526   10035 0          OCT    10035
```

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 1545   REF  14  LAST  571   24,2527  3 5022 1          CAF     FIVE
 1546   REF  11  LAST  579   24,2530  0 5606 1          TC      GENTRAN
 1547   REF   2  LAST  691   24,2531   01457 0          ADRES   DV47TEMP
 1548   REF   2  LAST  691   24,2532   01664 1          ADRES   DELVCTL

 1549   REF   2  LAST  689   24,2533  0 3215 1          TC      SERVXT
 1550   REF 145  LAST  691   24,2534  0 6006 1 P47BODY  TC      INTPRET
 1551                        24,2535   77775 1          VLOAD
 1552   REF  16  LAST  688   24,2536   15335 0          HI6ZEROS
 1553   REF   7  LAST  691   24,2537   03675 0          STORE   DELVIMU       CLEAR DISPLAY AND ACCUMULATOR STORAGE
 1554   REF   3  LAST  692   24,2540   03665 1          STORE   DELVCTL       UPON INITIATION OR-ENTER-RESPONSE
 1555                        24,2541   77776 1          EXIT
 1556   REF   3  LAST  386   24,2542  3 5067 0 P47BOD   CAF     PRIO15        LOWER PRIO THAN CALCN83 (20)
15563   REF   8  LAST  586   24,2543  0 5210 1          TC      PRIOCHNG        TO PREVENT INTERRUPTION OF CALCN83
155635  REF  43  LAST  691   24,2544  0 5412 0          TC      PHASCHNG
15564                       24,2545   05024 1          OCT     05024         TYPE C GROUP 4 BELOW FOR NOUN 83
15565                       24,2546   15000 0          OCT     15000         PRIO 15
15566   REF   1               24,2547  3 2422 1 P47/DSP  CAF     V1683
 1557   REF 166  LAST  691   24,2550  0 4662 1          TC      BANKCALL
 1558   REF  30  LAST  658   24,2551   20720 0          CADR    GOFLASH
 1559   REF  43  LAST  687   24,2552  0 4106 1          TC      GOTOPOOH
 1560   REF  44  LAST  692   24,2553  0 4106 1          TC      GOTOPOOH
 1561   REF   3  LAST  691   24,2554  1 2534 0          TCF     P47BODY       RECYCLE - CLEAR ACCUMULATED VELOCITY
```

P1563 ROUTINE **TIG-30** DESCRIPTION

```
1588  REF  50 LAST  691  E7,1412                    EBANK= TIG
1589  REF   2 LAST  684 TO  688:   155   155*       COUNT  24/P40

1590  REF   2 LAST  684  24,2555  0 2326 1 TIGAVEG TC     P41/P40       TASK (4.37 PROTECTS)
1591  REF   1            24,2556  1 2360 1          TCF    P41REDSP      P41

1592  REF   2 LAST  684  24,2557  3 2425 0          CAF    V06N40        UNBLANK DISPLAY
1593  REF   6 LAST  690  24,2560  55'145 1          TS     NVWORD1

1594  REF   1            24,2561  3 2414 1          CAF    SEC24.96
1595  REF  28 LAST  691  24,2562  0 5245 1          TC     WAITLIST
1596  REF  51 LAST  693  E7,1412                    EBANK= TIG
1597  REF   3 LAST  216  24,2563   02574 0          2CADR  TIG-5
1597                     24,2564   50067 0
1598  REF  23 LAST  579  24,2565  4 6211 1          CS     SIX           4.6 = TIG-5 (2496CS), PRECHECK (-0CS)
1599  REF   3 LAST  690  24,2566  0 4114 1 TTGPHS   TC     NEWPHASE      ENTRY FROM P41REDSP (P41) WITH A=-4, OR
1600                     24,2567   00004 0          OCT    4                   FROM TIGON    (P47) WITH A=-2

1601  REF   2 LAST  539  24,2570  10 763 1 PRECHECK CCS    PHASE5        HAS SERVICER BEEN RESTARTED
1602  REF  29 LAST  690  24,2571  1 5324 0          TCF    TASKOVER      YES, DONT START ANOTHER ONE
1603  REF  44 LAST  634  24,2572  0 4701 0          TC     POSTJUMP
1604  REF   2 LAST  218  24,2573   76701 0          CADR   PREREAD
```

P1605 ROUTINE **TIG-5** DESCRIPTION

```
16242  REF  52  LAST  693   E7,1412                          EBANK=  TIG
1625   REF   3  LAST  690   24,2574   3 3064 0  TIG-5       CAF     5SEC
1626   REF  29  LAST  693   24,2575   0 5245 1              TC      WAITLIST
1627   REF  31  LAST  690   E6,1466                          EBANK=  DAPDATR1
1628   REF   3  LAST  217   24,2576    02612 0              2CADR   TIG-0
1628                        24,2577    50066 1
1629   REF  20  LAST  549   24,2600   4 5007 1              CS      BIT9          WILL CAUSE V99 FLASH
1630   REF   7  LAST  693   24,2601   55'145 1              TS      NVWORD1

1631   REF  14  LAST  689   24,2602   0 5372 1              TC      2PHSCHNG
1632                        24,2603    40074 0              OCT     40074         A, 4.7 = TIG-0 (500CS)
1633                        24,2604    00033 1              OCT     00033         A, 3.3 = S40.13 (PRIO20)

1634   REF   4  LAST  688   24,2605   3 5002 0              CAF     PRIO20
1635   REF  21  LAST  563   24,2606   0 5147 0              TC      FINDVAC
1636   REF   6  LAST  213   E7,1427                          EBANK=  TGO
1637   REF   2  LAST  213   24,2607    02427 1              2CADR   S40.13
1637                        24,2610    34067 1
1638   REF  30  LAST  693   24,2611   1 5324 0              TCF     TASKOVER
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 1648   REF  32  LAST  694   E6,1466                          EBANK=  DAPDATR1        TASK, 4.7 PHASE, OR 4.77 (-OCS) IN R40
16485   REF   2  LAST  199   24,2612  4 0103 1  TIG-0        CS      FLAGWRD7        SET IGN FLAG
16486   REF  24  LAST  648   24,2613  7 5003 0                 MASK    BIT13
16487   REF   3  LAST  695   24,2614  26 103 1                 ADS     FLAGWRD7

 1649   REF   4  LAST  695   24,2615  30 103 0                 CAE     FLAGWRD7        CHECK ASTN FLAG FOR V99 RESPONSE
 1650   REF  25  LAST  507   24,2616  7 5004 1                 MASK    BIT12
 1651                        24,2617  0 0006 1                 EXTEND
 1652   REF  31  LAST  694   24,2620  1 5324 0                 BZF     TASKOVER        WAIT FOR V99P

16522   REF   3  LAST  693   24,2621  3 2425 0                 CAF     V06N40          CLEAR THE V99 (IN CASE OF A RESTART
16524   REF   8  LAST  694   24,2622  55'145 1                 TS      NVWORD1                 DURING THE V99 SEQUENCE)

 1653   REF  44  LAST  692   24,2623  0 5412 0                 TC      PHASCHNG        V99P HAS COME ALREADY, DO IGNITION NOW
 1654                        24,2624   00614 1                 OCT     00614           A, 4.61 = IGNITION (-OCS) TBASE OLD

 1660   REF  14  LAST  687   24,2625  30 032 0  IGNITION       CAE     COUX            SAVE FOR ROLL DAP REFERENCE OGAD
 1661   REF   1              24,2626  55'450 0                 TS      OGAD                    V99PJOB (CLOCKJOB) SETS UP IGNITION
 1662                        24,2627  0 0006 1                 EXTEND                  TASK (4.61 PROTECTION)
 1663   REF  19  LAST  587   24,2630  3 0025 0                 DCA     TIME2                   FOR RESTARTS
 1664   REF   4  LAST  173   24,2631  53'337 0                 DXCH    TEVENT
 1665   REF   7  LAST  447   24,2632  4 0101 0                 CS      FLAGWRD5        SET ENGONFLG
 1666   REF  27  LAST  446   24,2633  7 5011 0                 MASK    BIT7
 1667   REF   8  LAST  695   24,2634  26 101 0                 ADS     FLAGWRD5
 1668   REF  25  LAST  695   24,2635  3 5003 1  SPSON          CAF     BIT13           TURN ON SPS ENGINE
 1669                        24,2636  0 0006 1                 EXTEND
 1670   REF  22  LAST  594   24,2637  05 011 1                 WOR     DSALMOUT

 1671   REF  21  LAST  694   24,2640  3 5007 0  IMPULCHK       CAF     BIT9            CHECK FOR IMPULSIVE BURN
 1672   REF   8  LAST  482   24,2641  7 0076 1                 MASK    FLAGWRD2
 1673   REF 152  LAST  594   24,2642  10 000 0                 CCS     A
 1674   REF   1              24,2643  1 2733 0                 TCF     IMPLBURN        IMPULSIVE
 1675   REF  13  LAST  549   24,2644  4 0102 0                 CS      FLAGWRD6        NON-IMPULSIVE, SET STRULLSW FOR STEERULL
 1676   REF  26  LAST  695   24,2645  7 5003 0                 MASK    BIT13
 1677   REF  14  LAST  695   24,2646  26 102 0                 ADS     FLAGWRD6

 1678   REF   9  LAST  542   24,2647  4 4105 0  PREPTVC        CS      OCT60000        RESET T5 BITS
 1679   REF  15  LAST  695   24,2650  7 0102 0                 MASK    FLAGWRD6
 1680   REF  16  LAST  695   24,2651  54 102 0                 TS      FLAGWRD6

 1681                        24,2652  0 0006 1                 EXTEND                  KILL RCS
 1682   REF   1              24,2653  3 2433 1                 DCA     T5IDL24
 1683   REF   8  LAST  550   24,2654  53'313 0                 DXCH    T5LOC

 1684   REF  22  LAST  617   24,2655  4 6214 1                 CS      THREE           4.3 = DOTVCON (40CS)
 1685   REF   4  LAST  693   24,2656  0 4114 1                 TC      NEWPHASE
 1686                        24,2657   00004 0                 OCT     4
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1687   REF   1                 24,2660  0 5267 1            TC     FIXDELAY
1688                           24,2661   00050 I            DEC    40              0.4 SECOND DELAY FOR THRUST BUILDUP

1689   REF  39  LAST  690      24,2662  4 5017 0  DOTVCON   CS     BIT1            SET TVCPHASE = TVCDAPON CALL (FRESHDAP)
1690   REF   2  LAST  105      24,2663  55'644 1            TS     TVCPHASE
1691   REF 131  LAST  690      24,2664  3 5021 1            CAF    ZERO            SET TVCEXECUTIVE PHASE
1692   REF   2  LAST  106      24,2665  55'651 0            TS     TVCEXPHS
1693   REF  10  LAST  695      24,2666  4 4105 0            CS     OCT60000        SET T5 BITS TO INDICATE TVC TAKEOVER....
1694   REF  17  LAST  695      24,2667  7 0102 0            MASK   FLAGWRD6            BITS 15,14  =  10
1695   REF  32  LAST  418      24,2670  6 5001 0            AD     BIT15
1696   REF  18  LAST  695      24,2671  54 102 0            TS     FLAGWRD6

1697   REF  23  LAST  695      24,2672  3 6214 0            CAF    THREE           6.3 = CLOKTASK (100CS), DROPPING PRE40.6
1698   REF  66  LAST  625      24,2673  54 001 1            TS     L                  WHICH IS HANDLED NOW BY REDOTVC
1699                           24,2674  4 0000 0            COM
1700   REF   2  LAST  185      24,2675  52 765 1            DXCH   -PHASE6

17031                          24,2676  0 0006 1            EXTEND                 STORE RCS ATTITUDE ERRORS FOR USE IN
17032  REF   3  LAST  113      24,2677  4 1571 1            DCS    ERRORY          INITIALIZING TVC ATTITUDE ERRORS
17033  REF   4  LAST  107      24,2700  53'703 0            DXCH   ERRBTMP

17034  REF  15  LAST  692      24,2701  4 5022 0            CS     FIVE            4.5 = DOSTRULL  ( 160 CS )
17035  REF   5  LAST  695      24,2702  0 4114 1            TC     NEWPHASE
17036                          24,2703   00004 0            OCT    4

1704   REF  14  LAST  587      24,2704  3 4777 1            CAF    POSMAX          SET TIME5 FOR STARTING RIGHT AWAY
1705   REF   6  LAST  550      24,2705  54 030 0            TS     TIME5
1706                           24,2706  0 0006 1            EXTEND
1707   REF   1                 24,2707  3 3067 0            DCA    TVCON2C         (TVCDAPON)
1708   REF   9  LAST  695      24,2710  53'313 0            DXCH   T5LOC           (KILLS RCS DAP)

1709   REF   2  LAST  696      24,2711  0 5267 1            TC     FIXDELAY        0.4 + 1.6 = 2.0 SEC FOR ULLAGE-OFF AND
1710                           24,2712   00240 1            DEC    160                STEERING (IF NON-IMPULSIVE)

1711   REF  27  LAST  695      24,2713  3 5003 1  DOSTRULL  CAF    BIT13           CHECK STRULLSW FOR IMPULSIVE BURN
1712   REF  19  LAST  696      24,2714  7 0102 0            MASK   FLAGWRD6
1713   REF 153  LAST  695      24,2715  10 000 0            CCS    A
1714   REF   1                 24,2716  0 2724 1            TCR    STEERULL        NON-IMPULSIVE, STEERING AND ULLAGE OFF
1715   REF   1                 24,2717  0 2727 1            TCR    ULAGEOFF        ULLAGE OFF  (ONLY, OR AGAIN)

1716                           24,2720  0 0006 1            EXTEND
1717   REF  12  LAST  201      24,2721  3 5021 1            DCA    NEGO            KILL GROUP 4  (DP NEGO = -0,+0)
1718   REF   3  LAST  201      24,2722  52 761 0            DXCH   -PHASE4

1719   REF  32  LAST  695      24,2723  1 5324 0  ENDIGN    TCF    TASKOVER


1720   REF   9  LAST  695      24,2724  4 0076 1  STEERULL  CS     FLAGWRD2        SET STEERSW
1721   REF  17  LAST  422      24,2725  7 5005 0            MASK   BIT11
1722   REF  10  LAST  696      24,2726  26 076 1            ADS    FLAGWRD2
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1723   REF 132  LAST  696   24,2727  3 5021 1  ULAGEOFF CAF    ZERO
1724                       24,2730  0 0006 1           EXTEND
1725   REF   2  LAST  183   24,2731  01 005 0           WRITE  CHAN5          ZERO CHANNEL 5
1726   REF 161  LAST  688   24,2732  0 0002 0           TC     Q


1727   REF  28  LAST  696   24,2733  4 5003 0  IMPLBURN CS     BIT13          RESET STRULLSW (COULD BE AN IMPULSIVE
17271  REF  20  LAST  696   24,2734  7 0102 0           MASK   FLAGWRD6             ENGINE FAIL)
17272  REF  21  LAST  697   24,2735  54 102 0           TS     FLAGWRD6

17273  REF   2  LAST  685   24,2736  0 3366 1           TCR    E7SETTER

1728   REF  53  LAST  694   E7,1412                    EBANK= TIG
1729                       24,2737  0 0006 1           EXTEND                PREPARE FOR R1 OF V06N40 (CLOCKTASK)
1730   REF   7  LAST  694   24,2740  3 1430 1           DCA    TGO
1731   REF  54  LAST  697   24,2741  53'413 1           DXCH   TIG
1732                       24,2742  0 0006 1           EXTEND
1733   REF  20  LAST  695   24,2743  3 0025 0           DCA    TIME2
1734   REF  55  LAST  697   24,2744  21'413 1           DAS    TIG

17341  REF  15  LAST  694   24,2745  0 5372 1           TC     2PHSCHNG
17342                      24,2746   40153 1           OCT    40153          A,3.15 = ENGINOFF (TGO+1)....NOTE GROUP
17343                      24,2747   07014 0           OCT    07014          C, DELTAT AND 2CADR FOLLOW FOR TASK BELO
17344                      24,2750   77777 0           DEC    -0             -0 CS
17345  REF  33  LAST  695   E6,1466                    EBANK= DAPDATR1
17346  REF   1              24,2751   02757 0           2CADR  IMPLCONT
17346  REF   1              24,2752   50066 1
1735   REF   8  LAST  697   24,2753  31'430 1           CAE    TGO +1         (TPAGREE IN S40.13, LESS THAN 600CS)
1736   REF  30  LAST  694   24,2754  0 5245 1           TC     WAITLIST
1737   REF   9  LAST  697   E7,1427                    EBANK= TGO
1738   REF   2  LAST  213   24,2755   02766 1           2CADR  ENGINOFF
1739                       24,2756   50067 0
1742   REF  22  LAST  695   24,2757  4 5007 1  IMPLCONT CS     BIT9           RESET IMPULSW, ENGINOFF IS NOW SET UP
1743   REF  11  LAST  696   24,2760  7 0076 1           MASK   FLAGWRD2
1744   REF  12  LAST  697   24,2761  54 076 1           TS     FLAGWRD2

1745   REF   1              24,2762  0 3371 1           TCR    E6SETTER
1746   REF  34  LAST  697   E6,1466                    EBANK= DAPDATR1

17462  REF 133  LAST  697   24,2763  3 5021 1           CAF    ZERO           SET UP V97VCNTR IN CASE ENGINOFF (MASS-
17463  REF   2  LAST  216   24,2764  55'444 0           TS     V97VCNTR            BACK) ARRIVES BEFORE TVCDAPON

1747   REF   1              24,2765  1 2647 1           TCF    PREPTVC


1753   REF  10  LAST  697   E7,1427                    EBANK= TGO             E7 FORCED BY 3.15SPOT VARIABLE DELTA-T
17532  REF   2  LAST  697   24,2766  0 3371 1  ENGINOFF TCR    E6SETTER       TASK, 3.15 PHASE (TGO+1 CS)      GET E6
17533  REF  35  LAST  697   E6,1466                    EBANK= DAPDATR1
1754   REF   4  LAST  280   24,2767  31'474 1           CAF    CSMMASS
1755   REF   3  LAST  198   24,2770  55'652 0           TS     MASSTMP        COPYCYCLE FOR MASSBACK
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1756   REF  16  LAST  697   24,2771  0 5372 1          TC     2PHSCHNG
1757                        24,2772   00003 1          OCT    00003          KILL GROUP 3 PROTECTION OF ENGINOFF, DO
1758                        24,2773   40634 1          OCT    40634          A, 4.63 = DOSPSOFF  (-OCS)
1759   REF   2  LAST  198   24,2774  0 3017 1 DOSPSOFF TCR    SPSOFF         SHUT DOWN SPS, MASS UPDATES, ETC.
1760   REF   1              24,2775  4 2427 0          CS     OCT27/24       (OCTAL 27)
1761   REF   6  LAST  698   24,2776  0 4114 1          TC     NEWPHASE
1762                        24,2777   00004 0          OCT    4              4.27 = DOTVCRCS (250 CS)

1763   REF   3  LAST  696   24,3000  0 5267 1          TC     FIXDELAY       2.5 SECOND DELAY FOR SPS TAILOFF
1764                        24,3001   00372 1          DEC    250

1765   REF   2  LAST  203   24,3002  0 2320 1 DOTVCRCS TCR    SETMAXDB       WIDE DEADBAND FOR CUTOFF TRANSIENT

1766   REF  25  LAST  550   24,3003  0 4740 0          TC     IBNKCALL       SET UP RCS DAP (KILLS TVCDAPS, SETS T5
1767   REF   2  LAST  198   24,3004   42024 1          CADR   RCSDAPON             BITS, WAITS 0.6SEC FOR TVCEXEC DIE)

17672  REF  26  LAST  698   24,3005  0 4740 0          TC     IBNKCALL       UPDATE WEIGHT/G AND MASS-PROPERTIES FOR
17673  REF   3  LAST  254   24,3006   13366 0          CADR   MASSPROP             RCS DAP STARTUP IN 0.6 SECONDS

1768   REF   2  LAST  198   24,3007  0 3071 1          TCR    TVCZAP         WIPE OUT TVC, TURN OFF CLOKTASK

1769   REF  45  LAST  695   24,3010  0 5412 0          TC     PHASCHNG
1770                        24,3011   00354 0          OCT    00354          A, 4.35 = POSTBURN (NOVAC, PRIO12)
1771   REF   2  LAST  183   24,3012  3 4710 0          CAF    PRIO12         SET UP POSTBURN V16N40 JOB
1772   REF  21  LAST  691   24,3013  0 5134 1          TC     NOVAC
1773   REF  36  LAST  697   E6,1466                    EBANK= DAPDATR1       (SETMAXDB IN POST41)
1774   REF   3  LAST  686   24,3014   02246 0          2CADR  POSTBURN
1774                        24,3015   50066 1
1775   REF  33  LAST  696   24,3016  1 5324 0          TCF    TASKOVER

1776   REF  37  LAST  698   E6,1466                    EBANK= DAPDATR1
1783                        24,3017  0 0006 1 SPSOFF   EXTEND                ESTABLISH SPSOFF TEVENT
1784   REF  21  LAST  697   24,3020  3 0025 0          DCA    TIME2
1785   REF   5  LAST  695   24,3021  53'337 0          DXCH   TEVENT
1786   REF  28  LAST  695   24,3022  4 5011 0          CS     BIT7           RESET ENGONFLG
1787   REF   9  LAST  695   24,3023  7 0101 0          MASK   FLAGWRD5
1788   REF  10  LAST  698   24,3024  54 101 0          TS     FLAGWRD5       (RESTARTS WILL SHUT DOWN SPS NOW)
1789   REF  29  LAST  697   24,3025  4 5003 0          CS     BIT13          SHUT DOWN SPS ENGINE
1790                        24,3026  0 0006 1          EXTEND
1791   REF  23  LAST  695   24,3027  03 011 1          WAND   DSALMOUT

17911  REF  38  LAST  568   24,3030  3 5002 0          CAF    BIT14          ISSUE SIV CUTOFF COMMAND
17912                       24,3031  0 0006 1          EXTEND                FOR POSSIBLE BACK-UP USE
17913  REF  27  LAST  549   24,3032  05 012 1          WOR    CHAN12
1792   REF   3  LAST  697   24,3033  31'444 1 MASSBACK CAE    V97VCNTR       RESTORE PART OF PRE-DECREMENTED MASS
A1793                                                                            V97VCNTR = VCNTR UNLESS V97 IS
A1794                                                                            ACTIVE. ONLY V97VCNTR IS THEN RIGHT
1795                        24,3034  0 0006 1          EXTEND                 VCNTR COUNTS 1/2-SECONDS IN TVC EXEC
1796   REF   1              24,3035  7 0110 0          MP     EMDOT             MDOT, SC.AT B+3 KG/CS
1797   REF 154  LAST  696   24,3036  22 000 1          LXCH   A
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1798                                24,3037  0 0006 1           EXTEND
1799   REF  13  LAST  520   24,3040  7 5041 0           MP      1SEC          DEC 100
1800   REF   4  LAST  697   24,3041  6 1652 1           AD      MASSTMP       CORRECTION IS ACCURATE TO 5 CS OF FLOW
1801   REF   5  LAST  697   24,3042  55'474 0           TS      CSMMASS            (1.44 KG OR 0.4 BITS)

18011  REF   3  LAST  696   24,3043  3 1644 0           CA      TVCPHASE      CHECK IF OK FOR TRIM UPDATE
18012  REF  80  LAST  688   24,3044  6 5017 1           AD      ONE                THESE CHECKS ARE ONLY NEEDED
18013                       24,3045  0 0006 1           EXTEND                     FOR A LESS THAN 0.4 SEC BURN
18014  REF   1              24,3046  1 3057 1           BZF     BTRIMR        NO, INITIALIZATION NOT COMPLETE
18015  REF  22  LAST  697   24,3047  4 0102 0           CS      FLAGWRD6      YES, CHECK IF TVC
18016  REF  11  LAST  696   24,3050  7 4105 0           MASK    OCT60000
18017                       24,3051  0 0006 1           EXTEND
18018  REF   2  LAST  699   24,3052  6 3057 0           BZMF    BTRIMR        NO, NOT TVC YET
18105  REF   2  LAST  105   24,3053  31'601 1 BESTTRIM  CAE     DELPBAR       UPDATE TRIMS WITH DELFILTER VALUES
1811   REF  13  LAST  280   24,3054  55'423 1           TS      PACTOFF
1812   REF   2  LAST  105   24,3055  31'603 0           CAE     DELYBAR
1813   REF   2  LAST  280   24,3056  55'424 0           TS      YACTOFF
1814   REF 162  LAST  697   24,3057  0 0002 0 BTRIMR    TC      Q
1815   REF  38  LAST  698   E6,1466                     EBANK=  DAPDATR1
1816   REF   1              24,3060   03205 0 STEERADS 2CADR   STEERING
1816   REF   1              24,3061   50066 1
1817                        24,3062   37703 1 .6SECT5  OCT     37703
1818                        24,3063   00000 1 5SECDP   DEC     0             MAKE DP 5SEC
1819                        24,3064   00784 1 5SEC     DEC     500
18195                       24,3065   02202 0 OCT02202 OCT     02202         BITS 2,8,11 FOR CHANNEL 12 TVC/OPTICS
1820   REF  39  LAST  699   E6,1466                     EBANK=  DAPDATR1
1821   REF   1              24,3066   02147 1 TVCON2C  2CADR   TVCDAPON
1821   REF   1              24,3067   36066 1

1822                        24,3070  0 0004 0   -1      INHINT
1823   REF   1              24,3071  4 3065 0 TVCZAP   CS      OCT02202      DISABLE TVC AND OPT ERR CNTRS, REENGAGE
1824                        24,3072  0 0006 1           EXTEND                     OPTICS DAC
1825   REF  28  LAST  698   24,3073  03 012 1           WAND    CHAN12
1826   REF  40  LAST  696   24,3074  4 5017 0           CS      BIT1          ENABLE T4RUPT OPTICS MONITOR....PERMIT
1827   REF  23  LAST  453   24,3075  55'303 1           TS      OPTIND             OPTICS-ZERO BUT NOT OPTICS-DRIVE
18271  REF 134  LAST  697   24,3076  3 5021 1           CAF     ZERO          CLEAR NVWORD1 IN CASE CLOCKJOB WAITING
18272  REF   9  LAST  695   24,3077  55'145 1           TS      NVWORD1
1828   REF  18  LAST  696   24,3100  4 5005 0           CS      BIT11         CLEAR TIMRFLAG TO STOP CLOKTASK
1829   REF   5  LAST  695   24,3101  7 0103 1           MASK    FLAGWRD7
1830   REF   6  LAST  699   24,3102  54 103 1           TS      FLAGWRD7
1831   REF 163  LAST  699   24,3103  0 0002 0           TC      Q
1832   REF  40  LAST  699   E6,1466                     EBANK=  DAPDATR1
1833                        24,3104   43020 1 UPDATEVG STQ     BON
1834   REF   4  LAST  689   24,3105   03730 0                   QTEMP1
1835   REF   7  LAST  684   24,3106   01307 1                   XDELVFLG
1836   REF   1              24,3107   51133 1                   CALL40.8

1837                        24,3110   50135 0           SLOAD   BMN
1838   REF   3  LAST  684   24,3111   03343 0                   NBRCYCLS
1839   REF   1              24,3112   51137 0                   SETUP.9
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1840                                24,3113   53375 0          VLOAD  VAD
1841  REF   2  LAST  107   24,3114   03345 0                   DELVSUM
1842  REF   2  LAST  691   24,3115   03433 0                   DELVREF
1843  REF   1               24,3116   03353 1          STORE  DELVSUMP
1844                        24,3117   77776 1          EXIT
1845  REF  81  LAST  699   24,3120   3 5017 1         CA     ONE
1846  REF   4  LAST  699   24,3121   6 1742 1         AD     NBRCYCLS
1847  REF   2  LAST  107   24,3122   55'743 1         TS     NBRCYCLP

1848  REF  46  LAST  698   24,3123   0 5412 0         TC     PHASCHNG       TYPE B RESTART BELOW AND 5.3 REREADACCS
1849                        24,3124    10035 0         OCT    10035

1850  REF   3  LAST  700   24,3125   3 1743 0         CA     NBRCYCLP
1851  REF   5  LAST  700   24,3126   55'742 0         TS     NBRCYCLS
1852  REF 146  LAST  692   24,3127   0 6006 1         TC     INTPRET
1853                        24,3130    77775 1         VLOAD
1854  REF   2  LAST  700   24,3131    03353 1                DELVSUMP
1855  REF   3  LAST  700   24,3132    03345 0          STORE  DELVSUM

1856                        24,3133    77624 1  CALL40.8 CALL
1857  REF   1               24,3134    34153 1                S40.8
1858                        24,3135    77650 1          GOTO
1859  REF   5  LAST  699   24,3136    03730 0                QTEMP1

1860                        24,3137    67214 1  SETUP.9  BON    SLOAD
1861  REF   1               24,3140    01310 1                 FIRSTFLG
1862  REF   1               24,3141    51154 0                 SURELY.9
1863  REF   4  LAST  700   24,3142    03344 1                 NBRCYCLP
1864                        24,3143    74301 0          NORM   VXSC           (NORM  HANDLES ZERO PROPERLY)
1865  REF  35  LAST  681   24,3144    00047 1                 X1
1866  REF   2  LAST  124   24,3145    03705 0                 BDT
1867                        24,3146    53257 1          VSR*   VAD
1868                        24,3147    20563 0                 0 -14D,1
1869  REF   1               24,3150    03646 0                 VGTEMP
1870                        24,3151    77651 0          VSU
1871  REF   4  LAST  700   24,3152    03345 0                 DELVSUM
1872  REF   2  LAST  689   24,3153    03721 0          STORE  VGPREV
1873                        24,3154    77776 1  SURELY.9 EXIT
1874  REF   6  LAST  265   24,3155   3 5003 1         CAF    PRIO10
1875  REF  22  LAST  694   24,3156   0 5147 0         TC     FINDVAC
1876  REF  41  LAST  699   E6,1466                    EBANK= DAPDATR1
1877  REF   1               24,3157    02302 1          2CADR  S40.9
1877  REF   1               24,3160    34066 0
1879  REF  17  LAST  698   24,3161   0 5372 1         TC     2PHSCHNG
1879                        24,3162    00051 0          OCT    00051          A, 1.5 = RED040.9, PRIO 10
1880                        24,3163    10035 0          OCT    10035
1881  REF 147  LAST  700   24,3164   0 6006 1         TC     INTPRET
1882                        24,3165    77775 1          VLOAD
1883  REF   8  LAST  546   24,3166    01171 1                 RN             ACTIVE VEHICLE RADIUS VECTOR AT T1
1884  REF  11  LAST  555   24,3167    27570 0          STOVL  RINIT
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1885  REF   9  LAST  546  24,3170  01177 1                  VN          ACTIVE VEHICLE VELOCITY VECTOR AT T1
1886  REF  10  LAST  555  24,3171  17576 0          STODL   VINIT
1887  REF   6  LAST  643  24,3172  01205 1                  PIPTIME
1888  REF   2  LAST  122  24,3173  03474 0          STORE   INIT
1889                       24,3174  77621 1          BDSU
1890  REF  10  LAST  642  24,3175  03656 1                  TPASS4
1891  REF   9  LAST  642  24,3176  27423 1          STOVL   DELLT4
1892  REF  17  LAST  692  24,3177  15335 0                  HI6ZEROS
1893  REF   5  LAST  700  24,3200  17345 0          STODL   DELVSUM
1894  REF  18  LAST  701  24,3201  15335 0                  HI6ZEROS
1895  REF   6  LAST  700  24,3202  03343 0          STORE   NBRCYCLS
1896                       24,3203  77650 1          GOTO
1897  REF   2  LAST  699  24,3204  51133 1                  CALL40.8
1899  REF  42  LAST  700  E6,1466                    EBANK=  DAPDATR1
1899  REF 148  LAST  700  24,3205  0 6006 1  STEERING TC     INTPRET
1900                       24,3206  77624 1          CALL
1901  REF   2  LAST  689  24,3207  51104 0                  UPDATEVG
1902                       24,3210  77776 1          EXIT
1903  REF  23  LAST  697  24,3211  3 5007 0          CAF     BIT9        CHECK IMPULSW
1904  REF  13  LAST  697  24,3212  7 0076 1          MASK    FLAGWRD2
1905  REF 155  LAST  698  24,3213  10 000 0          CCS     A
1906                       24,3214  1 3217 1          TCF     +3          PRE-IGNITE, REQUEST ENG-OFF, OR POST-OFF
1907  REF  45  LAST  693  24,3215  0 4701 0  SERVXT   TC      POSTJUMP
1908  REF   2  LAST  690  24,3216   77227 0          CADR    SERVEXIT
1909  REF  30  LAST  698  24,3217  3 5003 1          CAF     BIT13       CHECK ENGINE-ON/-OFF
1910                       24,3220  0 0006 1          EXTEND
1911  REF  24  LAST  698  24,3221  02 011 0          RAND    DSALMOUT
1912                       24,3222  0 0006 1          EXTEND
1913  REF   3  LAST  692  24,3223  1 3215 0          BZF     SERVXT      ENGINE-OFF, SO PRE-IGNITE OR POST-OFF
1914  REF   3  LAST  697  24,3224  0 3366 1          TCR     E7SETTER
1916  REF  56  LAST  697  E7,1412                    EBANK=  TIG
1917                       24,3225  0 0004 0          INHINT
1918                       24,3226  0 0006 1          EXTEND
1919  REF  57  LAST  701  24,3227  3 1413 0          DCA     TIG
1920  REF 268  LAST  691  24,3230  52 155 1          DXCH    MPAC
1921                       24,3231  0 0006 1          EXTEND
1922  REF  22  LAST  698  24,3232  4 0025 1          DCS     TIME2
1923  REF 269  LAST  701  24,3233  20 155 1          DAS     MPAC
1924  REF   1              24,3234  0 7224 1          TCR     DPAGREE
1925  REF 270  LAST  701  24,3235  30 155 0          CAE     MPAC +1     (LESS THAN 6 (OR 4) SECONDS TO GO)
1926  REF 156  LAST  701  24,3236  10 000 0          CCS     A           PROTECT AGAINST NEG/ZRO W.L. CALL
1927                       24,3237  1 3242 1          TCF     +3
1928                       24,3240  1 3242 1          TCF     +2
1929  REF 135  LAST  699  24,3241  3 5021 1          CAF     ZERO
1930  REF  82  LAST  700  24,3242  6 5017 1          AD      ONE
1931  REF  67  LAST  696  24,3243  56 001 0          XCH     L
1932  REF 136  LAST  701  24,3244  3 5021 1          CA      ZERO
1933  REF  11  LAST  697  24,3245  53'430 0          DXCH    TGO
1934  REF  12  LAST  701  24,3246  3 1430 1          CA      TGO +1
1935  REF  31  LAST  697  24,3247  0 5245 1          TC      WAITLIST
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1936   REF  13  LAST  701   E7,1427                        EBANK= TGO
1937   REF   3  LAST  697   24,3250   02766 1              2CADR  ENGINOFF
1937                        24,3251   50067 0

1935   REF  18  LAST  700   24,3252   0 5372 1             TC     2PHSCHNG
1939                        24,3253    40153 1             OCT    40153          A, 3.15 = ENGINOFF (TGO+1)....NOTE GROUP
1940                        24,3254    10035 0             OCT    10035          B, 5.3 = REREADAC, AND START BELOW
19402  REF  47  LAST  688   24,3255   0 5560 1             TC     DOWNFLAG       CLEAR IMPULSW, ENGINOFF IS NOW SET UP
19403  REF   2  LAST  203   24,3256    00044 1             ADRES  IMPULSW        RESTARTS OK
1941   REF   4  LAST  701   24,3257   1 3215 0             TCF    SERVXT
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P1942 ROUTINE **CLOKTASK** DESCRIPTION

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19542  REF  58  LAST  701   E7,1412                          EBANK= TIG
1955   REF  19  LAST  699   24,3260  3 5005 1  CLOKTASK CAF    BIT11          IS TIMRFLAG SET
1956   REF   7  LAST  699   24,3261  7 0103 1           MASK   FLAGWRD7
1957   REF 157  LAST  701   24,3262  10 000 0           CCS    A
1958   REF   1               24,3263  1 3267 0           TCF    CLOCKON
1959   REF  47  LAST  700   24,3264  0 5412 0           TC     PHASCHNG
1960                        24,3265   00006 1           OCT    00006          KILL RESTART
1961   REF  34  LAST  698   24,3266  0 5324 1           TC     TASKOVER

1962                        24,3267  0 0006 1  CLOCKON  EXTEND
1963   REF  23  LAST  701   24,3270  3 0025 0           DCA    TIME2
1964   REF   7  LAST  282   24,3271  53'661 0           DXCH   TTOGO
1965                        24,3272  0 0006 1           EXTEND
1966   REF  59  LAST  703   24,3273  4 1413 1           DCS    TIG
1967   REF   8  LAST  703   24,3274  21'661 0           DAS    TTOGO

1968   REF  14  LAST  699   24,3275  3 5041 1  SETCLOCK CAF    1SEC
1969   REF  32  LAST  701   24,3276  0 5245 1           TC     WAITLIST
1970   REF  60  LAST  703   E7,1412                          EBANK= TIG
1971   REF   5  LAST  685   24,3277   03260 0           2CADR  CLOKTASK
1971                        24,3300   50067 0

1972   REF  10  LAST  699   24,3301  11'145 1           CCS    NVWORD1
1973                        24,3302  1 3305 0           TCF    +3
1974   REF   1               24,3303  1 3315 1           TCF    SETT86

19742                       24,3304  1 3305 0           TCF    +1
1975   REF   2  LAST  688   24,3305  4 2423 1           CS     V06N85B        CHECK FOR V06N85B (P41)
19752  REF  11  LAST  703   24,3306  6 1145 0           AD     NVWORD1
19753                       24,3307  0 0006 1           EXTEND
19754  REF   1               24,3310  1 3320 1           BZF    SETUPDYN       V06N85, SO UPDATE N85 FOR DYNAMIC DISP

1976   REF   2  LAST  585   24,3311  3 7664 1           CAF    PRIO27
1977   REF  22  LAST  698   24,3312  0 5134 1           TC     NOVAC
1978   REF  43  LAST  701   E6,1466                          EBANK= DAPDATR1
1979   REF   1               24,3313   03332 0           2CADR  CLOCKJOB
1979   REF   1               24,3314   50066 1
1980   REF  12  LAST  542   24,3315  4 0025 1  SETT86   CS     TIME1          SET GROUP6 TIMEBASE
1981   REF   1               24,3316  55'063 1           TS     TBASE6
1982   REF  35  LAST  703   24,3317  1 5324 0           TCF    TASKOVER

19822  REF   3  LAST  703   24,3320  3 7664 1  SETUPDYN CAF    PRIO27         SET UP A JOB TO UPDATE N85 (FOR P41=V06)
198222 REF  23  LAST  700   24,3321  0 5147 0           TC     FINDVAC
198224 REF  44  LAST  703   E6,1466                          EBANK= DAPDATR1
198226 REF   1               24,3322   03325 0           2CADR  DYNDISP
198226 REF   1               24,3323   50066 1
198228 REF   2  LAST  703   24,3324  1 3315 1           TCF    SETT86         CLOSE OUT CLOCKTASK
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19823  REF 149  LAST  701   24,3325  0 6006 1  DYNDISP  TC      INTPRET        UPDATE N85 FOR A DYNAMIC V06N85 IN P41,
198232                      24,3326   77624 1             CALL                       PRIOR TO BLANKING AND AVEG (V16N85)
198234 REF   3  LAST  689   24,3327   50370 0                     P40CNV85
198236                      24,3330   77776 1             EXIT
198238 REF   1              24,3331  1 3342 0             TCF     CKNVWRD1
```

P1983 ROUTINE **CLOCKJOB** DESCRIPTION

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 2003   REF  45  LAST  703   E6,1466                          EBANK=  DAPDATR1
 2004   REF  15  LAST  695   24,3332  3 0032 0  CLOCKJOB  CA      CDUX
200401  REF   1               24,3333  54 772 1           TS      CDUSPOTX
200402  REF   6  LAST  687   24,3334  3 0033 1           CA      CDUY
200403  REF   1               24,3335  54 766 1           TS      CDUSPOTY
200404  REF   9  LAST  573   24,3336  3 0034 0           CA      CDUZ
200405  REF   1               24,3337  54 770 0           TS      CDUSPOTZ
200406  REF 167  LAST  692   24,3340  0 4662 1           TC      BANKCALL
 20041  REF   1               24,3341   47555 1          CADR    QUICTRIG
 20042                        24,3342  0 0004 0  CKNVWRD1 INHINT
 20044  REF  12  LAST  703   24,3343  11'145 1           CCS     NVWORD1        DETERMINE FUNCTION, INDICATED BY NVWORD1
 2005   REF   1               24,3344  1 3363 0           TCF     NOFLASH
 2006   REF  80  LAST  691   24,3345  1 5217 1           TCF     ENDOFJOB
 2007   REF   1               24,3346  1 3355 0           TCF     ENGREQST       SPS ENGINE-ON-ENABLE V99 FLASH
 2008   REF   4  LAST  695   24,3347  3 2425 0  FAILDSP  CAF     V06N40         SPS ENGINE-FAILED V97 FLASH
 2009   REF 168  LAST  705   24,3350  0 4662 1           TC      BANKCALL
 2010   REF   1               24,3351   20715 0          CADR    CLOCPLAY
 2011   REF   1               24,3352  1 3432 0           TCF     V97T           TERMINATE
 2012   REF   1               24,3353  1 3465 1           TCF     V97P           PROCEED
 2013   REF   1               24,3354  1 3514 0           TCF     V97E           ENTER
R2014
 2015   REF   5  LAST  705   24,3355  3 2425 0  ENGREQST CAF     V06N40
 2016   REF 169  LAST  705   24,3356  0 4662 1           TC      BANKCALL
 2017   REF   2  LAST  705   24,3357   20715 0          CADR    CLOCPLAY
 2018   REF   1               24,3360  1 3402 0           TCF     V99T           TERMINATE
 2019   REF   1               24,3361  1 3410 0           TCF     V99P           PROCEED
 2020   REF   1               24,3362  1 3374 0           TCF     V99E           ENTER

 2024   REF  13  LAST  705   24,3363  31'145 0  NOFLASH  CAE     NVWORD1        DISPLAY NVWORD1 NORMALLY
 2025   REF 170  LAST  705   24,3364  0 4662 1           TC      BANKCALL
 2026   REF   2  LAST  540   24,3365   20707 0          CADR    REGODSP


 2027   REF   5  LAST  648   24,3366  3 5060 1  E7SETTER CAF     EBANK7
 2028   REF  32  LAST  648   24,3367  54 003 0           TS      EBANK
 2029   REF  61  LAST  703   E7,1412                          EBANK=  TIG
 2030   REF 164  LAST  699   24,3370  0 0002 0           TC      Q

 2031   REF  10  LAST  574   24,3371  3 5057 0  E6SETTER CAF     EBANK6         SET UP EBANK6
 2032   REF  33  LAST  705   24,3372  54 003 0           TS      EBANK
 2033   REF  46  LAST  705   E6,1466                          EBANK=  DAPDATR1
 2034   REF 165  LAST  705   24,3373  0 0002 0           TC      Q

20345   REF  47  LAST  705   E6,1466                          EBANK=  DAPDATR1
 2035   REF  19  LAST  702   24,3374  0 5372 1  V99E     TC      2PHSCHNG
 2036                        24,3375   00006 1          OCT     00006          KILL PRE40.6/CLOKTASK PROTECTION
 2037                        24,3376   05024 1          OCT     05024          C, PRIORITY NEXT, JOB BELOW
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20372                          24,3377   27000 1            OCT    27000
2038   REF   3  LAST  698     24,3400   0 3070 0  V99EJOB  TCR    TVCZAP -1      WIPE OUT TVC, CLOKTASK
2039   REF   2  LAST  686     24,3401   1 2254 1           TCF    P40RCS         V16N85 POST-BURN OPERATIONS

20392  REF  48  LAST  705     E6,1466                      EBANK= DAPDATR1
2040   REF  20  LAST  705     24,3402   0 5372 1  V99T     TC     2PHSCHNG       (ENTRY FROM V97T FLOW TOO)
2041                          24,3403    00006 1           OCT    00006          KILL PRE40.6/CLOKTASK PROTECTION
2042                          24,3404    05024 1           OCT    05024          C, PRIORITY NEXT, JOB BELOW
20422                          24,3405   27000 1            OCT    27000
2043   REF   4  LAST  706     24,3406   0 3070 0  V99TJOB  TCR    TVCZAP -1      WIPE OUT TVC, CLOKTASK
2044   REF   5  LAST  687     24,3407   1 2275 1           TCF    POST41         AVEGEXIT, SETMAXDB, GOTOPOOH

2045                          24,3410   0 0004 0  V99P     INHINT
2046   REF   8  LAST  703     24,3411   30 103 0           CAE    FLAGWRD7       CHECK ASTN FLAG FOR PRIOR V99P
2047   REF  26  LAST  695     24,3412   7 5004 1           MASK   BIT12
2048   REF 158  LAST  703     24,3413   10 000 0           CCS    A
20485  REF   1                24,3414   1 3427 1           TCF    V99P/TIG       YES, THIS MUST BE A RESTART ENTRY

20486  REF  27  LAST  706     24,3415   3 5004 0  ASTNV99P CAF    BIT12          SET ASTN FLAG
20487  REF   9  LAST  706     24,3416   26 103 1           ADS    FLAGWRD7
2051   REF  10  LAST  706     24,3417   30 103 0           CAE    FLAGWRD7       CHECK IGN FLAG FOR TIG-0 ARRIVAL
2052   REF  31  LAST  701     24,3420   7 5003 0           MASK   BIT13
2053                          24,3421   0 0006 1           EXTEND
2054   REF   2  LAST  706     24,3422   1 3427 1           BZF    V99P/TIG       NO, CLEAR THE V99 AND WAIT FOR TIG-0

2055   REF  41  LAST  699     24,3423   3 5017 1  ENDV99P1 CAF    BIT1           TIG-0 HAS COME ALREADY
2056   REF  33  LAST  703     24,3424   0 5245 1           TC     WAITLIST       SET UP IGNITION HERE
2057   REF  49  LAST  706     E6,1466                      EBANK= DAPDATR1
2058   REF   2  LAST  216     24,3425    02625 1           2CADR  IGNITION
2058                          24,3426    50066 1
20605  REF   6  LAST  705     24,3427   3 2425 0  V99P/TIG CAF    V06N40         CLEAR THE V99 FLASH AND WAIT FOR TIG-0
20606  REF  14  LAST  705     24,3430   55'145 1           TS     NVWORD1
2061   REF  81  LAST  705     24,3431   1 5217 1  ENDV99P  TCF    ENDOFJOB

20665  REF   6  LAST  699     E6,1474                      EBANK= CSMMASS
2067   REF  21  LAST  706     24,3432   0 5372 1  V97T     TC     2PHSCHNG
2068                          24,3433    00006 1           OCT    00006          KILL GROUP 6 (CLOKTASK)
2069                          24,3434    40674 0           OCT    40674          A, 4.67 = V97TTASK (-0 CS), TBASE NOW
2070   REF  42  LAST  706     24,3435   3 5017 1           CAF    BIT1
2071   REF   4  LAST  436     24,3436   0 5235 0           TC     TWIDDLE
2072   REF   2  LAST  216     24,3437    03441 0           ADRES  V97TTASK       KEEP EBANK6 FOR MASSES, SPSOFF, ETC.
2073   REF  82  LAST  706     24,3440   1 5217 1           TCF    ENDOFJOB

2074   REF   7  LAST  706     E6,1474                      EBANK= CSMMASS
2075   REF 137  LAST  701     24,3441   3 5021 1  V97TTASK CAF    ZERO           DISABLE CLOCKJOB
2076   REF  15  LAST  706     24,3442   55'145 1           TS     NVWORD1
2077   REF   1                24,3443   3 2434 0           CAF    3MDOT          3 SECONDS OF MDOT (2-4 SEC ENGFAIL
2078   REF   8  LAST  706     24,3444   6 1474 1           AD     CSMMASS              DETECTION) NOT LOST BECAUSE THRUST
2079   REF   5  LAST  699     24,3445   55'652 0           TS     MASSTMP              FAILED.  COPYCYCLE FOR MASSBACK
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2080   REF  48  LAST  703   24,3446  0 5412 0           TC     PHASCHNG
2081                       24,3447   05014 1           OCT    05014          C, DELTAT NEXT, TASK BELOW, IN
2082                       24,3450   77777 0           DEC    -0             -0 CS

2083   REF   3  LAST  698   24,3451  0 3017 1           TCR    SPSOFF         SHUTDOWN SPS ENGINE, MASS UPDATE, ETC.
2084   REF  49  LAST  707   24,3452  0 5412 0           TC     PHASCHNG
2085                       24,3453   00714 0           OCT    00714          A, 4.71 = V97TRCS (250 CS), TBASE OLD
2086   REF   4  LAST  698   24,3454  0 5267 1           TC     FIXDELAY       DELAY 2.5 SECONDS FOR (POSSIBLE) TAIL-
2087                       24,3455   00372 1           DEC    250                 OFF (FALSE THRUST-LOSS)

2088   REF  50  LAST  706   E6,1466                     EBANK= DAPDATR1
2089   REF  27  LAST  698   24,3456  0 4740 0  V97TRCS  TC     IBNKCALL       RCS DAP IN 0.6SEC, SETTING T5 BITS TO
2090   REF   3  LAST  698   24,3457   42024 1           CADR   RCSDAPON            KILL TVCEXEC/TVCROLLDAP STARTS
2091   REF   4  LAST  703   24,3460  3 7664 1           CAF    PRIO27         SET UP V99T FOR TVCZAP AND POST41 (SET-
2092   REF  23  LAST  703   24,3461  0 5134 1           TC     NOVAC               MAXDB AND GOTOPOOH)
2093   REF  51  LAST  707   E6,1466                     EBANK= DAPDATR1       EBANK6 FOR SETMAXDB IN POST41
2094   REF   2  LAST  705   24,3462   03402 1           2CADR  V99T
2094                       24,3463   50066 1
2095   REF  36  LAST  703   24,3464  1 5324 0  ENDV97T  TCF    TASKOVER

2096   REF   4  LAST  698   E6,1444                     EBANK= V97VCNTR
2097   REF  50  LAST  707   24,3465  0 5412 0  V97P     TC     PHASCHNG
2098                       24,3466   40734 0           OCT    40734          A, 4.73 = V97PTASK (-0 CS), TBASE NOW
2099   REF  43  LAST  706   24,3467  3 5017 1           CAF    BIT1
2100   REF   5  LAST  706   24,3470  0 5235 0           TC     TWIDDLE
2101   REF   2  LAST  215   24,3471   03473 1           ADRES  V97PTASK
2102   REF  83  LAST  706   24,3472  1 5217 1           TCF    ENDOFJOB

2103   REF   5  LAST  707   E6,1444                     EBANK= V97VCNTR
2104   REF   6  LAST  707   24,3473  31'444 1  V97PTASK CAE    V97VCNTR       GET MASS UPDATES (TVCEXEC) GOING AGAIN
2105   REF   2  LAST  105   24,3474  55'643 0           TS     VCNTR               (ERRORS IF FLASE THRUST-LOSS AND/OR
A2106                                                                            POOR SYNCH OF MANUAL ENGINE-ON AND
A2107                                                                            THE VERB 97 PROCEED)
2108   REF   7  LAST  706   24,3475  3 2425 0           CAF    V06N40         REDISPLAY V06N40
2109   REF  16  LAST  706   24,3476  55'145 1           TS     NVWORD1
2110   REF  44  LAST  688   24,3477  0 5546 0           TC     UPFLAG         SET IDLEFAIL TO ALLOW R41-BYPASS, IN
2111   REF   1               24,3500   00030 1           ADRES  IDLEFAIL            CASE OF UNFAVORABLE S40.8 SYNCH
2112   REF  45  LAST  707   24,3501  0 5546 0           TC     UPFLAG         SET STEERSW TO RE-ENABLE STEERING
2113   REF   1               24,3502   00042 1           ADRES  STEERSW
2114   REF  51  LAST  707   24,3503  0 5412 0           TC     PHASCHNG
2115                       24,3504   00134 1           OCT    00134          A, 4.13 = R40ENABL (200 CS), TBASE OLD
2116   REF   5  LAST  707   24,3505  0 5267 1           TC     FIXDELAY       WAIT 2 SECONDS, THEN
2117                       24,3506   00310 0           DEC    200

2118   REF   8  LAST  632   E7,1777                     EBANK= WHOCARES
2119   REF  48  LAST  702   24,3507  0 5560 1  R40ENABL TC     DOWNFLAG       RE-ENABLE R40 BY CLEARING IDLEFAIL
2120   REF   2  LAST  707   24,3510   00030 1           ADRES  IDLEFAIL
2121   REF  52  LAST  707   24,3511  0 5412 0           TC     PHASCHNG
2122                       24,3512   00004 0           OCT    00004          KILL GROUP 4
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2123   REF  37  LAST  707   24,3513  1 5324 0  ENDV97P  TCF    TASKOVER


2124   REF   6  LAST  707   E7,1777                    EBANK= WHOCARES
2125   REF  53  LAST  707   24,3514  0 5412 0  V97E     TC     PHASCHNG
2126                        24,3515   40534 1           OCT    40534          A, 4.53 = V97ETASK (-0 CS), TBASE NOW
2127   REF  44  LAST  707   24,3516  3 5017 1           CAF    BIT1
2128   REF  34  LAST  706   24,3517  0 5245 1           TC     WAITLIST
2129   REF  62  LAST  705   E7,1412                    EBANK= TIG
2130   REF   2  LAST  216   24,3520   03523 0           2CADR  V97ETASK
2130                        24,3521   50067 0
2131   REF  84  LAST  707   24,3522  1 5217 1           TCF    ENDOFJOB

2132   REF  63  LAST  708   E7,1412                    EBANK= TIG
2133   REF   5  LAST  239   24,3523  4 4112 0  V97ETASK CS     OCT24          FORCE R1 OF V06N40 TO READ  59X59
2134   REF  64  LAST  708   24,3524  55'412 0           TS     TIG
2135   REF   8  LAST  707   24,3525  3 2425 0           CAF    V06N40         REDISPLAY V06N40
2136   REF  17  LAST  707   24,3526  55'145 1           TS     NVWORD1
2137   REF   3  LAST  697   24,3527  0 3371 1           TCR    E6SETTER       RETURN TO EBANK6 FOR REST OF V97ETASK
2138   REF   9  LAST  706   E6,1474                    EBANK= CSMMASS
2139   REF   2  LAST  706   24,3530  3 2434 0           CAF    3MDOT          3 SECONDS OF MDOT (2-4 SEC ENGFAIL
2140   REF  10  LAST  708   24,3531  6 1474 1           AD     CSMMASS              DETECTION) NOT LOST BECAUSE THRUST
2141   REF   6  LAST  706   24,3532  55'652 0           TS     MASSTMP              FAILED....COPYCYCLE FOR MASSBACK
2142   REF  54  LAST  708   24,3533  0 5412 0           TC     PHASCHNG
2143                        24,3534   00754 1           OCT    00754          A, 4.75 = SPSOFF97 (-0 CS), TBASE OLD
2145   REF   4  LAST  707   24,3535  0 3017 1  SPSOFF97 TCR    SPSOFF
2146   REF  55  LAST  708   24,3536  0 5412 0           TC     PHASCHNG
2147                        24,3537   00114 0           OCT    00114          A, 4.11 = V97E40.6 (250 CS), TBASE OLD
2148   REF   6  LAST  707   24,3540  0 5267 1           TC     FIXDELAY       DELAY 2.5 SECONDS  FOR (POSSIBLE) TAIL-
2149                        24,3541   00372 1           DEC    250                  OFF (FALSE THRUST-LOSS)

2150   REF  52  LAST  707   E6,1466                    EBANK= DAPDATR1
2151   REF  45  LAST  708   24,3542  3 5017 1  V97E40.6 CAF    BIT1
2152   REF  35  LAST  708   24,3543  0 5245 1           TC     WAITLIST
2153   REF   2  LAST  685   E6,1447                    EBANK= CNTR
2154   REF   2  LAST  218   24,3544   02241 1           2CADR  PRE40.6        USE S40.6 RESTART ENTRY TO TRIM ENGINE
2154                        24,3545   40066 0
2155   REF  28  LAST  707   24,3546  0 4740 0           TC     IBNKCALL       RCS DAP IN 0.6SEC, SETTING T5 BITS TO
2156   REF   4  LAST  707   24,3547   42024 1           CADR   RCSDAPON             KILL TVCEXEC/TVCROLLDAP STARTS.
A2157                                                                            LEAVE NARROW DEADBAND FOR REIGNITE
2158   REF  22  LAST  706   24,3550  0 5372 1           TC     2PHSCHNG
2159                        24,3551   00026 0           OCT    00026          A, 6.2 = PRE40.6 (-0CS), CLOKTASK (1SEC)
2160                        24,3552   05014 1           OCT    05014          C, DELTAT NEXT, TASK BELOW, IN
21602                       24,3553   77777 0           DEC    -0             -0 CS

2161   REF   5  LAST  690   24,3554  4 5066 0  QUICKIGN CS     PRIO14         CLEAR ASTNFLAG AND SET IGNFLAG FOR
2162   REF  11  LAST  706   24,3555  7 0103 1           MASK   FLAGWRD7             IMMEDIATE V99 RESPONSE
2163   REF  32  LAST  706   24,3556  6 5003 1           AD     BIT13
2164   REF  12  LAST  708   24,3557  54 103 1           TS     FLAGWRD7
2165   REF   7  LAST  709   24,3560  0 5267 1           TC     FIXDELAY       DELAY TO ALLOW TIME FOR PRE40.6
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 2166                          24,3561   00036 I            DEC    30

 2167   REF  24  LAST  701    24,3562   4 5007 I  V99FLASH CS     BIT9          CAUSE V99 TO FLASH
 2168   REF  18  LAST  708    24,3563   55'145 1           TS     NVWORD1
 2169   REF  23  LAST  708    24,3564   0 5372 1           TC     2PHSCHNG
 2170                          24,3565    40774 1           OCT    40774         A, 4.77 = TIG-0 (-OCS) TBASE FOR PREPTVC
 2171                          24,3566    00033 1           OCT    00033         A, 3.3 = S40.13 (PRIO 20)
 2172   REF   5  LAST  694    24,3567   3 5002 0           CAF    PRIO20        SET UP TIMEBURN
 2173   REF  24  LAST  703    24,3570   0 5147 0           TC     FINDVAC
 2174   REF  14  LAST  702    E7,1427                      EBANK= TGO
 2175   REF   3  LAST  694    24,3571    02427 1           2CADR  S40.13
 2175                          24,3572    34067 1
 2176   REF  38  LAST  708    24,3573   1 5324 0  ENOV97E  TCF    TASKOVER      WAIT FOR CLOCKJOB (IMMEDIATE) REACTION
A2177                                                                           TO FLASHING V99 RESPONSE

R2178   MOD NO2          LOG SECTION  P40-P47
R2179   MOD BY   ZELDIN
R2180   FUNCTIONAL DESCRIPTION
R2181            COMPUTE INITIAL THRUST DIRECTION(UT) AND INITIAL VALUE OF VG
R2182            VECTOR(VGTIG).
R2183   CALLING SEQUENCE
R2184          L CALL
R2185        L+1        S40.1
R2186   NORMAL EXIT MODE
R2187            AT L+2 OF CALLING SEQUENCE (GOTO L+2)  NORMAL RETURN OR
R2188            ERROR RETURN IF NOSOFLAG =1
R2189   SUBROUTINES CALLED
R2190            CSMPREC
R2191            INITVEL
R2192            CALCGRAV
R2193            MIDGIM
R2194   ALARM OR ABORT EXIT MODES
R2195        L+2 OF CALLING SEQUENCE,UNSOLVABLE CONIC IF NOSOFLAG=1
R2196   ERASABLE INITIALIZATION REQUIRED
R2197            WEIGHT/G   ANTICIPATED MAG. OF VEHICLE MASS      SP B16KGM
R2198            XDELVFLG       1=DELTA-V MANEUVER,0=AIMPT STEER
R2199         IF DELTA-V MANEUVER
R2200            DELVSIN    SPECIFIED DELTA-V REQUIRED IN
R2201                       INERTIAL COORDS. OF ACTIVE VEHICLE
R2202                       AT TIME OF IGNITION                  VECTOR B7M/CS
R2203            DELVSAB    MAG. OF DELVSIN                      DP     B7M/CS
R2204            RTIG       POSITION AT TIME OF IGNITION       VECTOR B29M
R2205            VTIG       VELOCITY AT TIME OF IGNITION       VECTOR B7M/CS
R2206            CSTEER = 0              DP
R2207         IF AIMPOINT STEERING
R2208         IF AIMPT STEER
R2209            TIG        TIME OF IGNITION                     DP     B28CS
R2210            RTARG      POSITION TARGET TIME               VECTOR B29M
R2211            CSTEER = ECSTEER(GR 0) DP B1
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R2212           TPASS4 - TIME OF ARRIVAL AT AIMPOINT
R2213   OUTPUT
R2214             UT    1/2 UNIT VECTOR ALIGNED WITH THRUST DIRECTION IN REF COOR
R2215          VGTIG        INITIAL VALUE OF VELOCITY
R2216                       TO BE GAINED (INERT. COORD.)        VECTOR B7M/CS
R2217          DELVLVC      VGTIG IN LOC. VERT. COORDS.                 B7M/CS
R2218             F         NOMINAL THRUST FOR ENG USED FOR S40.13  DP B7 M-NEWT
R2219             BDT   V REQUIRED AT TIG -V REQUIRED AT (TIG-2SEC)
R2220             -GDT  FOR S40.13                                  VECT  B7M/CS
R2221          RTIG         CALC IN S40.1B(AIMPT) FOR S40.2,3  VECTOR B29M
R2222                       POSITION AT TIME OF IGNITION
R2223   DEBRIS      QTEMP1
R2224          MPAC,QPRET
R2225          PUSHLIST
R2226             RTX2,RTX1
 2227                        14,2011                         BANK   14
 2228   REF   1              16,2000                         SETLOC P40S1
 2229                        16,2020                         BANK

 2230   REF   1                                             COUNT  16/S40.1

 2231                        16,2020   77214 0  S40.1        SET    VLOAD
 2232   REF   2  LAST  700   16,2021   01070 1               FIRSTFLG
 2233   REF   1              16,2022   11566 1               L06ZEROS
 2234   REF   3  LAST  700   16,2023   03705 0         STORE BDT
 2235                        16,2024   43020 1         STQ   BDF
 2236   REF   8  LAST  642   16,2025   03657 0               QTEMP
 2237   REF   8  LAST  699   16,2026   01347 0               XDELVFLG
 2238   REF   1              16,2027   34116 0               S40.1B          LAMBERT
 2239                        16,2030   51575 1         VLOAD ABVAL           EXTERNAL DELTA-V
 2240   REF  10  LAST  678   16,2031   03646 0               DELVSIN
 2241   REF   3  LAST  678   16,2032   03654 0         STORE DELVSAB         COMPUTE FOR P30/P40 INTERFACE
422411                                                                            THUS PERMITTING MODULE-ONLY CHANGE
 22412                      16,2033   77201 1         SETPD VLOAD
 22413                      16,2034   00001 0               0
 22414  REF   6  LAST  675   16,2035   03640 0               VTIG
 2242   REF  11  LAST  701   16,2036   03576 0         STORE VINIT
 2243                       16,2037   53435 0         VXV   UNIT
 2244   REF   7  LAST  675   16,2040   03632 0               RTIG
 2245   REF   2  LAST  124   16,2041   27713 1         STOVL UT              UP IN UT
 2246   REF   8  LAST  710   16,2042   03632 0               RTIG
 2247   REF  12  LAST  700   16,2043   03570 0         STORE RINIT
 2248                       16,2044   65236 0         VSQ   PDDL
 2249                       16,2045   00045 0               36D
 2250   *                   16,2046   56275 1         DMPR  DDV
 2251   REF   1             16,2047   34152 0               THETACON
 2252                       16,2050   41205 0         DMP   DMP
 2253   REF   4  LAST  710   16,2051   03654 0               DELVSAB
 2254   REF   2  LAST  103   16,2052   03076 0               WEIGHT/G
 2255                       16,2053   77671 1         DDV
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2256   REF   3  LAST  684   16,2054   03727 0                F
2257                       16,2055   24017 1          STOVL  14D
2258   REF  11  LAST  710   16,2056   03646 0                DELVSIN

2259                       16,2057   74241 0          DOT    VXSC
2260   REF   3  LAST  710   16,2060   03713 1                UT
2261   REF   4  LAST  711   16,2061   03713 1                UT
2262                       16,2062   41552 0          VSL2   PUSH          (DELTAV.UP)UP SCALED AT 2(+7) P.D.L. 0
2263                       16,2063   65245 1          BVSU   PDDL          DELTA VP SCALED AT 2(+7) P.D.L. 6
2264   REF  12  LAST  711   16,2064   03646 0                DELVSIN
2265                       16,2065   00017 1                14D
2266                       16,2066   63356 1          SIN    PDVL
2267                       16,2067   00007 0                6D
2268                       16,2070   53435 0          VXV    UNIT
2269   REF   5  LAST  711   16,2071   03713 1                UT
2270                       16,2072   45561 1          VXSC   STADR
2271   REF   6  LAST  685   16,2073   50056 1          STOVL  VGTIG         UNIT(VPXUP)SIN(THETAT)IN VGTIG
2272                       16,2074   65256 0          UNIT   PDDL          UNIT(DELTA VP) IN P.D.L. 6
2273                       16,2075   00017 1                14D
2274                       16,2076   74346 0          COS    VXSC
2275                       16,2077   74255 0          VAD    VXSC
2276   REF   7  LAST  711   16,2100   03721 0                VGTIG
2277                       16,2101   00045 0                36D
2278                       16,2102   53352 0          VSL2   VAD
2279                       16,2103   77626 0          STADR
2280   REF   8  LAST  711   16,2104   74056 1          STORE  VGTIG         VG IGNITION SCALED AT 2(+7)M/CS

2281                       16,2105   77656 1          UNIT
2282   REF   6  LAST  711   16,2106   27713 1          STOVL  UT            THRUST DIRECTION SCALED AT 2(+1)
2283   REF   9  LAST  711   16,2107   03721 0                VGTIG
2284                       16,2110   43006 0          PUSH   SET
2285   REF   9  LAST  648   16,2111   01072 0                AVFLAG
2286                       16,2112   77624 1          CALL
2287   REF   2  LAST  642   16,2113   10647 0                MIDGIM         VGTIG IN LV COOR AT 2(+7)M/CS IN DELVLVC
2288                       16,2114   77650 1          GOTO
2289   REF   9  LAST  710   16,2115   03657 0                QTEMP
2290                       16,2116   45345 1  S40.18  DLOAD  DSU           LAMBERT
2291   REF  65  LAST  708   16,2117   03413 1                TIG
2292   REF   1              16,2120   36001 0                TWODT
2293   REF  36  LAST  686   16,2121   14041 1          STODL  TDEC1
2294   REF  11  LAST  701   16,2122   03656 1                TPASS4
2295                       16,2123   77625 0          DSU
2296   REF  37  LAST  711   16,2124   00041 1                TDEC1
2297   REF  10  LAST  701   16,2125   37423 0          STCALL DELLT4
2298   REF   2  LAST  641   16,2126   61651 1                AGAIN
2299                       16,2127   77775 1          VLOAD
2300   REF  13  LAST  641   16,2130   03612 1                VIPRIME
2301   REF   7  LAST  711   16,2131   17713 1          STODL  UT
2302   REF  66  LAST  711   16,2132   03413 1                TIG
2303   REF  38  LAST  711   16,2133   00041 1          STORE  TDEC1
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2304                                16,2134   77621 1           BDSU
2305   REF  12  LAST  711           16,2135   03656 1                 TPASS4
2306   REF  11  LAST  711           16,2136   37423 0           STCALL DELLT4
2307   REF   3  LAST  711           16,2137   61651 1                 AGAIN
2308                                16,2140   41575 0           VLOAD  PUSH
2309   REF  15  LAST  642           16,2141   03646 0                 DELVEET3
2310   REF  10  LAST  711           16,2142   03721 0           STORE  VGTIG
2311                                16,2143   45014 0           SET    CALL
2312   REF  10  LAST  711           16,2144   01072 0                 AVFLAG
2313   REF   3  LAST  711           16,2145   10647 0                 MIDGIM
2314                                16,2146   52001 1           SETPD  GOTO
2315                                16,2147   00001 0                 0
2316   REF   1                     16,2150   61704 0                 CALCUT

2317                                16,2151   00024 1 THETACON  2DEC   .31830989 B-B
2317                                16,2152   13714 1
2318   REF   1                     30,2000                     SETLOC P40S3
2319                                30,3645                     BANK

2320   REF   1                                                 COUNT  24/S40.1

2321                                30,3645   04000 0 EP4(45)H  2DEC   .125
2321                                30,3646   00000 1
2322                                30,3647   00707 1 EP4(10)H  2DEC   .027777777
2322                                30,3650   03434 1
2323                                30,3651   45020 1 AGAIN     STQ    CALL
2324   REF   6  LAST  700           30,3652   03730 0                  QTEMP1
2325   REF   5  LAST  639           30,3653   27071 1                  THISPREC
2326                                30,3654   66134 1           SXA,2  SXA,1
2327   REF  13  LAST  680           30,3655   03746 1                  RTX2
2328   REF  12  LAST  673           30,3656   03745 1                  RTX1
2329                                30,3657   77775 1           VLOAD
2330   REF  21  LAST  640           30,3660   00001 0                  RATT
2331   REF   9  LAST  710           30,3661   03632 0           STORE  RTIG
2332   REF  13  LAST  710           30,3662   27570 0           STOVL  RINIT
2333   REF  20  LAST  668           30,3663   00007 0                  VATT
2334   REF   7  LAST  710           30,3664   03640 0           STORE  VTIG
2335   REF  12  LAST  710           30,3665   03576 0           STORE  VINIT
2336                                30,3666   67201 0           SETPD  SLOAD
2337                                30,3667   00001 0                  0
2338   REF  19  LAST  701           30,3670   15335 0                  HI6ZEROS
2339                                30,3671   43125 0           PDDL   BON
2340   REF   1                     30,3672   21646 0                  EP4(45)H
2341   REF   4  LAST  637           30,3673   03705 0                  NORMSW
2342                                30,3674   61677 0                  +3
2343                                30,3675   77745 1           DLOAD
2344   REF   1                     30,3676   21650 1                  EP4(10)H
2345                                30,3677   45006 0           PUSH   CALL
2346   REF   3  LAST  555           30,3700   22000 1                  INITVEL
2347                                30,3701   52001 1           SETPD  GOTO
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2348                            30,3702   00001 0                 0
2349   REF   7  LAST  712       30,3703   03730 0                 QTEMP1
2350                            30,3704   45175 0  CALCUT VLOAD   CALL
2351   REF  10  LAST  712       30,3705   03632 0                 RTIG
2352   REF   1                  30,3706   77353 1                 CALCGRAV      GDELTAT IN MPAC AT 2(+7)M/CS
2353                            30,3707   70372 0          VSL1   V/SC
2354   REF   1                  30,3710   21747 0                 2DDCS         G AT 2(-5) M/CS.CS
2355                            30,3711   52315 1          PDVL   VSU
2356   REF  14  LAST  711       30,3712   03612 1                 VIPRIME
2357   REF   8  LAST  711       30,3713   03713 1                 UT
2358                            30,3714   52341 0          V/SC   VSU
2359   REF   2  LAST  713       30,3715   21747 0                 2DDCS
2360                            30,3716   72561 0          VXSC   VSL2
2361   REF   5  LAST  688       30,3717   03703 0                 CSTEER
2362                            30,3720   24015 0          STOVL  12D           B,C SCALED AT 2(-5) PDL 12D
2363   REF  11  LAST  712       30,3721   03721 0                 VGTIG
2364                            30,3722   41456 0          UNIT   PUSH          UG PDL 0 SCALED AT 2(+1)

2365                            30,3723   74241 0          DOT    VXSC
2366                            30,3724   00015 0                 12D
2367                            30,3725   00001 0                 0
2368                            30,3726   51352 1          VSL2   BVSU
2369                            30,3727   00015 0                 12D
2370                            30,3730   14015 0          STODL  12D           Q PDL 12D SCALED AT 2(-5)
2371   REF   4  LAST  711       30,3731   03727 0                 F
2372                            30,3732   56261 1          SRR    DDV
2373                            30,3733   21605 1                 4
2374   REF   3  LAST  710       30,3734   03076 0                 WEIGHT/G
2375                            30,3735   63316 0          DSQ    PDVL          F/MASS SQUARED PDL 6 AT 2(-10)M/(CS.CS)
2376                            30,3736   00015 0                 12D
2377                            30,3737   77636 1          VSQ
2378                            30,3740   75421 1          BDSU   SQRT
2379                            30,3741   76561 1          VXSC   VSL1
2380                            30,3742   53455 0          VAD    UNIT
2381                            30,3743   00015 0                 12D
2382   REF   9  LAST  713       30,3744   37713 0          STCALL UT
2383   REF  10  LAST  711       30,3745   03657 0                 QTEMP
2384                            30,3746   01440 0  2DDCS  2DEC   2DD 8-12
2384                            30,3747   00000 1
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R2385   PROGRAM DESCRIPTION S40.2,3  DATE 15,NOV,66
R2386   MOD NO 2        LOG SECTION P40-P47
R2387   MOD BY ZELDIN
R2388   FUNCTIONAL DESCRIPTION
R2389            COMPUTE GIMBAL ANGLES IF THRUSTING OCCURRED WITH PRESENT IMU
R2390            ORIENTATION, WINGS LEVEL SPACECRAFT,HEADS UP
R2391            COMPUTE X AXIS OF ENGINE BELL
R2392            COMPUTE PREFERRED IMU ORIENTATION(XSCREF)
R2393            FOR THIS CALCULATION,ASSUME X AXIS OF SC ALONG UT INITIALLY,
R2394            YSC=UNIT(XXR),ZSC=UNIT(XX(XXR)) AND ROTATE ENGINE BELL ALONG UT
R2395            NEW SC AXES WILL BE APPROX. WINGS LEVEL AND NEW SC AXES IN REF.
R2396            COORDS. WILL BE PREFERRED IMU ORIENTATION.
R2397            COMPUTE DESIRED THRUST DIRECTION IN SM COORDS.
R2398   CALLING SEQUENCE
R2399          L CALL
R2400        L+1 S40.2,3
R2401   NORMAL EXIT MODE
R2402        AT L+2 OF CALLING SEQUENCE (GOTO L+2)
R2403   SUBROUTINES CALLED
R2404            CALCGA
R2405   ALARM OR ABORT MODES
R2406            NONE
R2407   ERASABLE INITIALIZATION REQUIRED
R2408            PACTOFF     TOTAL PITCH TRIM ANGLE     SP  AT 1.0795111 REV.
R2409            YACTOFF     TOTAL YAW   TRIM ANGLE     SP  AT 1.0795111 REV.
R2410            UT          DESIRED THRUST DIRECTION       VECT.B2M/(CS.CS)
R2411            RTIG        POSITION AT TIME OF IGNITION   VECT.    B29M
R2412            ENG2FLAG    ON=RCS OFF=SPS
R2413   OUTPUT
R2414            SCAXIS      UNIT VECT. ALIGNED WITH ENG BELL IN SC COOR B1
R2415            XSCREF      UNIT VECTORS ALIGNED WITH PREFERRED IMU     B1
R2416            YSCREF
R2417            ZSCREF
R2418            GIMBAL ANGLES IN THETAD
R2419            POINTVSM    UNIT VECT ALONG DESIRED THRUST DIRECTION IN SM B1
R2420   DEBRIS
R2421            PUSHLIST,OPRET,MPAC
R2422            OTEMP  TEMP. ERASABLE
 2423                         24,3574                        BANK   24
 2424   REF   3  LAST  688   24,2000                        SETLOC P40S
 2425                         24,3574                        BANK
 2426   REF   1                                             COUNT* $$/S40.2
 2427                         24,3574   64375 1  S40.2,3    VLOAD  MXV
 2428   REF  10  LAST  713   24,3575   03713 1              UT
 2429   REF  18  LAST  622   24,3576   01736 1              REFSMMAT
 2430                         24,3577   44172 0    VSL1      STO
 2431   REF  11  LAST  713   24,3600   03657 0              QTEMP
 2432   REF   5  LAST  622   24,3601   03357 0    STORE     POINTVSM        THRUST IN SM AT 2
 2433                         24,3602   43001 1    SETPD     BON
 2434                         24,3603   00001 0              0
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2435   REF   3  LAST  688   24,3604   00704 1            ENG2FLAG
2436   REF   1              24,3605   51715 0            S40.2,38
2437                        24,3606   77745 1     DLOAD
2438   REF  20  LAST  712   24,3607   15335 0            HI6ZEROS
2439                        24,3610   67206 1     PUSH   SLOAD          ZERO PDL 0
2440   REF   3  LAST  699   24,3611   03025 0            YACTOFF
2441                        24,3612   72405 0     DMP    SL1
2442   REF   1              24,3613   11754 1            TRIMSCAL
2443                        24,3614   41415 1     DAD    PUSH
2444   REF   1              24,3615   11756 0            YBIAS
2445                        24,3616   65346 0     COS    PDDL           COS(Y +YO) PDL 2
2446                        24,3617   41556 1     SIN    PUSH           SIN(Y +YO) PDL 4
2447                        24,3620   77735 0     SLOAD
2448   REF  14  LAST  699   24,3621   03024 1            PACTOFF
2449                        24,3622   72405 0     DMP    SL1
2450   REF   2  LAST  715   24,3623   11754 1            TRIMSCAL
2451                        24,3624   41415 1     DAD    PUSH
2452   REF   1              24,3625   11760 0            PBIAS
2453                        24,3626   65346 0     COS    PDDL           COS(P +PO) PDL 6
2454                        24,3627   41556 1     SIN    PUSH           SIN(P +PO) PDL 8D
2455   REF   1              24,3630   14323 0     STODL  ZSCREF         SIN(P+PO)
2456                        24,3631   00007 0            6
2457                        24,3632   72405 0     DMP    SL1
2458                        24,3633   00005 1            4
2459                        24,3634   65276 1     DCOMP  PDDL           -SIN(Y+YO)COS(P+PO) PDL 10
2460                        24,3635   00007 0            6
2461                        24,3636   72405 0     DMP    SL1
2462                        24,3637   00003 1            2
2463                        24,3640   77666 1     VDEF

2464   REF   1              24,3641   14307 0     STODL  XSCREF          PD POINTER AT 6 NEW SC X AXIS SCALED AT
2465   REF   2  LAST  715   24,3642   00323 0            ZSCREF
2466                        24,3643   72405 0     DMP    SL1
2467                        24,3644   00005 1            4
2468                        24,3645   41325 0     PDDL   DMP
2469   REF   3  LAST  715   24,3646   00323 0            ZSCREF
2470                        24,3647   00003 1            2
2471                        24,3650   57552 1     SL1    DCOMP
2472                        24,3651   77666 1     VDEF

2473   REF   4  LAST  715   24,3652   14323 0     STODL  ZSCREF         PD POINTER AT 4 NEW SCZ AXIS SCALED AT 2
2474                        24,3653   77666 1     VDEF

2475   REF   1              24,3654   14315 0     STODL  YSCREF         PD POINTER ATO NEW SC Y AXIS SCALED AT 2
2476   REF   5  LAST  715   24,3655   00323 0            ZSCREF
2477                        24,3656   65325 0     PDDL   PDDL
2478   REF   2  LAST  715   24,3657   00315 0            YSCREF
2479   REF   2  LAST  715   24,3660   00307 0            XSCREF
2480                        24,3661   77666 1     VDEF
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2481  REF  15  LAST  622   24,3662  27351 0            STOVL  SCAXIS        ENGINE BELL SCALED AT 2
2482  REF  11  LAST  714   24,3663  03713 1                   UT
2483                       24,3664  53515 0            PDVL   UNIT
2484  REF  11  LAST  713   24,3665  03632 0                   RTIG
2485                       24,3666  57435 1            VXV    VCOMP
2486                       24,3667  00001 0                   0
2487                       24,3670  41456 0            UNIT   PUSH
2488                       24,3671  77624 1            CALL
2489  REF   1              24,3672  51734 0                   TSTRXUT
2490                       24,3673  57435 1            VXV    VCOMP
2491                       24,3674  00001 0                   0
2492                       24,3675  63372 1            VSL1   PDVL         2 RF/SC  IN PDL  120
2493  REF   3  LAST  715   24,3676  00307 0                   XSCREF
2494                       24,3677  76505 0            VXM    VSL1
2495                       24,3700  00001 0                   0
2496  REF   4  LAST  716   24,3701  24307 0            STOVL  XSCREF       X OF PREF IMU,X OF SC IN REF COOR. AT 2
2497  REF   3  LAST  715   24,3702  00315 0                   YSCREF
2498                       24,3703  76505 0            VXM    VSL1
2499                       24,3704  00001 0                   0
2500  REF   4  LAST  716   24,3705  24315 0            STOVL  YSCREF       Y OF PREF.IMU,Y OF SC IN REF COOR. AT 2
2501  REF   6  LAST  715   24,3706  00323 0                   ZSCREF
2502                       24,3707  76505 0            VXM    VSL1
2503                       24,3710  00001 0                   0
2504  REF   7  LAST  716   24,3711  00323 0            STORE  ZSCREF       Z OF PREF. IMU,Z OF SC IN REF COOR. AT 2
2505                       24,3712  52001 1            SETPD  GOTO
2506                       24,3713  00001 0                   0
2507  REF  12  LAST  714   24,3714  03657 0                   QTEMP
2508                       24,3715  77775 1  S40.2.38  VLOAD
2509  REF   6  LAST  597   24,3716  15333 0                   UNITX
2510  REF  16  LAST  716   24,3717  27351 0            STOVL  SCAXIS
2511  REF  12  LAST  716   24,3720  03713 1                   UT
2512  REF   5  LAST  716   24,3721  00307 0            STORE  XSCREF
2513                       24,3722  53435 0            VXV    UNIT
2514  REF  12  LAST  716   24,3723  03632 0                   RTIG
2515                       24,3724  34007 1            STCALL 6D
2516  REF   2  LAST  716   24,3725  51734 0                   TSTRXUT
2517  REF   5  LAST  716   24,3726  00315 0            STORE  YSCREF
2518                       24,3727  57435 1            VXV    VCOMP
2519  REF   6  LAST  716   24,3730  00307 0                   XSCREF
2520                       24,3731  77772 0            VSL1
2531  REF   8  LAST  716   24,3732  34323 1            STCALL ZSCREF       ZNB AXIS IN REF COOR
2532  REF  13  LAST  716   24,3733  03657 0                   QTEMP
2533                       24,3734  46145 0  TSTRXUT   DLOAD  BHIZ
2534                       24,3735  00045 0                   36D
2535  REF   1              24,3736  51741 1                   BADVCTOR
2536                       24,3737  43575 1            VLOAD  RVQ
2537                       24,3740  00007 0                   6D
2538                       24,3741  53575 0  BADVCTOR  VLOAD  UNIT
2539  REF  13  LAST  716   24,3742  03632 0                   RTIG
2540                       24,3743  53515 0            PDVL   UNIT
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 2541   REF   8  LAST  712   24,3744   03640 0                VTIG
 2542                       24,3745   53322 1          VSR3  VAD
 2543                       24,3746   53435 0          VXV   UNIT
 2544   REF  13  LAST  716   24,3747   03713 1                UT
 2545                       24,3750   77676 0          VCOMP
 2546                       24,3751   00007 0          STORE 6D
 2547                       24,3752   77616 0          RVQ
 2548                       24,3753   21215 1 TRIMSCAL 2DEC  1.07975111 B-1
 2548                       24,3754   12215 1
 2549                       24,3755   00053 1 YBIAS    2DEC  +.00263888889   YAW   MECH BIAS (+0.95 DEG, THRUST ON)
 2549                       24,3756   07423 0
 2550                       24,3757   77636 1 PBIAS    2DEC  -.00597222222   PITCH MECH BIAS (-2.15 DEG, THRUST ON)
 2550                       24,3760   44653 1
A2551                                                          REFERENCE, TRW 68.6520.3.3-40 27FEB,1968
R2552   PROGRAM DESCRIPTION S41.1  DATE 8DEC66
R2553   MOD NO1   LOG SECTION P40-P47
R2554   MOD BY ZELDIN
R2555   FUNCTIONAL DESCRIPTION
R2556           COMPUTE VELOCITY TO BE GAINED INITIALLY IN REF COORDS.
R2557           TO CONTROL COORDS.
R2558   CALLING SEQUENCE
R2559        L   CALL
R2560        L+1        S41.1
R2561   NORMAL EXIT MODE
R2562           AT L +2 OF CALLING SEQUENCE
R2563   SUBROUTINES CALLED:
R2564           CALCSMSC
R2565           COUTRIG
R2566   ALARM OR ABORT MODES
R2567           NONE
R2568   ERASABLE INITIALIZATION REQUIRED
R2569           VG IN REF. COORD. PDL L POINTER AT L+5 .S41.1 WILL RETURN WITH
R2570           POINTER AT L (L MUST BE LESS THAN OR = TO 14D)
R2571   OUTPUT
R2572           MPAC CONTAINS VG IN CONTROL COORDS          VECT. B7M/CS
R2573   DEBRIS:
R2574         QTEMP    TEMP ERASABLE
R2575         QPRET
 2576   REF   1                                             COUNT  22/S41.1

 2577   REF   1                  22,2000                    SETLOC P40S5
 2578                            22,3431                    BANK

 2579                            22,3431   45020 1 S41.1    STO    CALL
 2580   REF  14  LAST  716       22,3432   03657 0                 QTEMP
 2581   REF   5  LAST  595       22,3433   47477 0                 COUTRIG
 2582                            22,3434   77775 1          VLOAD
 2583                            22,3435   45121 1          MXV    CALL
 2584   REF  19  LAST  714       22,3436   01736 1                 REFSMMAT
 2585   REF   3  LAST  595       22,3437   47644 1                 *SMNB*
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2586                          22,3440   74321 1            MXV    VXSC
2587   REF   3  LAST  414     22,3441   05003 1                   QUADROT
2588   REF   1                22,3442   05446 1                   TENBNK14      VG IN CONTROL COORD IN MPAC SCALED AT
2589                          22,3443   52072 0            VSL5   GOTO          VG IN CONTROL COORDS. IN MPAC AT 2(+7)
2590   REF  15  LAST  717     22,3444   03657 0                   QTEMP
2591                          22,3445   24000 1  TENBNK14  2DEC   10. B-4
2591                          22,3446   00000 1
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P2592   NAME        S40.8 - CROSS PRODUCT STEERING
R2593   FUNCTION    (1) UPDATES THE VELOCITY-TO-BE-GAINED VECTOR.
R2594               (2) GENERATES ANGULAR RATE STEERING COMMANDS FOR AUTOPILOT.
R2595               (3) ESTABLISHES ENGINE CUT-OFF SIGNALS AT APPROPRIATE TIMES.
R25952              (4) INITIATES THRUST-FAIL ROUTINE, R40
R2596   CALLING SEQ CALL S40.8
R2597   INPUT       VGPREV  - LAST VALUE OF THE VELOCITY-TO-BE-GAINED VECTOR
R2598                         PRIOR TO UPDATING IN METERS/CS AT +7.
R2599               DELVREF - CHANGE IN VEHICLE VELOCITY SINCE LAST MEASUMEMENT
R2600                         IN METERS/CS AT +7.
R2601               BDT     - EFFECT OF RATE OF CHANGE OF REQUIRED VELOCITY AND
R2602                         GRAVITY DURING DT UPON VELOCITY-TO-BE-GAINED IN
R2603                         METERS/CS AT +7.
R2604               CSTEER  - A SCALAR OF THE STEERING LAW, SC.AT B+1, USED FOR
R2605                         SPS AIMPOINT STEERING MANEUVERS
R2606               IDLEFAIL- A FLAG TO INHIBIT (IDLE) THE THRUST-FAIL ROUTINE
R2607               STEERSW - A SWITCH TO PRECLUDE NEEDLESS CONDUCT OF STEERING
R2608               REFSMMAT, DAPDATR1, PIPTIME
R2609               EREPFRAC, ETODECAY, KPRIMEDT FOR TVC
R2614   OUTPUT      TTOGO   - TIME REMAINING FOR ENGINE BURN IN CS AT +28
R2615               OMEGAC  - DP VECTOR RATE COMMAND, SC.AT  1/(2TVCDT) REVS/SEC
R26152              VG, VGPREV, VGDISP, TGO, TIG, SCALED AS NOTED IN CODING
R26153              STEERSW, IMPULSW, NVWORD1
R26154              REPFRAC, CNTR, VCNTR, VCNTRTMP FOR TVC (R40 INTERFACING)
R2616   DEBRIS      OMEGAXC,+1
R2617   SUBROUTINES USED    - *SMNB* , ALARM

 2618   REF   2  LAST  710   16,2000                        SETLOC P40S1
 2619                        16,2153                        BANK
 2620   REF  53  LAST  708   E6,1466                        EBANK= DAPDATR1
 2621   REF   1                                            COUNT  16/S40.8

 2622                        16,2153   44001 0  S40.8      SETPD  STQ
 2623                        16,2154   00001 0  SPBIT1             0D
 2624   REF  16  LAST  718   16,2155   03657 0                    QTEMP
 2625                        16,2156   51375 1            VLOAD   BVSU              CONSTRUCT DELVG, SC.AT B+7  M/CS
 2626   REF   3  LAST  700   16,2157   03433 0                    DELVREF
 2627   REF   4  LAST  710   16,2160   03705 0                    BDT
 2628                        16,2161   77655 1            VAD
 2629   REF   3  LAST  700   16,2162   03721 0                    VGPREV
 2630   REF   4  LAST  129   16,2163   03460 0            STORE   VG                VELOCITY-TO-BE-GAINED, SC.AT B+7  M/CS

 2631                        16,2164   77646 0            ABVAL
 2632   REF   7  LAST  685   16,2165   03773 1            STORE   VGDISP            FOR DISPLAY PURPOSES
 2633                        16,2166   77776 1            EXIT
 2634   REF  56  LAST  708   16,2167   0 5412 0           TC      PHASCHNG
 2635                        16,2170    10035 0           OCT     10035             TYPE B  RESTART BELOW AND 5.3 REREADAC

 2636   REF 150  LAST  704   16,2171   0 6006 1           TC      INTPRET
 2637                        16,2172    77775 1           VLOAD
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2638   REF   5  LAST  719   16,2173   03460 0                VG
2639   REF   4  LAST  719   16,2174   03721 0          STORE VGPREV
2640                        16,2175   77214 0          BOFF  VLOAD
2641   REF   2  LAST  707   16,2176   01344 0                STEERSW        SKIP TGO AND CROSS-PRODUCT
2642   REF  17  LAST  719   16,2177   03657 0                QTEMP
2643   REF   4  LAST  719   16,2200   03433 0                DELVREF
2644                        16,2201   41446 1          ABVAL PUSH           CHECK FOR LOTHRUST
2645                        16,2202   41335 1          SLOAD DMP
26453  REF   1              16,2203   01354 1                DVTHRESH       SC.AT B-2 M/CS
26454  REF   1              16,2204   36011 1                DPB-9
26456                       16,2205   77621 1          BDSU
2646                        16,2206   77440 1          BMN   EXIT
2647   REF   1              16,2207   40222 1                LOTHRUST
2648   REF  54  LAST  719   16,2210  31'466 1          CAE   DAPDATR1       ENABLE TVCDAP CG TRACKING
2649   REF  39  LAST  698   16,2211  7 5002 1          MASK  BIT14
2650   REF 159  LAST  706   16,2212  10 000 0          CCS   A
2651   REF  46  LAST  708   16,2213  3 5017 1          CAF   BIT1
2652   REF 160  LAST  720   16,2214  50 000 1          INDEX A              LM-OFF, LM-ON VALUE
2653   REF   1              16,2215  31'421 1          CAE   EREPFRAC
2654   REF   2  LAST  105   16,2216  55'642 1          TS    REPFRAC

2655   REF 151  LAST  719   16,2217  0 6006 1          TC    INTPRET
2656                        16,2220   51375 1 TGOCALC  VLOAD BVSU           GET DELVG
2657   REF   5  LAST  720   16,2221   03433 0                DELVREF
2658   REF   5  LAST  719   16,2222   03705 0                BDT
2659                        16,2223   77656 1          UNIT
2660                        16,2224   41441 0          DOT   PUSH           (OOD)
2661   REF   6  LAST  720   16,2225   03460 0                VG
2662                        16,2226   56244 0          BPL   DDV            ANGLE SHOULD BE GREATER THAN PI/2
2663   REF   1              16,2227   40214 1                INCRSVG              DISPLAY ALARM IF NOT
2664   REF   1              16,2230   36005 1                2VEXHUST
2665                        16,2231   41215 1          DAD   DMP            (DOT PRODUCT UP FROM OOD)
2666   REF   1              16,2232   11564 0                LODPHALF
2667                        16,2233   70501 1          NORM  SR1
2668   REF  36  LAST  700   16,2234   00047 1                X1
2669                        16,2235   60325 0          PDDL  NORM
2670                        16,2236   00045 0                36D            (MAG DELVG)
2671   REF  18  LAST  681   16,2237   00050 1                X2
2672                        16,2240   77665 1          BDDV
2673                        16,2241   53664 0          XSU,2 SL*
2674   REF  37  LAST  720   16,2242   00046 0                X1
2675                        16,2243   57607 1                0 -90,2
2676                        16,2244   41405 0          DMP   PUSH           (OOD)
2677   REF   1              16,2245   36003 1                -FOURDT
2678                        16,2246   54335 0          SLOAD SR
2679   REF   1              16,2247   03013 0                ETDECAY        ETDECAY SC.AT B+14 CS
2680                        16,2250   20617 0                140
2681                        16,2251   45421 1          BDSU  STADR
2682   REF  15  LAST  709   16,2252   74347 1          STORE TGO            TIME TO GO IN CS. AT +28
2683                        16,2253   77615 0          DAD
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2684   REF   7  LAST  701   16,2254   01205 1                    PIPTIME
2685   REF  67  LAST  711   16,2255   17413 1           STODL    TIG
2686   REF  16  LAST  720   16,2256   03430 0                    TGO
2687                        16,2257   50025 0           DSU      BMN
2688   REF   1              16,2260   36007 0                    FOURSEC
2689   REF   1              16,2261   40201 0                    S40.81

2690                        16,2262   74375 0  XPRODUCT VLOAD    VXSC
2691   REF   6  LAST  720   16,2263   03705 0                    BDT
2692   REF   6  LAST  713   16,2264   03703 0                    CSTEER
2693                        16,2265   52352 1           VSL2     VSU
2694   REF   6  LAST  720   16,2266   03433 0                    DELVREF
2695                        16,2267   63256 0           UNIT     PDVL
2696   REF   7  LAST  720   16,2270   03460 0                    VG
2697                        16,2271   47256 0           UNIT     VXV
2698                        16,2272   45121 1           MXV      CALL
2699   REF  20  LAST  717   16,2273   01736 1                    REFSMMAT        (REFSMMAT/2)
2700   REF   4  LAST  717   16,2274   47644 1                    *SMNB*
2701                        16,2275   77761 1           VXSC
2702   REF   2  LAST  105   16,2276   03235 0                    KPRIMEDT        (KPRIMEDT SCIAT PI/8 RAD)
2703   REF   5  LAST  104   16,2277   03126 1  OMEGACLC STORE    OMEGAC
2704                        16,2300   77650 1           GOTO
2705   REF  18  LAST  720   16,2301   03657 0                    QTEMP

2706   REF   1              17,2000                    SETLOC   DAPS7
2707                        17,2000                    BANK
2708   REF   1                                         COUNT    17/S40.8

2709                        17,2000   00000 1  TWODT     2DEC    200.0 B-28      2 SEC
2709                        17,2001   00310 0
2710                        17,2002   77715 1  -FOURDT   2DEC    -800 B-18       -4(200CS), SC.AT B+18CS (-4 FOR SCALING)
2710                        17,2003   77777 0
2711                        17,2004   17602 0  2VEXHUST  2DEC    63.020792 B-7   2(10338.0564 FPS), SC.AT B+7 M/CS
2711                        17,2005   25124 1
2712                        17,2006   00000 1  FOURSEC   2DEC    400.0  B-28     4 SEC
2712                        17,2007   00620 0
2713                        17,2010   00040 0  DP8-9     2DEC    1 B-9
2713                        17,2011   00000 1
2714   REF   1              20,2000                    SETLOC   DAPS8
2715                        20,2201                    BANK

2716   REF   1                                         COUNT    20/S40.8

2717                        20,2201   77214 0  S40.81    SET     VLOAD           TGO LESS THAN 4 SECONDS
2718   REF   3  LAST  702   20,2202   01066 0                    IMPULSW         FOR ENGINE-OFF CALL
2719   REF  21  LAST  715   20,2203   15335 0                    HI6ZEROS
2720   REF   6  LAST  721   20,2204   03126 1  RATEZRO   STORE    OMEGAC          TVC TO ATTITUDE HOLD
2721                        20,2205   77776 1           EXIT
2722   REF  15  LAST  696   20,2206   3 4777 1          CAF      POSMAX          INHIBIT SWITCHOVER/TVC EG TRACKING
2723   REF   3  LAST  708   20,2207   55'447 0          TS       CNTR
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2724   REF 152  LAST  720   20,2210  0 6006 1          TC     INTPRET
2725                        20,2211   52014 0          CLEAR  GOTO
2726   REF   3  LAST  720   20,2212   01264 0                 STEERSW        RESTARTS OK
2727   REF  19  LAST  721   20,2213   03657 0                 QTEMP
2728                        20,2214   77776 1  INCRSVG EXIT                  ALARM INDICATING THAT THRUST IS POINTING
2729   REF  27  LAST  658   20,2215  0 5650 1          TC     ALARM          IN WRONG DIRECTION.
2730                        20,2216   01407 0          OCT    01407
2731   REF 153  LAST  722   20,2217  0 6006 1          TC     INTPRET
2732                        20,2220   77650 1          GOTO
2733   REF  20  LAST  722   20,2221   03657 0                 QTEMP

2734                        20,2222   77214 0  LOTHRUST BON    VLOAD          THRUST FAILURE (LO-OR-NO) INDICATED
2735   REF   3  LAST  707   20,2223   00711 0                 IDLEFAIL       SET BY V97P. ALLOWS 1 BYPASS IN CASE OF
2736   REF  21  LAST  722   20,2224   03657 0                 QTEMP               UNFAVORABLE S40.8 SYNCH
2737   REF  22  LAST  721   20,2225   15335 0                 HI6ZEROS       START OF ENGINE-FAIL (R40) OPERATIONS
2738   REF   7  LAST  721   20,2226   03126 1          STORE  OMEGAC         PUT TVC IN ATTITUDE HOLD
2739                        20,2227   77776 1          EXIT

2740   REF 138  LAST  706   20,2230  4 5021 0          CS     ZERO
2741   REF   3  LAST  707   20,2231   55'643 0          TS     VCNTR          KILL CSMMASS UPDATING
2742   REF   2  LAST  106   20,2232   55'653 1          TS     VCNTRTMP       (TVCEXEC LOGIC REQUIRES THIS TOO)
2743   REF   3  LAST  720   20,2233   55'642 1          TS     REPFRAC        KILL TVCDAP CG TRIM TRACKING
2744   REF  19  LAST  709   20,2234   55'145 1          TS     NVWORD1        SET UP ENGINE-FAIL V97FLASH (CLOCKJOB)

2745   REF 154  LAST  722   20,2235  0 6006 1          TC     INTPRET
2746                        20,2236   52014 0          CLEAR  GOTO           INHIBIT STEERING AND TGO CALC (MANUAL
2747   REF   4  LAST  722   20,2237   01264 0                 STEERSW              SHUTDOWN IF NOT SET UP AGAIN)
2748   REF  22  LAST  722   20,2240   03657 0                 QTEMP          RESTARTS OK
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R2749   NAME        S40.9 - VTOGAIN (AIMPOINT MANEUVERS ONLY)
R2750   FUNCTION    (1) GENERATES REQUIRED VELOCITY AND VELOCITY-TO-BE-GAINED
R2751               VECTORS FOR USE DURING AIMPOINT MANEUVERS
R2752               (2) UPDATES THE B VECTOR WHICH IS USED IN THE FINAL
R2753               CALCULATION OF EXTRAPOLATING THE VELOCITY-TO-BE-GAINED
R2754   CALLING SEQ VIA FINDVAC AS NEW JOB.
R2755   INPUT       RNIT     - ACTIVE VEHICLE RADIUS VECTOR IN METERS AT +29.
R2756               VNIT     - ACTIVE VEHICLE VELOCITY VECTOR IN METERS/CS AT +7
R2757               VRPREV   - LAST COMPUTED VELOCITY REQUIRED VECTOR IN
R2758                          METERS/CS AT +7.
R2759               NOMTIG     - TIME OF IGN. USED IN TARGETTING ROUTINES%+28"
R2760               DELLT4     - TRANSFER TIME FROM PIPTIME TO TARGET%+28"
R2761               TNIT       - TIME OF RNIT AND VNIT IN CS AT +28
R2762               GDT/2    - HALF OF VELOCITY GAINED IN DELTA T TIME DUE TO
R2763                          ACCERERATION OF GRAVITY IN METERS/CS AT +7.
R2764               DELVREF  - CHANGE IN VELOCITY DURING LAST 2 SEC IN
R2765                          METERS/CS AT +7.
R2766           NORMSW   SET=CENTRAL ANGLE BETWEEN RTARG AND RTIG IS BETWEEN
R2767                    165 TO 195 DEGREES
R2768                    RESET=CENTRAL ANGLE OUTSIDE CONE DESCRIBED ABOVE
R2769   OUTPUT      VGTEMP   - VELOCITY TO BE GAINED VECTOR IN METERS/CS AT +7.
R2770               COGA       - INPUT OF INITIAL GUESS FOR LAMBERT FROM S40.1 O
R2771                          OR PREVIOUS PASS THRU S40.9
R2772               GOBL/2     -OBLATENESS TERM IN AVG GRAV CALC-GOBL*RSQ/MU
R2773               VRPREV   - VELOCITY REQUIRED VECTOR IN METERS/CS AT +7.
R2774               BDT      - B VECTOR IN METERS/CS AT +7.
R2775   SUBROUTINES USED -  INITVEL
 2776   REF   3 LAST  719   16,2000                    SETLOC P40S1
 2777                       16,2302                    BANK

 2778   REF   7 LAST  701   E6,1742                    EBANK= NBRCYCLS
 2779   REF   1                                        COUNT  16/S40.9

 2780   REF 155 LAST  722   16,2302  0 6006 1  S40.9   TC     INTPRET
 2781                       16,2303   71201 1          SETPD  DLOAD
 2782                       16,2304   00001 0                 0D0
 2783   REF   2 LAST  710   16,2305   11566 1                 L06ZEROS
 2784                       16,2306   77725 1          PDDL
 2785   REF   1             16,2307   34424 1                 EP4(45)L
 2786                       16,2310   71214 0          BON    DLOAD
 2787   REF   5 LAST  712   16,2311   03705 0                 NORMSW
 2788                       16,2312   34314 0                 +2
 2789   REF   1             16,2313   34426 0                 EP4(10)L
 2790                       16,2314   77606 1          PUSH
 2793                       16,2315   45014 0          CLEAR  CALL
 2794   REF   3 LAST  489   16,2316   00675 0                 GUESSW
 2795   REF   1             16,2317   22002 0                 HAVEGUES
27951                       16,2320   77776 1          EXIT
27952   REF  57 LAST  719   16,2321  0 5412 0          TC     PHASCHNG       SAVE TIME BY NOT REDOING LAMBERT CALCS
27953                       16,2322   05021 1          OCT    05021          C, PRIORITY NEXT, JOB BELOW
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27954                                  16,2323   10000 0           OCT     10000
27955  REF 156  LAST  723              16,2324   0 6006 1          TC      INTPRET
2796                                   16,2325   77614 1 ENDLAMB   BON
2797   REF   3  LAST  710              16,2326   01310 1                   FIRSTFLG
2798   REF   1                         16,2327   34345 1                   FIRSTTME
2799                                   16,2330   52375 1           VLOAD   VSU
2800   REF  15  LAST  713              16,2331   03612 1                   VIPRIME
2801   REF   2  LAST  122              16,2332   03466 0                   VRPREV
2802                                   16,2333   45325 1           PDDL    DSU
2803   REF   3  LAST  701              16,2334   03474 0                   TNIT
2804   REF   2  LAST  122              16,2335   03476 1                   TNITPREV
2805                                   16,2336   55261 1           SL      BDDV
2806                                   16,2337   20222 1                   17D
2807   REF   1                         16,2340   34420 0                   200CSHI
2808                                   16,2341   77761 1           VXSC
2809                                   16,2342   76451 0           VSU     VSL1
2810   REF   2  LAST   79              16,2343   01207 0                   GDT/2
2811   REF   7  LAST  721              16,2344   03705 0           STORE   BDT
2812                                   16,2345   57535 0 FIRSTTME  SLOAD   DCOMP
2813   REF  14  LAST  712              16,2346   03747 0                   RTX2
28131                                  16,2347   77640 0           BMN
2814   REF   1                         16,2350   34365 0                   MOONCASE
2815                                   16,2351   53575 0           VLOAD   UNIT
2816   REF   9  LAST  700              16,2352   01171 1                   RN
2817                                   16,2353   45345 1           DLOAD   DSU
2818   REF   8  LAST  721              16,2354   01205 1                   PIPTIME
2819   REF   3  LAST  684              16,2355   03450 0                   NOMTIG
2820                                   16,2356   56205 0           DMP     DDV
2821   REF   1                         16,2357   34422 1                   EARTHMU
2822                                   16,2360   00043 0                   340
2823                                   16,2361   53361 0           VXSC    VAD
2824   REF   2  LAST   79              16,2362   01215 0                   GOBL/2
2825   REF   2  LAST  700              16,2363   03646 0                   VGTEMP          NOTE  NO TEST IS MADE TO SUBTRACT GOBL
2826   REF   3  LAST  724              16,2364   03646 0           STORE   VGTEMP          INSIDE 165-195 DEGREE CONE AREA.
2827                                   16,2365   77776 1 MOONCASE  EXIT
2828   REF  58  LAST  723              16,2366   0 5412 0          TC      PHASCHNG
2829                                   16,2367   04021 0           OCT     04021           C, JOB BELOW

2830   REF 157  LAST  724              16,2370   0 6006 1 COPY40.9 TC      INTPRET
2831                                   16,2371   77745 1           DLOAD
2832   REF   4  LAST  724              16,2372   03474 0                   TNIT
2833   REF   3  LAST  724              16,2373   27476 1           STOVL   TNITPREV
2834   REF  16  LAST  724              16,2374   03612 1                   VIPRIME
2835   REF   3  LAST  724              16,2375   03466 0           STORE   VRPREV
2836                                   16,2376   77414 0           CLEAR   EXIT
2837   REF   4  LAST  724              16,2377   01270 0                   FIRSTFLG
2838   REF  83  LAST  701              16,2400   4 5017 0    -2    CS      ONE             REDO40.9 (RESTART)  ENTRY TO END  S40.9
2839   REF   3  LAST  723              16,2401   55742 0           TS      NBRCYCLS
2840   REF  59  LAST  724              16,2402   0 5412 0  ENDS40.9 TC     PHASCHNG
2841                                   16,2403   00001 0           OCT     00001
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 2842   REF  85  LAST  708   16,2404  1 5217 1           TCF    ENDOFJOB

 28421  REF 158  LAST  724   16,2405  0 6006 1  REDO40.9 TC     INTPRET         S40.9 RESTARTS COME HERE TO GRACEFULLY
 28422                       16,2406   77775 1           VLOAD                        TERMINATE S40.9 SO THAT IT CAN BE
 28423  REF   3  LAST  723   16,2407   11566 1                 LOGZEROS               SET UP WITH LATEST R,V,T NEXT PASS
 28424  REF   6  LAST  701   16,2410   17345 0           STODL  DELVSUM               (TYPE C PHASE POINTS '04021' WILL
 28425  REF   4  LAST  725   16,2411   11566 1                 LOGZEROS               FORCE NORMAL S40.9 TERMINATIONS,
 28426  REF   9  LAST  724   16,2412   27343 0           STOVL  NBRCYCLS              RATHER THAN LOSE TIME OF BRAND NEW
 284262 REF   5  LAST  720   16,2413   03721 0                 VGPREV                 PASS -- QUICK OLD DATA BETTER THAN
 284264 REF   4  LAST  724   16,2414   03646 0           STORE  VGTEMP                NONE) NOW CAN GO THRU SETUP.9
 28427                       16,2415   77776 1           EXIT                         WITHOUT DISTURBING VGPREV
 28428  REF   1              16,2416  1 2400 0           TCF    ENDS40.9 -2     STORE 0.0 COVERED NBRCYCLS,P -- FIX UP S

 2843                        16,2417   01440 0  200CSHI  2DEC   200 B-12
 2843                        16,2420   00000 1
 2844                        16,2421   55340 0  EARTHMU  2DEC*  -3.986032 E10 B-36*
 2844                        16,2422   61710 0
 2845                        16,2423   04000 0  EP4(45)L 2DEC   .125
 2845                        16,2424   00000 1
 2846                        16,2425   00707 1  EP4(10)L 2DEC   .027777777
 2846                        16,2426   03434 1
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P2847   NAME        S40.13 - TIMEBURN
R2848   FUNCTION    (1) DETERMINE WHETHER A GIVEN COMBINATION OF VELOCITY-TO-
R2849               BE-GAINED AND ENGINE CHOICE RESULT IN A BURN TIME SUFFICIENT
R2850               TO ALLOW STEERING AT THE VEHICLE DURING THE BURN, AND
R2851               (2) THE MAGNITUDE OF RESULTING BURN TIME - IF IT IS SHORT -
R2852               AND THE ASSOCIATED TIME OF THE ENGINE-OFF SIGNAL.
R2853   CALLING SEQ VIA FINDVAC AS NEW JOB.
R2854   INPUT       VGTIG - VELOCITY TO BE GAINED VECTOR (METERS/C.S.) AT +7
R2855            WEIGHT/G - MASS OF VEHICLE IN KGM AT TIG
R2856               F - ENGINE THRUST IN M.NEWTONS AT +7
R2857               MDOT - RATE OF DECREASE OF VEHICLE MASS DURING ENGINE BURN
R2858                      IN KILOGRAMS/CENTISECOND AT +3.  THIS SCALING MAY
R2859                      REQUIRE MODIFICATION FOR SATURN BURNS.
R2860   OUTPUT      IMPULSW - ZERO FOR STEERING
R2861                       - ONE FOR ATTITUDE HOLD
R2862               TGO - TIME TO BURN IN CENTISECONDS AT +14
R2863     THE QUANTITY M.NEWTON SHALL BE USED TO EXPRESS WEIGHT IN TERMS OF
R2864     (KILOGRAM*METER)/(CENTISECOND*CENTISECOND)
R2865     (1) M.NEWTON = (10000) NEWTONS
 2866   REF  17  LAST  721   E7,1427                          EBANK= TGO
 2867   REF   1                                              COUNT  16/40.13

 2868   REF 159  LAST  725   16,2427  0 6006 1  S40.13   TC     INTPRET
 2869                       16,2430   43001 1            SETPD  SET
 2870                       16,2431   00001 0                   OOD
 2871   REF   4  LAST  721  16,2432   01066 0                   IMPULSW        ASSUME NO STEERING UNTIL FOUND OTHERWISE
 2872                       16,2433   51575 1            VLOAD  ABVAL
 2873   REF  12  LAST  713  16,2434   03721 0                   VGTIG          VELOCITY TO BE GAINED AT +7
 2874                       16,2435   77776 1            EXIT
 2875   REF  29  LAST  698  16,2436  3 5011 1            CAF    BIT7           TEST +X TRANSLATION
 2876                       16,2437  0 0006 1            EXTEND
 2877   REF   4  LAST  593  16,2440  06 031 0            RXOR   CHAN31
 2878   REF  30  LAST  726  16,2441  7 5011 0            MASK   BIT7
 2879                       16,2442  0 0006 1            EXTEND
 2880   REF   1             16,2443  1 2525 0            BZF    NOTADOUL
 2881   REF 160  LAST  726  16,2444  0 6006 1            TC     INTPRET
 2882                       16,2445   56325 0            PDDL   DDV            OOD = MAG OF VGTIG AT +7
 2883   REF   1             16,2446   36021 1                   S40.135        COMPENSATION FOR 2 JET ULLAGE AT +24
 2884   REF   4  LAST  713  16,2447   03076 0                   WEIGHT/G       MASS IN KGMS AT +16
 2885                       16,2450   72414 0            BON    SL1            DOUBLE CORRECTION IF FOUR JETS
 2886   REF   2  LAST  688  16,2451   00700 0                   NJETSFLG
 2887   REF   1             16,2452   34453 1                   S40.130
 2888                       16,2453   77621 1  S40.130  BDSU
 2889                       16,2454   56325 0            PDDL   DDV            OOD = MAG OF VGTIG CORRECTED FOR ULLAGE
 2890   REF   1             16,2455   01770 0                   KIVAL          M.NETWON-CS AT +24
 2891   REF   5  LAST  726  16,2456   03076 0                   WEIGHT/G
 2892                       16,2457   50021 1            BDSU   BMN
 2893                       16,2460   00001 0                   OOD
 2894   REF   1             16,2461   34504 1                   S40.131        TGO LESS THAN 100 CS
 2895                       16,2462   41325 0            PDDL   DMP            02D = TEMP1 AT +7
```

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2896   REF   2  LAST  698   16,2463   00111 0                    EMDOT      SPS FLOW RATE SC.AT B+3 KG/CS (SP. NOTE)
2900   REF   1              16,2464   36015 0                    3.5SEC     350 CS AT +14
2901                        16,2465   65221 0          BDSU      PDDL
2902   REF   6  LAST  726   16,2466   03076 0                    WEIGHT/G
2903   REF   2  LAST   87   16,2467   01775 0                    FANG
2904                        16,2470   60405 0          DMP       SR2
2905   REF   1              16,2471   36017 1                    5SECOND    500 CS AT +14
2906                        16,2472   41471 0          DDV       PUSH       04D = TEMP2
2907                        16,2473   51021 0          BDSU      BPL
2908                        16,2474   00003 1                    02D
2909   REF   1              16,2475   34520 1                    S40.133    TGO GREATER THAN 600 CS
2910                        16,2476   55345 0          DLOAD     BDDV
2911                        16,2477   43205 1          DMP       DAD
2912   REF   2  LAST  727   16,2500   36017 1                    5SECOND    500 CS AT +14
2913   REF   1              16,2501   36013 0                    1SEC2D     100 CS AT +14
2914                        16,2502   77650 1          GOTO
2915   REF   1              16,2503   34511 0                    S40.132
2916                        16,2504   41345 0  S40.131 DLOAD     DMP        TGO LESS THAN 100 CS
2917   REF   7  LAST  727   16,2505   03076 0                    WEIGHT/G
2918                        16,2506   56215 1          DAD       DDV
2919   REF   1              16,2507   01772 1                    K2VAL      M.NEWTON-CS AT +24
2920   REF   1              16,2510   01774 1                    K3VAL      M.NEWTONS AT +10
2921                        16,2511   77776 1  S40.132 EXIT
2922   REF  18  LAST  726   E7,1427                    EBANK=     TGO
2923   REF   7  LAST  353   16,2512   0 7226 0         TC        TPAGREE
2924   REF 271  LAST  701   16,2513   3 0154 1         CA        MPAC
2925   REF  68  LAST  701   16,2514   56 001 0         XCH       L
2926   REF 139  LAST  722   16,2515   3 5021 1         CA        ZERO
2927   REF  19  LAST  727   16,2516   53'430 0         DXCH      TGO        TGO IN CS AT +28
2928   REF   1              16,2517   0 2522 0         TC        S40.134
2929                        16,2520    77414 0 S40.133 CLEAR     EXIT       WILL STEER VEHICLE
2930   REF   5  LAST  726   16,2521    01266 1                    IMPULSW
2931   REF  60  LAST  724   16,2522   0 5412 0 S40.134 TC        PHASCHNG   KILL GROUP 3
2932                        16,2523    00003 1         OCT       3

2933   REF  86  LAST  725   16,2524   1 5217 1         TCF       ENDOFJOB


2934   REF 161  LAST  726   16,2525   0 6006 1 NOTADDUL TC       INTPRET
2935                        16,2526    77650 1         GOTO
2936   REF   2  LAST  726   16,2527    34454 0                    S40.130 +1 DO NOT COMPENSATE FOR 7 SEC OF ULLAGE
2937   REF   2  LAST  721   17,2000                    SETLOC     DAPS7
2938                        17,2012                    BANK

2939   REF   1                                        COUNT      17/40.13

2940   REF   1              E3,1767            K1VAL    =         EK1VAL     DP PAD LOAD B+23 NEWTON-SEC/E+2
2941   REF   1              E3,1771            K2VAL    =         EK2VAL     DP PAD LOAD B+23 NEWTON-SEC/E+2
2942   REF   1              E3,1773            K3VAL    =         EK3VAL     SP PAD LOAD B+09 NEWTONS/E+4
2943                        17,2012    00144 0 1SEC2D   2DEC      100.0 B-14 100.0 CS AT +14
2943                        17,2013    00000 1
```

L P40-P47 USER'S PAGE NO. 45 E7 S3

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 2944                    17,2014   01274 1  3.5SEC   2DEC   350.0 B-13      350.0 CS AT +13
 2944                    17,2015   00000 1
 2945                    17,2016   00764 1  5SECOND  2DEC   500.0 B-14      500 CS AT +14
 2945                    17,2017   00000 1
 2946                    17,2020   00000 1  S40.135  2DEC   69.6005183 B-23 IMPULSE FROM 7.96 SECS OF 2-JET FIRING
 2946                    17,2021   04263 1
A294602                                                                     7.96(199.6)COS(10)  LB-SEC,  SC.AT
A294603                                                                     B+23 NEWTON-SEC/E+2  (7 SEC ULLAGE
A294604                                                                     TO GO, PLUS 0.96 SEC FROM PIPTIME)
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P2947   NAME     S40.6  GIMBAL DRIVE TEST AND/OR GIMBAL TRIM
R2948   MOD NO 5                          DATE 9 MARCH, 1967
R2949   MOD BY   ENGEL                    LOG SECTION P40-P47
R2950   FUNCTIONAL DESCRIPTION
R2951        GIMBAL DRIVE TEST....0,+2,-2,0  DEGREE ENGINE COMMANDS, AT 2 SECOND
R2952             INTERVALS, FIRST IN PITCH, THEN IN YAW. ASTRONAUT VERIFICATION
R2953             OF GIMBAL MOTION ON GPI
R2954        GIMBAL TRIM....AFTER A 4 SECOND DELAY,ENGINE COMMANDED TO
R2955             PRE-COMPUTED TRIM POSITION. ASTRONAUT VERIFICATION ON GPI.
R2956        PRE40.6....RESTART ENTRY TO RE-DO S40.6, ONLY IF RCS IS ON - IF TVC
R2957              IS NOT ON - PRIMARILY TO GET ACTUATORS TRIMMED FOR IGNITION.
R2958              BYPASS 4 SEC DELAY.  SPEED IS CRITICAL NEAR IGNITION.
R2959              IF TVC IS ON (TVCDAPON OR LATER)  THEN REDOTVC WILL TAKE CARE
R2960              OF RESTARTING ACTUATORS.
R2961   CALLING SEQUENCE....
R2962        WAITLIST,  WITH 2CADR FOR S40.6 (OR PRE40.6),  WITH EBANK= CNTR
R2963   NORMAL EXIT MODE - FIXDELAY, TASKOVER
R2964   SUBROUTINES CALLED....
R2965        OUTPUT (INTERNAL)
R2966        FIXDELAY
R2967   ALARM OR ABORT EXIT MODES - NONE
R2968   ERASEABLE INITIALIZATION REQUIRED
R2969        CNTR = +0,  NORMALLY SET BY THE P40 CALL AT TST.TRIM
R2970        MRKRTMP...POSITIVE FOR GIMBAL DRIVE TEST AND GIMBAL TRIM (BOTH)
R2971                  NEGATIVE FOR GIMBAL TRIM ONLY
R2972        PACTOFF, YACTOFF SC.AT 85.41 ARCSEC/BIT  (V48N48 P,YTRIM)
R2973        ..SC CONT.. SWITCH AT ..CMC.. (A/P CONTROL SWITCH AT ..GNC..)
R2974        ACTIVE SPS GIMBAL MOTOR POWER(S),  PITCH, YAW
R2975   OUTPUT
R2976        TVCYAW, TVCPITCH (BITS RELEASED)
R2977        TVC ENABLE  AND  OPTICS ERROR COUNTER ENABLE
R2978   DEBRIS
R2979        TEMPR60, CNTR
R2980


 2981                          17,2022                    BANK   17
 2982   REF   2  LAST  721    20,2000                    SETLOC DAPS6
 2983                          20,2241                    BANK

 2984   REF   4  LAST  721    E6,1447                    EBANK= CNTR
 2985   REF   1                                          COUNT  20/S40.6

 2986   REF  23  LAST  699    20,2241  4 0102 0  PRE40.6 CS     FLAGWRD6        RESTART ENTRY TO S40.6 (DO NOT PERMIT
 2987   REF  12  LAST  699    20,2242  7 4105 0          MASK   OCT60000           IF TVC, BITS 15,14 = 1,0)
 2988                          20,2243  0 0006 1          EXTEND
 2989                          20,2244  6 2246 0          BZMF   +2
 29892  REF  39  LAST  709    20,2245  1 5324 0          TCF    TASKOVER        TVC, REDOTVC WILL REESTABLISH INTERFACE

 2990   REF  47  LAST  720    20,2246  4 5017 0          CS     BIT1            RCS, SO DO S40.6,  GIMTRIM ONLY
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 2991   REF   3  LAST  685   20,2247  55'445 1          TS      MRKRTMP

 2992   REF  48  LAST  729   20,2250  3 5017 1          CAF     BIT1          FOR REVISED S40.6 TIMING FOR RESTARTS...
 2993   REF   5  LAST  729   20,2251  55'447 0          TS      CNTR          TO INDICATE A RESTART ENTRY (CNTR IS
A2994                                                                          NORMALLY +0. BY S40.6)

 29945  REF   6  LAST  730   E6,1447                    EBANK=  CNTR
 2995   REF 140  LAST  727   20,2252  4 5021 0  S40.6   CS      ZERO          INHIBIT OPTICS ACTIVITY
 2996   REF  24  LAST  699   20,2253  55'303 1          TS      OPTIND

 2997   REF  28  LAST  691   20,2254  4 5016 1          CS      BIT2          DISENABLE OPTICS ERROR COUNTERS (ZERO,
 2998                        20,2255  0 0006 1          EXTEND                      AND INHIBIT PULSE TRANSMISSION -
 2999   REF  29  LAST  699   20,2256  03 012 1          WAND    CHAN12              NORMAL STATE)

 3000   REF   1               20,2257  3 2344 0          CAF     OCT02200      TVC ENABLE (SPS SERVO AMPS SEE DAC
 3001                        20,2260  0 0006 1          EXTEND                      VOLTAGES) AND DISENGAGE OPTICS/DAC
 3002   REF  30  LAST  730   20,2261  05 012 1          WOR     CHAN12

 3003   REF   8  LAST  708   20,2262  0 5267 1          TC      FIXDELAY      60MS PROCEDURAL DELAY (40MS MINIMUM) FOR
 3004                        20,2263   00006 1          DEC     6                   RELAY LATCHING

 3005   REF  29  LAST  730   20,2264  3 5016 0          CAF     BIT2          ENABLE OPTICS ERROR COUNTERS
 3006                        20,2265  0 0006 1          EXTEND
 3007   REF  31  LAST  730   20,2266  05 012 1          WOR     CHAN12

 3008   REF   9  LAST  730   20,2267  0 5267 1          TC      FIXDELAY      20MS PROCEDURAL DELAY (4MS MINIMUM) FOR
 3009                        20,2270   00002 0          DEC     2                   RELAY LATCHING

 3010   REF   7  LAST  730   20,2271  11'447 0  RSTRTST CCS     CNTR          CHECK FOR RESTART ENTRY (PRE40.6)
 3011   REF   1               20,2272  1 2332 0          TCF     GIMTRIM +2    RESTART ENTRY....BYPASS 4 SECOND DELAY
A3012                                                                          TST.TRIM SETS +0 ON NORMAL ENTRY

 3013   REF   4  LAST  730   20,2273  31'445 0          CAE     MRKRTMP       CHECK FOR TEST/TRIM OR TRIM ONLY
 3014   REF   8  LAST  730   20,2274  55'447 0          TS      CNTR                MRKRTMP SAVES CNTR FOR RESTARTS
 3015                        20,2275  0 0006 1          EXTEND
 3016   REF   2  LAST  730   20,2276  6 2330 0          BZMF    GIMTRIM       (TRIM ONLY)

 3017   REF 141  LAST  730   20,2277  4 5021 0  GDTSETUP CS      ZERO          GIMBAL DRIVE TEST SETUP, FOR PITCH
 3018   REF   9  LAST  730   20,2300  55'447 0          TS      CNTR

 3019   REF   1               20,2301  3 2346 1  GIMDTEST CAF    +2ACTDEG      GIMBAL DRIVE TEST, 1ST INCREMENT
 3020   REF   1               20,2302  0 2315 1          TC      OUTPUT              (LEAVES GIMBAL AT +2 DEG)
 3021   REF   1               20,2303  3 2345 1          CAF     -4ACTDEG      2ND INCREMENT (LEAVES GIMBAL AT -2)
 3022   REF   2  LAST  730   20,2304  0 2315 1          TC      OUTPUT
 3023   REF   2  LAST  730   20,2305  3 2346 1          CAF     +2ACTDEG      3RD INCREMENT (LEAVES GIMBAL AT -0)
 3024   REF   3  LAST  730   20,2306  0 2315 1          TC      OUTPUT

 3025   REF  10  LAST  730   20,2307  4 1447 0          CS      CNTR          CHECK FOR COMPLETION OF YAW TEST
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3026   REF 161  LAST  720   20,2310  10 000 0          CCS    A
3027   REF   3  LAST  730   20,2311  1 2330 1          TCF    GIMTRIM        COMPLETED, GO TO GIMBAL TRIM ROUTINE
3028   REF  49  LAST  730   20,2312  4 5017 0          CS     BIT1           SET UP YAW TEST
3029   REF  11  LAST  730   20,2313  55'447 0          TS     CNTR
3030   REF   1               20,2314  1 2301 0          TCF    GIMDTEST       FOR YAW TEST

3031                         20,2315  0 0006 1  OUTPUT  EXTEND                OUTPUT THE INCREMENT....SAVE Q
3032   REF   4  LAST  391   20,2316  23'146 0          QXCH   TEMPR60

3033   REF  12  LAST  731   20,2317  51'447 1          INDEX  CNTR
3034   REF   1               20,2320  54 054 1          TS     TVCPITCH

3035   REF  13  LAST  731   20,2321  51'447 1          INDEX  CNTR
3036   REF  20  LAST  703   20,2322  3 5005 1          CAF    BIT11
3037                         20,2323  0 0006 1          EXTEND
3038   REF   5  LAST  183   20,2324  05 014 1          WOR    CHAN14

3039   REF  10  LAST  730   20,2325  0 5267 1          TC     FIXDELAY       WAIT 2SEC, WHILE ASTRONAUT VERIFIES
3040                         20,2326   00310 0          DEC    200                 GIMBAL MOTION ON GPI
3041   REF   5  LAST  731   20,2327  0 1146 0          TC     TEMPR60

3042   REF  11  LAST  731   20,2330  0 5267 1  GIMTRIM TC     FIXDELAY       WAIT 4 SECONDS BEFORE GIMBAL TRIM
3043                         20,2331   00620 0          DEC    400

3044   REF 142  LAST  730   20,2332  4 5021 0    +2    CS     ZERO           PICK UP TRIM VALUES AND OUTPUT THEM
3045   REF  15  LAST  715   20,2333  6 1423 0          AD     PACTOFF             (AVOID +0) ENTRY POINT FROM RSTRTST
3046   REF   2  LAST  731   20,2334  54 054 1          TS     TVCPITCH            ON A RESTART, TO AVOID 4SEC DELAY
3047   REF 143  LAST  731   20,2335  4 5021 0          CS     ZERO
3048   REF   4  LAST  715   20,2336  6 1424 1          AD     YACTOFF
3049   REF   1               20,2337  54 053 0          TS     TVCYAW

3050   REF   2  LAST  169   20,2340  3 5062 0          CAF    PRIO6          RELEASE THE COUNTERS, BITS 11,12
3051                         20,2341  0 0006 1          EXTEND
3052   REF   6  LAST  731   20,2342  05 014 1          WOR    CHAN14

3053   REF  40  LAST  729   20,2343  1 5324 0  ENDS40.6 TCF    TASKOVER


30535                        20,2344   02200 1  OCT02200 OCT    02200          BITS 8,11 FOR CHANNEL 12 TVC/OPTICS
3054                         20,2345   77527 1  -4ACTDEG DEC    -168           -2(+2ACTDEG), WHOLE BITS, NO ROUNDUP
3055                         20,2346   00124 0  +2ACTDEG DEC    +84            +2 DEG, SC.AT 85.41 ARCSEC/BIT (+84D)

R3056  CALLED BY ..DONOUN46.. (VERB 48), OR DIRECTLY BY ..FRESHDAP.. (RCS DAP) VIA IBNKCALL

3058   REF   1                                          COUNT  20/S41.2

3059   REF  55  LAST  720   20,2347  3 1466 1  S41.2   CA     DAPDATR1
```

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3060   REF  24  LAST  696   20,2350  7 6214 1          MASK   THREE
3061   REF 162  LAST  731   20,2351  6 0000 1          AD     A
3062   REF   4  LAST  416   20,2352  55'130 0          TS     RATEINDX

3063                        20,2353  0 0004 0          INHINT
3064   REF  56  LAST  731   20,2354  31'466 1          CAE    DAPDATR1       IS LEM ATTACHED (BITS 14,13 OF DAPDATR1
3065   REF  10  LAST  691   20,2355  7 4371 1          MASK   PRIO30                          =10)
3066   REF   1               20,2356  6 7705 1          AD     -BIT14         (OCT57777)
3067                        20,2357  0 0006 1          EXTEND
3068   REF   1               20,2360  1 2365 1          BZF    TOGETHER       YES

3069   REF  30  LAST  730   20,2361  4 5016 1          CS     BIT2           NO, UNSET FLAG
3070   REF  13  LAST  708   20,2362  7 0103 1          MASK   FLAGWRD7
3071   REF  14  LAST  732   20,2363  54 103 1          TS     FLAGWRD7

3072                        20,2364  1 2370 0          TCF    +4

3073   REF  15  LAST  732   20,2365  4 0103 1 TOGETHER CS     FLAGWRD7       ATTACHED, SET FLAG FOR INTEGRATION
3074   REF  31  LAST  732   20,2366  7 5016 1          MASK   BIT2
3075   REF  16  LAST  732   20,2367  26 103 1          ADS    FLAGWRD7

3076                        20,2370  0 0003 1          RELINT

3077   REF  57  LAST  732   20,2371  3 1466 1          CA     DAPDATR1
3078   REF  25  LAST  687   20,2372  7 5014 0          MASK   BIT4
3079                        20,2373  0 0006 1          EXTEND
3080                        20,2374  6 2376 1          BZMF   +2             DEC 46 MEANS NARROW DB
3081   REF   1               20,2375  3 2476 0          CA     DEC409
3082   REF   1               20,2376  6 2477 1          AD     DEC46          DEC 455 MEANS WIDE DB
3083   REF   4  LAST  687   20,2377  55'655 1          TS     ADB

3084   REF  58  LAST  732   20,2400  3 1466 1          CA     DAPDATR1
3085   REF  31  LAST  726   20,2401  7 5011 0          MASK   BIT7           QUAD BD
3086                        20,2402  0 0006 1          EXTEND
3087                        20,2403  6 2405 1          BZMF   +2
3088   REF  84  LAST  724   20,2404  3 5017 1          CA     ONE
3089   REF   2  LAST  109   20,2405  55'631 0          TS     XTRANS
3090   REF  59  LAST  732   20,2406  3 1466 1          CA     DAPDATR1
3091   REF  27  LAST  542   20,2407  7 5006 0          MASK   BIT10          QUAD AC
3092                        20,2410  0 0006 1          EXTEND
3093                        20,2411  6 2413 0          BZMF   +2
3094   REF  85  LAST  732   20,2412  4 5017 0          CS     ONE
3095   REF   3  LAST  732   20,2413  27'631 0          ADS    XTRANS

3096                        20,2414  0 0004 0          INHINT
3097                        20,2415  0 0006 1          EXTEND
3098                        20,2416  1 2423 1          BZF    +5             CLEAR NJETSFLG (4 JETS, OR NO JETS)
3099   REF  19  LAST  593   20,2417  4 0075 1          CS     FLAGWRD1       SET NJETSFLG   (2 JETS, AC OR BD QUADS)
3100   REF  33  LAST  696   20,2420  7 5001 1          MASK   BIT15          NJETSFLG = 1 FOR 2 JET ULLAGE (AC OR BD)
3101   REF  20  LAST  732   20,2421  26 075 1          ADS    FLAGWRD1
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3102                                20,2422  1 2426 1          TCF     +4
3103   REF  34  LAST  732   20,2423  4 5001 1          CS      BIT15          NJETSFLG = 0 FOR 4 JET (OR 0 JET) ULLAGE
3104   REF  21  LAST  732   20,2424  7 0075 1          MASK    FLAGWRD1
3105   REF  22  LAST  733   20,2425  54 075 1          TS      FLAGWRD1
3106                        20,2426  0 0003 1          RELINT
3107   REF   2  LAST  280   20,2427  3 1467 0          CA      DAPDATR2
3108   REF  33  LAST  708   20,2430  7 5003 0          MASK    BIT13
3109                        20,2431  0 0006 1          EXTEND
3110                        20,2432  6 2434 0          BZMF    +2
3111                        20,2433  1 2435 0          TCF     +2
3112   REF  86  LAST  732   20,2434  4 5017 0          CS      ONE
3113                        20,2435  4 0000 0          COM
3114   REF   2  LAST  109   20,2436  55'630 1          TS      ACORBD         MINUS FOR A-C,PLUS FOR B-D

3115   REF   3  LAST  733   20,2437  3 1467 0          CA      DAPDATR2
3116   REF  28  LAST  732   20,2440  7 5006 0          MASK    BIT10
3117   REF 163  LAST  732   20,2441  10 000 0          CCS     A
3118                        20,2442  1 2446 1          TCF     +4
3119   REF  87  LAST  733   20,2443  3 5017 1          CA      ONE
3120   REF   2  LAST  109   20,2444  55'626 0          TS      RACFAIL
3121   REF   1              20,2445  1 2456 0          TCF     BDFAIL
3122   REF 144  LAST  731   20,2446  3 5021 1          CA      ZERO
3123   REF   3  LAST  733   20,2447  55'626 0          TS      RACFAIL
3124   REF   4  LAST  733   20,2450  3 1467 0          CA      DAPDATR2
3125   REF  26  LAST  732   20,2451  7 5014 0          MASK    BIT4
3126   REF 164  LAST  733   20,2452  10 000 0          CCS     A
3127   REF   2  LAST  733   20,2453  1 2456 0          TCF     BDFAIL
3128   REF  88  LAST  733   20,2454  4 5017 0          CS      ONE
3129   REF   4  LAST  733   20,2455  55'626 0          TS      RACFAIL
3130   REF   5  LAST  733   20,2456  3 1467 0 BDFAIL   CA      DAPDATR2
3131   REF  32  LAST  732   20,2457  7 5011 0          MASK    BIT7
3132   REF 165  LAST  733   20,2460  10 000 0          CCS     A
3133                        20,2461  1 2465 0          TCF     +4
3134   REF  89  LAST  733   20,2462  3 5017 1          CA      ONE
3135   REF   2  LAST  109   20,2463  55'627 1          TS      RBDFAIL
3136   REF 166  LAST  705   20,2464  0 0002 0          TC      Q
3137   REF 145  LAST  733   20,2465  3 5021 1          CA      ZERO
3138   REF   3  LAST  733   20,2466  55'627 1          TS      RBDFAIL
3139   REF   6  LAST  733   20,2467  3 1467 0          CA      DAPDATR2
3140   REF  50  LAST  731   20,2470  7 5017 0          MASK    BIT1
3141   REF 166  LAST  733   20,2471  10 000 0          CCS     A
3142   REF 167  LAST  733   20,2472  0 0002 0          TC      Q
3143   REF  90  LAST  733   20,2473  4 5017 0          CS      ONE
3144   REF   4  LAST  733   20,2474  55'627 1          TS      RBDFAIL
3145   REF 168  LAST  733   20,2475  0 0002 0          TC      Q

R3146  DAPFIG ENTRY VIA TC POSTJUMP AS JOB FROM ..STABLISH.. (VERB 46)
3147                        42,3606                    BANK    42
3148   REF   2  LAST  253   42,2000                    SETLOC  EXTVBS
```

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3149                          42,3606                    BANK

3150  REF  25  LAST  709      42,3606  4 5007 1  DAPFIG  CS      BIT9          TURN OFF SIVB TAKEOVER
3151                          42,3607  0 0006 1          EXTEND
3152  REF  32  LAST  730      42,3610  03 012 1          WAND    CHAN12
3153  REF  60  LAST  732      42,3611  31'466 1          CAE     DAPDATR1      DETERMINE VEHICLE CONFIGURATION
3154                          42,3612  0 0006 1          EXTEND
3155  REF  23  LAST  689      42,3613  7 5015 1          MP      BIT3               RIGHT SHIFT 4 OCTAL DIGITS
3156  REF  25  LAST  732      42,3614  7 6214 1          MASK    THREE              (IN CASE BIT 15 IS USED)
3157  REF 167  LAST  733      42,3615  50 000 1          INDEX   A
3158                          42,3616  1 3617 0          TCF     +1                 BRANCH BASED ON CONFIG....

3159  REF   1                 42,3617  1 3631 1          TCF     NODAPUP       CM.......ACTIVATE NODAP
3160  REF   1                 42,3620  1 3624 0          TCF     RCSDAPUP           CSM......ACTIVATE RCSDAP
3161  REF   2  LAST  734      42,3621  1 3624 0          TCF     RCSDAPUP           CSM/LEM..ACTIVATE RCSDAP
3162  REF  46  LAST  701      42,3622  0 4701 0          TC      POSTJUMP
3163  REF   1                 42,3623   67215 0          CADR    SATSTKON
3164                          42,3624  0 0004 0  RCSDAPUP INHINT                CALL TO ACTIVATE RCSDAP, AND RETURN
3165  REF  29  LAST  708      42,3625  0 4740 0          TCR     IBNKCALL
3166  REF   5  LAST  708      42,3626   42024 1          CADR    RCSDAPON
3167                          42,3627  0 0003 1          RELINT
3168  REF   1                 42,3630  1 3646 1          TCF     ENDFIG        CAME IN VIA V46, GO OUT VIA GOPIN
3169                          42,3631  0 0006 1  NODAPUP EXTEND                T5 IDLE FOR NODAP (DONT WORRY ABOUT T)
3170  REF   1                 42,3632  3 3651 0          DCA     T5IDLDAP
3171  REF  10  LAST  696      42,3633  53'313 0          DXCH    T5LOC
3172  REF  49  LAST  707      42,3634  0 5560 1          TC      DOWNFLAG      RESET T5-USAGE FLAGS FOR NODAP
31725 REF   1                 42,3635   00132 1          ADRES   DAPBIT1        BIT 15  FLAG 6 = 0
3173  REF  50  LAST  734      42,3636  0 5560 1          TC      DOWNFLAG
31732 REF   1                 42,3637   00133 0          ADRES   DAPBIT2        BIT 14  FLAG 6 = 0
31734                         42,3640  0 0004 0          INHINT
31735 REF  30  LAST  734      42,3641  0 4740 0          TC      IBNKCALL      ZERO JET CHANNELS IN 14 MS AND THEN
31736 REF   2  LAST  549      42,3642   42632 0          CADR    ZEROJET       LEAVE THE T6 CLOCK DISABLED.
31738                         42,3643  0 0003 1          RELINT
3174  REF  51  LAST  733      42,3644  3 5017 1          CAF     BIT1          KILL KALCMANU JOB
3175  REF   6  LAST  596      42,3645  55'332 0          TS      HOLDFLAG
3176  REF  47  LAST  734      42,3646  0 4701 0  ENDFIG  TC      POSTJUMP      CAME IN VIA V46, GO OUT VIA GOPIN
3177  REF  28  LAST  549      42,3647   66121 0          CADR    GOPIN
3178  REF  16  LAST  731      E6,1423                    EBANK=  PACTOFF
3179  REF   5  LAST  690      42,3650   03153 0  T5IDLDAP 2CADR  T5IDLOC
3179                          42,3651   12106 0

31791 REF   9  LAST  634      30,2000                    SBANK=  LOWSUPER
3180                          17,2022                    BANK    17
3181  REF   3  LAST  729      20,2000                    SETLOC  DAPS6
3182                          20,2476                    BANK

3183                          20,2476   00631 0  DEC409  DEC     409
3184                          20,2477   00056 1  DEC46   DEC     46
```

R3185 CALLED BY ..DONOUN47.. (VERB 48), OR DIRECTLY BY ..FRESHDAP.. (RCS DAP)

```
3186   REF   1              20,2500  31'470 0  S40.14   CAE     IXX             RCS ENTRY
3187                        20,2501  0 0006 1           EXTEND
3188   REF   1              20,2502  7 2525 0           MP      CONTONE
3189   REF   2  LAST  109   20,2503  55'623 0           TS      J/M

3190   REF   1              20,2504  3 1471 1           CA      IAVG
3191                        20,2505  0 0006 1           EXTEND
3192   REF   2  LAST  735   20,2506  7 2525 0           MP      CONTONE
3193   REF   2  LAST  109   20,2507  55'624 1           TS      J/M1

3194   REF   2  LAST  109   20,2510  55'625 0           TS      J/M2

3195                        20,2511  0 0006 1           EXTEND
3196   REF   1              20,2512  3 2527 0           DCA     CONTTWO
3197                        20,2513  0 0006 1           EXTEND
3198   REF   2  LAST  735   20,2514  11'470 1           DV      IXX
3199   REF   2  LAST  109   20,2515  55'620 0           TS      KMJ

3200                        20,2516  0 0006 1           EXTEND
3201   REF   2  LAST  735   20,2517  3 2527 0           DCA     CONTTWO
3202                        20,2520  0 0006 1           EXTEND
3203   REF   2  LAST  735   20,2521  11'471 0           DV      IAVG
3204   REF   2  LAST  109   20,2522  55'621 1           TS      KMJ1

3205   REF   2  LAST  109   20,2523  55'622 1           TS      KMJ2

3206   REF 169  LAST  733   20,2524  0 0002 0           TC      Q

3207                        20,2525   25137 0  CONTONE  DEC     .662034         2PI/M
3208                        20,2526   00023 0  CONTTWO  2DEC    .00118
3208                        20,2527   12522 1
3209   REF   1                                         COUNT   24/TVNG

3210                        31,3700                    BANK    31
3211   REF   4  LAST  714   24,2000                    SETLOC  P40S
3212                        24,3761                    BANK

3213                        24,3761   37405 1  POS=2.5  OCT     37405
3214   REF  61  LAST  734   E6,1466                    EBANK=  DAPDATR1
3215   REF   1              24,3762   02014 0  RCSCADR  2CADR   RCSUP
3215   REF   1              24,3763   42066 1
3216                        24,3764   37704 0   6SECTS  OCT     37704
3218   REF   1                                         COUNT   21/RCSUP

3219                        20,2530                    BANK    20

3220   REF   1              21,2000                    SETLOC  DAPS3
3221                        21,2014                    BANK
```

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 3222   REF   6  LAST  588   21,2014  22 016 0  RCSUP    LXCH   BANKRUPT
 3223                       21,2015  0 0006 1           EXTEND
 3224   REF   6  LAST  588   21,2016  22 012 1           QXCH   QRUPT

 3225   REF   6  LAST  734   21,2017  0 2024 0           TCR    RCSDAPON       ACTIVATE RCS DAP

 3226   REF  27  LAST  550   21,2020  1 5333 0           TCF    RESUME

 3227   REF  62  LAST  735   E6,1466                     EBANK= DAPDATR1
 3228   REF   2  LAST  205   21,2021   02122 1  RCSADDR  2CADR  RCSATT
 3228                       21,2022   42066 1


 3229                       21,2023   37704 0  0.6SECTS OCT    37704

A3230                                                                 RCSDAPON ENTRY MUST BE UNDER INT-INHIBIT
 3231   REF   1             21,2024  3 2023 1  RCSDAPON CAF    0.6SECTS       0.6 SEC ALLOWS TVCEXEC/ROLLDAP TO DIE
 3232   REF   7  LAST  696   21,2025  54 030 0    +1     TS     TIME5          ENTRY FROM ROOTOPOO
 3233   REF   1             21,2026  55'465 0           TS     T5PHASE        WILL CAUSE FRESHDAP (+1)

 3234   REF  12  LAST  549   21,2027  4 1501 0           CS     RCSFLAGS       SET BIT3 TO REINITIALIZE FDAI ERROR
 3235   REF  24  LAST  734   21,2030  7 5015 1           MASK   BIT3                DISPLAY, IN CASE SC CONT SWITCH
 3236   REF  13  LAST  736   21,2031  27'501 0           ADS    RCSFLAGS            IN SCS NOT GNC (GUIDEMODE PRIMARY)

 3237                       21,2032  0 0006 1           EXTEND
 3238   REF   1             21,2033  3 2022 0           DCA    RCSADDR        (RCSATT)
 3239   REF  11  LAST  734   21,2034  53'313 0           DXCH   TSLOC

 3240   REF  13  LAST  729   21,2035  4 4105 0           CS     OCT60000       SET BITS 15,14 TO 01 TO INDICATE
 3241   REF  24  LAST  729   21,2036  7 0102 0           MASK   FLAGWRD6            TS TAKEOVER BY RCSDAP
 3242   REF  40  LAST  720   21,2037  6 5002 0           AD     BIT14
 3243   REF  25  LAST  736   21,2040  54 102 0           TS     FLAGWRD6       KILLS TVCEXEC AND ROLLDAP STARTS

 3244   REF 170  LAST  735   21,2041  0 0002 0           TC     Q              RETURN TO CALLER (TVCDAPOF OR RCSDAPUP)
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R0001 PROGRAM NAME- PROG52 DATE- NOV 30, 1966
R0003 MOD NO- 2 LOG SECTION- P51-P53
R0005 MODIFICATION BY- LONSKE ASSEMBLY- SUNDISK REV 30

R0007 FUNCTIONAL DESCRIPTION-

R0008 ALIGNS THE IMU TO ONE OF THREE ORIENTATIONS SELECTED BY THE ASTRONAUT. THE PRESENT IMU ORIENTATION IS KNOWN
R0010 AND IS STORED IN REFSMMAT. THE THREE POSSIBLE ORIENTATIONS MAY BE_

R0011 (A) PREFERRED ORIENTATION

R0012 AN OPTIMUM ORIENTATION FOR A PREVIOUSLY CALCULATED MANUEVER. THIS ORIENTATION MUST BE CALCULATED AND
R0014 STORED BY A PREVIOUSLY SELECTED PROGRAM.

R0015 (B) NOMINAL ORIENTATION

R0016 X = UNIT(Y X Z)
R0017 -SM -SM -SM

R0018 Y = UNIT(V X R)
R0019 -SM - -

R0020 Z = UNIT(-R)
R0021 -SM -

R0022 WHERE_
R0023 R = THE GEOCENTRIC RADIUS VECTOR AT TIME T(ALIGN) SELECTED BY THE ASTRONAUT
R0025 -

R0026 V = THE INERTIAL VELOCITY VECTOR AT TIME T(ALIGN) SELECTED BY THE ASTRONAUT
R0028 -

R0029 (C) REFSMMAT ORIENTATION

R0030 THIS SELECTION CORRECTS THE PRESENT IMU ORIENTATION. THE PRESENT ORIENTATION DIFFERS FROM THAT TO WHICH IT
R0032 WAS LAST ALIGNED ONLY DUE TO GYRO DRIFT(I.E. NEITHER GIMBAL LOCK NOR IMU POWER INTERRUPTION HAS OCCURED
R0034 SINCE THE LAST ALIGNMENT).

R0035 AFTER A IMU ORIENTATION HAS BEEN SELECTED ROUTINE S52.2 IS OPERATED TO COMPUTE THE GIMBAL ANGLES USING THE
R0037 NEW ORIENTATION AND THE PRESENT VEHICLE ATTITUDE. CAL52A THEN USES THESE ANGLES, STORED IN THETAD,+1,+2, TO
R0039 COARSE ALIGN THE IMU. THE STAR SELECTION ROUTINE, R56, IS THEN OPERATED. IF 2 STARS ARE NOT AVAILABLE AN ALARM
R0041 IS FLASHED TO NOTIFY THE ASTRONAUT. AT THIS POINT THE ASTRONAUT WILL MANUEVER THE VEHICLE AND SELECT 2 STARS
R0043 EITHER MANUALLY OR AUTOMATICALLY. AFTER 2 STARS HAVE BEEN SELECTED THE IMU IS FINE ALIGNED USING ROUTINE R51. IF
R0045 THE RENDEZVOUS NAVIGATION PROCESS IS OPERATING(INDICATED BY RNDVZFLG) P20 IS DISPLAYED. OTHERWISE P00 IS
R0047 REQUESTED.

R0048 CALLING SEQUENCE-

R0049 THE PROGRAM IS CALLED BY THE ASTRONAUT BY DSKY ENTRY.

L P51-P53 USER'S PAGE NO. 2 EO S3

R0050 SUBROUTINES CALLED-

R0051 1. FLAGDOWN 7. S52.2 13. NEWMODEX
R0052 2. R02BOTH 8. CAL53A 14. PRIOLARM
R0053 3. GOPERF4 9. FLAGUP
R0054 4. MATMOVE 10. R56
R0055 5. GOFLASH 11. R51
R0056 6. S52.3 12. GOPERF3

R0057 NORMAL EXIT MODES-

R0058 EXITS TO ENDOFJOB

R0059 ALARM OR ABORT EXIT MODES-

R0060 NONE

R0061 OUTPUT-

R0062 THE FOLLOWING MAY BE FLASHED ON THE DSKY
R0063 1. IMU ORIENTATION CODE
R0064 2. ALARM CODE 215 -PREFERRED IMU ORIENTATION NOT SPECIFIED
R0065 3. TIME OF NEXT IGNITION
R0066 4. GIMBAL ANGLES
R0067 5. ALARM CODE 405 -TWO STARS NOT AVAILABLE
R0068 6. PLEASE PERFORM P00
R0069 THE MODE DISPLAY MAY BE CHANGED TO 20

R0070 ERASABLE INITIALIZATION REQUIRED-

R0071 PFRATFLG SHOULD BE SET IF A PREFERRED ORIENTATION HAS BEEN COMPUTED.IF IT HAS BEEN COMPUTED IT IS STORED IN
R0073 XSMD,YSMD,ZSMD.
R0074 RNDVZFLG INDICATES WHETHER THE RENDEZVOUS NAVIGATION PROCESS IS OPERATING.

R0076 DEBRIS-

R0077 WORK AREA
0078 REF 3 LAST 215 15,2000 P54 = PROG52
0079 33,3776 BANK 33
0080 REF 1 15,2000 SETLOC P50S
0081 15,2000 BANK

0082 REF 10 LAST 734 30,2000 SBANK= LOWSUPER
0083 REF 7 LAST 452 FB,1773 EBANK= SAC
0084 REF 1 COUNT 15/P52

0085 REF 61 LAST 727 15,2000 0 5412 0 PROG52 TC PHASCHNG
0086 15,2001 00254 1 OCT 00254
0087 REF 51 LAST 734 15,2002 0 5560 1 TC DOWNFLAG
00875 REF 21 LAST 659 15,2003 00027 1 ADRES UPDATFLG BIT 7 FLAG 1

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0088   REF  52  LAST  738   15,2004  0 5560 1          TC     DOWNFLAG
00885  REF   7  LAST  648   15,2005   00031 0          ADRES  TRACKFLG      BIT 5  FLAG 1
0089   REF 171  LAST  705   15,2006  0 4662 1          TC     BANKCALL
0090   REF   6  LAST  691   15,2007   17653 1          CADR   R02BOTH       IMU STATUS CHECK
0091   REF  27  LAST  733   15,2010  3 5014 1          CAF    BIT4
0092   REF  39  LAST  638   15,2011  7 0076 1          MASK   STATE +2       IS PFRATFLG SET(PREFERRED ORIENTATION)
0093   REF 168  LAST  734   15,2012  10 000 0          CCS    A
0094   REF   1               15,2013  0 2016 1          TC     P52A          YES
0095   REF  32  LAST  732   15,2014  3 5016 0          CAF    BIT2          NO
0096   REF   2  LAST  739   15,2015  0 2017 0          TC     P52A +1
0097   REF  52  LAST  734   15,2016  3 5017 1  P52A    CAF    BIT1
0098   REF   8  LAST  560   15,2017  55'132 1          TS     OPTION2
0099   REF  53  LAST  739   15,2020  3 5017 1  P52B    CAF    BIT1
0100   REF 172  LAST  739   15,2021  0 4662 1          TC     BANKCALL      FLASH OPTION CODE AND ORIENTATION CODE
0101   REF   1               15,2022   21135 0          CADR   GOPERF4R
0102   REF  45  LAST  692   15,2023  0 4106 1          TC     GOTOPOOH
0103                         15,2024  0 2031 1          TC     +5
0104   REF   1               15,2025  0 2020 1          TC     P52B          NEW CODE - NEW ORIENTATION CODE INPUT
0105   REF  62  LAST  738   15,2026  0 5412 0          TC     PHASCHNG
0106                         15,2027   00014 1          OCT    00014
0107   REF  87  LAST  727   15,2030  0 5217 0          TC     ENDOFJOB
0108   REF   9  LAST  739   15,2031  3 1132 0          CA     OPTION2
0109   REF  26  LAST  734   15,2032  7 6214 1          MASK   THREE
0110   REF 169  LAST  739   15,2033  50 000 1          INDEX  A
0111                         15,2034  0 2035 0          TC     +1
0112   REF   1               15,2035  0 2041 0          TC     P52T          L.S.
0113   REF   1               15,2036  0 2110 0          TC     P52J          PREF
0114   REF   2  LAST  739   15,2037  0 2041 0          TC     P52T          NOM
0115   REF   1               15,2040  1 2120 1          TCF    P52C          REF
0116                         15,2041  0 0006 1  P52T    EXTEND
0117   REF  13  LAST  696   15,2042  3 5021 1          DCA    NEGO
0118   REF  32  LAST  527   15,2043  53'046 0          DXCH   DSPTEM1
0119   REF   1               15,2044  3 2157 0          CAF    V06N34
0120   REF 173  LAST  739   15,2045  0 4662 1          TC     BANKCALL
0121   REF  31  LAST  692   15,2046   20720 0          CADR   GOFLASH
0122   REF  46  LAST  739   15,2047  0 4106 1          TC     GOTOPOOH
0123                         15,2050  0 2052 1          TC     +2
0124                         15,2051  0 2044 0          TC     -5
0125                         15,2052  0 0006 1          EXTEND
0126   REF  33  LAST  739   15,2053  3 1046 1          DCA    DSPTEM1
0127                         15,2054  0 0006 1          EXTEND
0128                         15,2055  1 2057 0          BZF    +2
0129                         15,2056  1 2062 0          TCF    +4

0130                         15,2057  0 0006 1          EXTEND
0131   REF  24  LAST  703   15,2060  3 0025 0          DCA    TIME2
0132   REF  34  LAST  739   15,2061  53'046 0          DXCH   DSPTEM1
0133   REF  10  LAST  739   15,2062  3 1132 0          CA     OPTION2
0134   REF  33  LAST  739   15,2063  7 5016 1          MASK   BIT2
0135   REF 170  LAST  739   15,2064  10 000 0          CCS    A
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0136                              15,2065  1 2073 0          TCF     +6              NOM
0137   REF 162  LAST  727         15,2066  0 6006 1          TC      INTPRET         LS
0138                              15,2067   77624 1          CALL
0139   REF   1                   15,2070   34531 1                   P52LS
0140                              15,2071   77650 1          GOTO
0141   REF   1                   15,2072   32100 1                   P52D
0142   REF 163  LAST  740         15,2073  0 6006 1          TC      INTPRET
0143                              15,2074   77745 1          DLOAD
0144   REF  35  LAST  739         15,2075   01046 1                   DSPTEM1
0145                              15,2076   77624 1          CALL                    COMPUTE NOMINAL IMU
0146   REF   1                   15,2077   34661 1                   S52.3            ORIENTATION
0147                              15,2100   77624 1  P52D    CALL                    READ VEHICLE ATTITUDE AND
0148   REF   1                   15,2101   22331 0                   S52.2            COMPUTE GIMBAL ANGLES
0149                              15,2102   77776 1          EXIT
0150   REF   1                   15,2103  3 2160 1          CAF     VB06N22
0151   REF 174  LAST  739         15,2104  0 4662 1          TC      BANKCALL        DISPLAY GIMBAL ANGLES
0152   REF  32  LAST  739         15,2105   20720 0          CADR    GOFLASH
0153   REF  47  LAST  739         15,2106  0 4106 1          TC      GOTOPOOH
0154   REF   1                   15,2107  0 2161 0          TC      COARSTYP
0155   REF 164  LAST  740         15,2110  0 6006 1  P52J    TC      INTPRET         RECYCLE- VEHICLE HAS BEEN MENUEVERED
0156                              15,2111   77650 1          GOTO
0157   REF   2  LAST  740         15,2112   32100 1                   P52D
0158   REF 165  LAST  740         15,2113  0 6006 1          TC      INTPRET
0159                              15,2114   77624 1          CALL                    DO COARSE ALIGN
0160   REF   1                   15,2115   30770 1                   CAL53A           ROUTINE
0161                              15,2116   77414 0  CAL53RET SET     EXIT
0162   REF   5  LAST  620         15,2117   01462 0                   REFSMFLG
0163   REF  63  LAST  739         15,2120  0 5412 0  P52C    TC      PHASCHNG
01631                             15,2121   04024 0          OCT     04024
01632  REF   1                   15,2122  3 5025 0          CAF     ALRM15
0164   REF 175  LAST  740         15,2123  0 4662 1          TC      BANKCALL
0165   REF   3  LAST  685         15,2124   21045 0          CADR    GOPERF1
0166   REF  48  LAST  740         15,2125  0 4106 1          TC      GOTOPOOH
0167                              15,2126  0 2130 1          TC      +2              V33
0168   REF   1                   15,2127  0 2142 1          TC      P52F            E
0169   REF 166  LAST  740         15,2130  0 6006 1          TC      INTPRET
0170                              15,2131   43234 0          RTB     DAD
0171   REF  19  LAST  622         15,2132   45510 1                   LOADTIME
0172   REF   1                   15,2133   32264 0                   TSIGHT1
0173                              15,2134   77624 1          CALL
0174   REF   1                   15,2135   30225 1                   LOCSAM
0175                              15,2136   77776 1          EXIT
0176   REF 176  LAST  740         15,2137  0 4662 1  P52E    TC      BANKCALL        DO STAR SELECTION
0177   REF   1                   15,2140   30333 1          CADR    PICAPAR
0178   REF   1                   15,2141  0 2147 1          TC      P52I            2 STARS NOT AVAILABLE
0179   REF 167  LAST  740         15,2142  0 6006 1  P52F    TC      INTPRET         2 STARS AVAILABLE
0180                              15,2143   77624 1          CALL
0181   REF   2  LAST  215         15,2144   30532 0                   R51
0182                              15,2145   77776 1  ENDP505 EXIT
0183   REF  49  LAST  740         15,2146  0 4106 1          TC      GOTOPOOH
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0196  REF  28  LAST  722   15,2147  0 5650 1  P52I      TC     ALARM
0197                       15,2150   00405 0             OCT    405
0198  REF   5  LAST  658   15,2151  3 5050 1             CAF    V05N09
0199  REF 177  LAST  740   15,2152  0 4662 1             TC     BANKCALL
0200  REF  33  LAST  740   15,2153   20720 0             CADR   GOFLASH
0201  REF  50  LAST  740   15,2154  0 4106 1             TC     GOTOPOOH
0202  REF   2  LAST  740   15,2155  0 2142 1             TC     P52F          PROCEED - DO FINE ALIGN-R51
0203  REF   2  LAST  739   15,2156  0 2120 0             TC     P52C          RECYCLE- VEHICLE HAS BEEN MANUEVERED
0204                       15,2157   01442 1  V06N34     VN     00634
0205                       15,2160   01426 0  VB06N22    VN     00622
0206  REF   2  LAST  161   15,2161  3 5024 1  COARSTYP   CAF    OCT13
0207  REF 178  LAST  741   15,2162  0 4662 1             TC     BANKCALL
0208  REF   4  LAST  740   15,2163   21045 0             CADR   GOPERF1
0209  REF  51  LAST  741   15,2164  1 4106 0             TCF    GOTOPOOH      V34
0210  REF   2  LAST  739   15,2165  1 2113 1             TCF    P52J +3        NORMAL
0211  REF 168  LAST  740   15,2166  0 6006 1             TC     INTPRET       GYRO COARSE
0212                       15,2167   64375 1  GYCRS      VLOAD  MXV
0213  REF   3  LAST   73   15,2170   00307 0                    XSMD
0214  REF  21  LAST  721   15,2171   01736 1                    REFSMMAT
0215                       15,2172   77656 1             UNIT
0216  REF   4  LAST  544   15,2173   26714 1             STOVL  XDC
0217  REF   3  LAST   73   15,2174   00315 0                    YSMD
0218                       15,2175   53521 1             MXV    UNIT
0219  REF  22  LAST  741   15,2176   01736 1                    REFSMMAT
0220  REF   4  LAST  544   15,2177   26722 1             STOVL  YDC
0221  REF   2  LAST   73   15,2200   00323 0                    ZSMD
0222                       15,2201   53521 1             MXV    UNIT
0223  REF  23  LAST  741   15,2202   01736 1                    REFSMMAT
0224  REF   4  LAST  544   15,2203   36730 0             STCALL ZDC
0225  REF   3  LAST  544   15,2204   47205 0                    CALCGTA
0226                       15,2205   43014 0             CLEAR  CLEAR
0227  REF   1              15,2206   01260 1                    DRIFTFLG
0228  REF   6  LAST  740   15,2207   01662 1                    REFSMFLG
0229                       15,2210   77776 1             EXIT
0230  REF   1              15,2211  3 2244 1             CAF    V16N20
0231  REF 179  LAST  741   15,2212  0 4662 1             TC     BANKCALL
0232  REF   2  LAST  391   15,2213   20676 1             CADR   GODSPR
0233  REF   1              15,2214  3 2323 1             CA     R55CDR
0234  REF 180  LAST  741   15,2215  0 4662 1             TC     BANKCALL
0235  REF   5  LAST  446   15,2216   17206 0             CADR   IMUPULSE
0236  REF 181  LAST  741   15,2217  0 4662 1             TC     BANKCALL
0237  REF   8  LAST  446   15,2220   17577 1             CADR   IMUSTALL
0238  REF   1              15,2221  0 5757 1             TC     CURTAINS
0239  REF  64  LAST  740   15,2222  0 5412 0             TC     PHASCHNG
0240                       15,2223   04024 0             OCT    04024
0241  REF 169  LAST  741   15,2224  0 6006 1             TC     INTPRET
0242                       15,2225   75160 1             AXC,1  AXC,2
0243  REF   4  LAST  741   15,2226   00306 1                    XSMD
0244  REF  24  LAST  741   15,2227   01735 1                    REFSMMAT
0245                       15,2230   77624 1             CALL
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 0246   REF   1              15,2231   31053 0                 MATMOVE
 0247                        15,2232   43014 0          CLEAR  SET
 0248   REF   2  LAST  684   15,2233   01273 0                 PFRATFLG
 0249   REF   7  LAST  741   15,2234   01462 0                 REFSMFLG
 0250                        15,2235   77234 1          RTB    VLOAD
 0251   REF   1              15,2236   31275 0                 SET1/POT
 0252   REF   8  LAST  664   15,2237   11566 1                 ZEROVEC
 0253   REF  18  LAST  434   15,2240   01472 1          STORE  GCOMP
 0254                        15,2241   52014 0          SET    GOTO
 0255   REF   2  LAST  741   15,2242   01060 0                 DRIFTFLG
 0256   REF   1              15,2243   30655 1                 R51K
 0257                        15,2244   04024 0  V16N20  VN     1620
 0258   REF   2  LAST  157      5025            ALRM15  EQUALS OCT15
 0259   REF   1              16,2000                 SETLOC  P50S2
 0260                        16,2530                 BANK
 0261                        16,2530   01531 1  V06N89* VN     0689
R0262   NAME-P52LS
R0263   FUNCTION - TO DISPLAY THE LANDING SITE LATITUDE,
R0264   LONGTITUDE AND ALTITUDE. TO ACCEPT NEW DATA VIA
R0265   THE KEYBOARD. TO COMPUTE THE LANDING SITE
R0266   ORIENTATION FOR P52 OR P54
R0267
R0268   LET:
R0269      RLS = LANDING SITE VECTOR IN REF COORDINATES
R0270      R   = CSM POSITION VECTOR IN REF COORDINATES
R0271      V   = CSM VELOCITY VECTOR IN REF COORDINATES
R0272   THEN THE LANDING SITE ORIENTATION IS:
R0273      XSMD = UNIT(RLS)
R0274      YSMD = UNIT(ZSMD*XSMD)
R0275      ZSMD = UNIT((R*V)*RLS)
R0276   CALL -   CALL
R0277                  P52LS
R0278   INPUTS-  DSPTEM1=TIME OF ALIGNMENT
R0279            RLS=LANDING SITE VECTOR IN MOON FIXED COORINATES
R0280   OUTPUTS- XSMD,YSMD,ZSMD
R0281   SUBROUTINES- RP-TO-R ,LAT-LONG,LLASRD,LLASRDA,CSMPREC
R0282   DEBRIS- VAC, SEE SUBROUTINES
R0283
 0284                        16,2531   43020 1  P52LS   STQ    SET
 0285   REF   2  LAST   72   16,2532   00300 1                 OMAJ
 0286   REF  16  LAST  630   16,2533   01463 1                 LUNAFLAG
 0287                        16,2534   77745 1          DLOAD
 0288   REF  36  LAST  740   16,2535   01048 1                 DSPTEM1
 0289   REF   2  LAST   93   16,2536   02607 1          STORE  TSIGHT
 0290                        16,2537   43175 0          VLOAD  SET
 0291   REF   8  LAST  608   16,2540   02026 1                 RLS
 0292   REF   7  LAST  644   16,2541   00462 1                 ERADFLAG
 0293                        16,2542   14001 0          STODL  OD
 0294   REF   3  LAST  742   16,2543   02607 1                 TSIGHT
 0295                        16,2544   34007 1          STCALL 6D
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0296   REF   3  LAST  605   16,2545   55344 1                    RP-TO-R
0297                       16,2546   77742 0          VSR2
0298   REF  10  LAST  627   16,2547   16152 0          STODL     ALPHAV
0299   REF   4  LAST  742   16,2550   02607 1                    TSIGHT
0300                       16,2551   77624 1          CALL
0301   REF   4  LAST  608   16,2552   26370 1                    LAT-LONG
0302                       16,2553   77624 1          CALL
0303   REF   2  LAST  608   16,2554   62365 0                    LLASRD
0304                       16,2555   77776 1          EXIT
0305   REF   1              16,2556  3 2530 0  LSDISP CAF       V06N89*
0306   REF 182  LAST  741   16,2557   0 4662 1          TC        BANKCALL
0307   REF  34  LAST  741   16,2560   20720 0          CADR      GOFLASH
0308   REF  52  LAST  741   16,2561   0 4106 1          TC        GOTOPOOH
0309                       16,2562   0 2564 1          TC        +2
0310   REF   1              16,2563   0 2556 0          TC        LSDISP
0311   REF 170  LAST  741   16,2564   0 6006 1          TC        INTPRET
0312                       16,2565   77624 1          CALL
0313   REF   2  LAST  567   16,2566   62374 0                    LLASRDA
0314                       16,2567   45145 0          DLOAD     CALL
0315   REF   5  LAST  743   16,2570   02607 1                    TSIGHT
0316   REF   6  LAST  644   16,2571   26441 1                    LALOTORV
0317                       16,2572   53575 0          VLOAD     UNIT
0318   REF  11  LAST  743   16,2573   02152 0                    ALPHAV
0319   REF   5  LAST  741   16,2574   14307 0          STODL     XSMD
0320   REF   6  LAST  743   16,2575   02607 1                    TSIGHT
0321   REF  39  LAST  711   16,2576   34041 0          STCALL    TDEC1
0322   REF   6  LAST  607   16,2577   27071 1                    CSMPREC
0323                       16,2600   47375 0          VLOAD     VXV
0324   REF  22  LAST  712   16,2601   00001 0                    RATT
0325   REF  21  LAST  712   16,2602   00007 0                    VATT
0326                       16,2603   53435 0          VXV       UNIT
0327   REF   6  LAST  743   16,2604   00307 0                    XSMD
0328   REF   3  LAST  741   16,2605   00323 0          STORE     ZSMD
0329                       16,2606   53435 0          VXV       UNIT
0330   REF   7  LAST  743   16,2607   00307 0                    XSMD
0331   REF   4  LAST  741   16,2610   34315 1          STCALL    YSMD
0332   REF   3  LAST  742   16,2611   00300 1                    QMAJ
0333   REF   1              14,2000                    SETLOC    P50S1
0334                       14,2011                    BANK
R0335  NAME- AUTOMATIC OPTICS POSITIONING ROUTINE

R0336  FUNCTION- (1) TO POINT THE STAR LOS OF THE OPTICS AT A STAR OR LANDMARK DEFINED BY THE PROGRAM OR BY DSKY INPUT.
R0338             (2) TO POINT THE STAR LOS OF THE OPTICS AT THE LEM DURING RENDEZVOUS TRACKING OPERATIONS.

R0340  CALLING SEQUENCE- CALL R52

R0341  INPUT- 1. TARG1FLG AND TARG2FLG- PRESET BY CALLER
R0342         2. RNDVZFLG AND TRACKFLG- PRESET BY CALLER
R0343         3. STAR CODE- PRESET BY CALLER. ALSO INPUT THROUGH DSKY
R0344         4. LAT, LONG AND ALT OF LANDMARK- INPUT THROUGH DSKY
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R0345          5. NO. OF MARKS(MARKINDX)- PRESET BY CALLER

R0346   OUTPUT-  DRIVE SHAFT AND TRUNNION CDUS

R0347   SUBROUTINES- 1. FIXDELAY        7. CLEANDSP
R0348                 2. GOPERF1        8. GODSPR
R0349                 3. GOFLASH        9. REFLASHR
R0350                 4. R53           10. R52.2
R0351                 5. ALARM         11. R52.3
R0352                 6. SR52.1

 0353   REF   1                                          COUNT   15/R52

 0354                          14,2011   43020 1  R52     STQ     CLEAR
 0355   REF   2  LAST   93     14,2012   02576 1           STQ     SAVQR52
 0356   REF   1                14,2013   04265 1           STQ     ADVTRK
 0357                          14,2014   77776 1  R52VR8   EXIT
 0358                          14,2015   0 0006 1          EXTEND
 0359   REF   8  LAST  510     14,2016   3 0036 1          DCA     COUT
 0360   REF   6  LAST  453     14,2017   53'161 1          DXCH    DESOPTT
 0361   REF 171  LAST  743     14,2020   0 6006 1          TC      INTPRET
 0362                          14,2021   43131 0           SSP     CLEAR
 0363   REF  25  LAST  730     14,2022   01304 1           STQ     OPTIND
 0364                          14,2023   00000 1           STQ     0
 0365   REF   1                14,2024   00271 0           STQ     R53FLAG
 0366                          14,2025   77776 1           EXIT
 0367   REF 172  LAST  744     14,2026   0 6006 1  R52A    TC      INTPRET
 0368                          14,2027   43014 0           SET     BON
 0369   REF   1                14,2030   00073 0           STQ     TRUNFLAG
 0370   REF   6  LAST  619     14,2031   00705 0           STQ     TARG1FLG
 0371   REF   1                14,2032   30112 0           STQ     R52H
 0372                          14,2033   77414 0           CLEAR   EXIT
 0373   REF   1                14,2034   03660 1           STQ     TERMIFLG
 0374   REF   8  LAST  242     14,2035   3 1314 0  R52C    CA      SWSAMPLE        IS OPTICS MODE IN AGC
 0375                          14,2036   0 0006 1          EXTEND
 0376   REF   1                14,2037   6 2140 0          BZMF    R52M            MANUAL
 0377   REF 183  LAST  743     14,2040   0 4662 1  R52D    TC      BANKCALL        AGC
 0378   REF   1                14,2041    26244 1          CADR    SR52.1
 0379   REF   1                14,2042   1 2170 1          TCF     R52L            GR 90 DEGREES
 0380   REF   1                14,2043   1 2133 0          TCF     R52J            GR 50 DEGREES
 0381   REF  46  LAST  707     14,2044   0 5546 0          TC      UPFLAG          LS 50 DEGREES
 0382   REF   2  LAST  744     14,2045    00013 0          ADRES   TRUNFLAG        SET TRUNFLAG  BIT 4  FLAG 0
 0383   REF  29  LAST  733     14,2046   3 5006 1  R52JA   CAF     BIT10           IS THIS A LEM
 0384   REF  40  LAST  739     14,2047   7 0075 1          MASK    STATE +1
 0385   REF 171  LAST  739     14,2050   10 000 0          CCS     A
 0386   REF   1                14,2051   0 2061 1          TC      R52E            YES
 0387   REF  31  LAST  560     14,2052   3 5012 1          CAF     BIT6            NO, IS R53FLAG SET
 0388   REF  41  LAST  744     14,2053   7 0074 0          MASK    STATE
 0389   REF 172  LAST  744     14,2054   10 000 0          CCS     A
 0390   REF   2  LAST  744     14,2055   1 2061 0          TCF     R52E            YES
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0391   REF   1                  14,2056  3 2160 1          CAF     V06N92          NO
0392   REF 184  LAST  744       14,2057  0 4662 1          TC      BANKCALL
0393   REF   3  LAST  741       14,2060   20676 1          CADR    GODSPR
0394   REF   9  LAST  744       14,2061  3 1314 0  R52E    CA      SWSAMPLE        IS OSS IN CMC MODE
0395                            14,2062  0 0006 1          EXTEND
0396   REF   1                  14,2063  6 2074 0          BZMF    R52F            NO
0397   REF  42  LAST  744       14,2064  4 0074 0          CS      STATE           YES- IS TRUNFLAG SET
0398   REF  28  LAST  739       14,2065  7 5014 0          MASK    BIT4
0399   REF 173  LAST  744       14,2066  10 000 0          CCS     A
0400                            14,2067  0 2072 0          TC      +3              NO
0401   REF   7  LAST  453       14,2070  3 1775 0          CA      PAC             YES
0402   REF   7  LAST  744       14,2071  55'160 0          TS      DESOPTT
0403   REF   8  LAST  738       14,2072  3 1773 0          CA      SAC
0404   REF   5  LAST  452       14,2073  55'161 1          TS      DESOPTS
0405   REF   5  LAST  536       14,2074  3 5036 1  R52F    CAF     .5SEC           WAIT 1/2 SEC
0406   REF 185  LAST  745       14,2075  0 4662 1          TC      BANKCALL
0407   REF  11  LAST  687       14,2076   01732 0          CADR    DELAYJOB
0408   REF  30  LAST  744       14,2077  3 5006 1          CAF     BIT10
0409   REF  43  LAST  745       14,2100  7 0075 1          MASK    STATE +1
0410   REF 174  LAST  745       14,2101  10 000 0          CCS     A
0411   REF   1                  14,2102  1 2113 1          TCF     R52HA           YES, LEM
0412   REF  35  LAST  733       14,2103  3 5001 0          CAF     BIT15           NO
0413   REF  44  LAST  745       14,2104  7 0103 1          MASK    STATE +7        IS TERMIFLG SET
0414                            14,2105  0 0006 1          EXTEND
0415   REF   1                  14,2106  1 2035 1          BZF     R52C            NO
0416   REF 173  LAST  744       14,2107  0 6006 1  R52Q    TC      INTPRET         YES
0417                            14,2110   77650 1          GOTO
0418   REF   3  LAST  744       14,2111   02576 1                  SAVQR52
0419                            14,2112   77776 1  R52H    EXIT                    LEM
0420   REF 186  LAST  745       14,2113  0 4662 1  R52HA   TC      BANKCALL
0421   REF   2  LAST  564       14,2114   76557 1          CADR    R61CSM
0422   REF  45  LAST  745       14,2115  3 0075 0          CA      STATE +1
0423   REF  27  LAST  568       14,2116  7 5013 1          MASK    BIT5
0424                            14,2117  0 0006 1          EXTEND                  TRACKFLG
0425   REF   1                  14,2120  1 2107 1          BZF     R52Q

0426   REF  46  LAST  745       14,2121  4 0075 1          CS      STATE +1
0427   REF  33  LAST  733       14,2122  7 5011 0          MASK    BIT7            UPDATFLG
0428   REF 175  LAST  745       14,2123  10 000 0          CCS     A
0429   REF   1                  14,2124  1 2131 1          TCF     R52SYNC

0430   REF  47  LAST  745       14,2125  3 0101 1  R52I    CA      STATE +5
0431   REF  31  LAST  745       14,2126  7 5006 0          MASK    BIT10
0432   REF 176  LAST  745       14,2127  10 000 0          CCS     A
0433   REF   1                  14,2130  0 2040 1          TC      R52D            PRFTRKAT = 1
0434   REF   1                  14,2131  3 2204 0  R52SYNC CAF     1.8SEC          MAKE UP FOR LOST TIME
0435   REF   2  LAST  745       14,2132  1 2075 0          TCF     R52F +1

0436   REF  53  LAST  739       14,2133  0 5560 1  R52J    TC      DOWNFLAG        CLEAR TRUNFLAG
0437   REF   3  LAST  744       14,2134   00013 0          ADRES   TRUNFLAG        BIT 4  FLAG 0
```

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0438  REF  29  LAST  741   14,2135  0 5650 1           TC     ALARM          SET 407 ALARM
0439                       14,2136   00407 1           OCT    407
0440  REF   1              14,2137  0 2046 1           TC     R52JA
0441  REF  32  LAST  744   14,2140  3 5012 1  R52M     CAF    BIT6           IS R53FLAG SET
0442  REF  48  LAST  745   14,2141  7 0074 0           MASK   STATE
0443  REF 177  LAST  745   14,2142  10 000 0           CCS    A
0444  REF   3  LAST  745   14,2143  0 2074 0           TC     R52F           YES
0445                       14,2144  0 0004 0           INHINT                NO
0446  REF   1              14,2145  3 7661 1           CAF    PRIO24
0447  REF  25  LAST  709   14,2146  0 5147 0           TC     FINDVAC
0448  REF   9  LAST  745   E5,1773                     EBANK= SAC
0449  REF   1              14,2147   02153 1           2CADR  R53JOB
0449  REF   1              14,2150   30065 1
0450                       14,2151  0 0003 1           RELINT
0451  REF   4  LAST  746   14,2152  1 2074 1           TCF    R52F
0452  REF 174  LAST  745   14,2153  0 6006 1  R53JOB   TC     INTPRET
0453                       14,2154   77624 1           CALL
0454  REF   2  LAST  620   14,2155   31300 0                  R53
0455                       14,2156   77776 1  ENDPLAC  EXIT                  INTERPRETER RETURN TO ENDOFJOB(R22 USES)
0456  REF  88  LAST  739   14,2157  0 5217 0           TC     ENDOFJOB
0457                       14,2160   01534 1  V06N92   VN     00692
0458                       14,2161   01531 1  V06N89A  VN     0689
0459                       14,2162   10464 0  SHAXIS   2DEC   .5376381241 B-1
                           14,2163   12470 1

0460                       14,2164   00000 1           2DEC   0
0460                       14,2165   00000 1
0461                       14,2166   15373 1           2DEC   .8431766920 B-1
0461                       14,2167   11554 0
0462  REF  32  LAST  745   14,2170  3 5006 1  R52L     CAF    BIT10          IS THIS A LEM
0463  REF  49  LAST  746   14,2171  7 0075 1           MASK   STATE +1
0464  REF 178  LAST  746   14,2172  10 000 0           CCS    A
0465  REF   2  LAST  744   14,2173  0 2133 1           TC     R52J           YES
0466  REF   1              14,2174  3 2203 1           CAF    OCT404
0467  REF 187  LAST  745   14,2175  0 4662 1           TC     BANKCALL
0468  REF   1              14,2176   21766 0           CADR   PRIOLARM
0469  REF   2  LAST  232   14,2177  1 2205 0           TCF    TERM52         TERMINATE
0470  REF   5  LAST  746   14,2200  1 2074 1           TCF    R52F           PROCEED
0471  REF   6  LAST  746   14,2201  1 2074 1           TCF    R52F           NO PROVISION FOR NEW DATA
0472  REF  89  LAST  746   14,2202  1 5217 1           TCF    ENDOFJOB

0473                       14,2203   00404 1  OCT404   OCT    404

0474                       14,2204   00264 1  1.8SEC   DEC    180

0475  REF   4  LAST  232   14,2205  0 5536 1  TERM52   TC     CLEARMRK

0476  REF 188  LAST  746   14,2206  0 4662 1           TC     BANKCALL       KILL MARK SYSTEM
0477  REF   6  LAST  599   14,2207   16063 0           CADR   MKRELEAS
```

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0478   REF 146  LAST  733   14,2210  3 5021 1          CAF     ZERO
0479   REF   3  LAST  242   14,2211  55'323 0          TS      OPTCADR

0480   REF 189  LAST  746   14,2212  0 4662 1          TC      BANKCALL        CLEAR OUT EXTENDED VERBS
0481   REF   3  LAST  573   14,2213   20560 0          CADR    KLEENEX

0482   REF  53  LAST  743   14,2214  0 4106 1          TC      GOTOPOOH        NOW GO TO POO

0483                        14,2215   43020 1 ADVORB    STQ     SET             SETS UP ADVANCED ORBIT TRACKING
0484   REF   4  LAST  745   14,2216   02576 1                   SAVOR52
0485   REF   2  LAST  744   14,2217   04065 0                   ADVTRK
0486                        14,2220   43014 0          SET     SET
0487   REF  17  LAST  742   14,2221   01463 1                   LUNAFLAG
0488   REF   8  LAST  742   14,2222   00462 1                   ERADFLAG
0489                        14,2223   77650 1          GOTO
0490   REF   1              14,2224   30014 1                   R52VRB
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P0491   NAME -S50 ALIAS  LOCSAM
R0492   NAME- LOCSAM
R0493   FUNCTION -TO COMPUTE QUATITIGS LISTED BELOW ,USED IN THE
R0494              IMU ALIGNMENT PROGRAMS
R0495   DEFINE:
R0496        RATT=POSITION VECTOR OF CM  WRT PRIMARY BODY
R0497        VATT=VELOCITY VECTOR OF CM  WRT PRIMARY BODY
R0498        RE  =RADIUS OF EARTH
R0499        RM  =RADIUS OF MOON
R0500        ECLIPOL= POLE OF ECLIPTIC SCALED BY TANGENTIAL VELOCITY OF EARTH
R0501                 WRT TO SUN  OVER  THE VELOCITY OF LIGHT
R0502        REM =POSITION OF MOON  WRT  EARTH
R0503        RES =POSITION OF SUN  WRT EARTH
R0504        C = VELOCITY OF LIGHT
R0505
R0506
R0507             EARTH IS PRIMARY                MOON IS PRIMARY
R0508                  -                               -
R0509             VEARTH=-1(RATT)                 VEARTH=-1(REM+RATT)
R0510
R0511                  -                               -
R0512             VMOON= 1(REM-RATT)              VMOON =-1(RATT)
R0513
R0514                  -                               -
R0515             VSUN = 1(RES)                   VSUN  =1(RES-REM)
R0516
R0517                          -1
R0518             CEARTH=COS(SIN (RE/RATT)+5)     CEARTH=COS 5
R0519
R0520                                                          -1
R0521             CMOON= COS 5                    CMOON=COS(SIN CRM/RATT)+5)
R0522
R0523
R0524             CSUN = COS 15                   CSUN = COS 15
R0525
R0526
R0527                          VEL/C = VSUN X ECLIPOL + VATT/C
R0528
R0529
R0530
R0531   CALL -    DLOAD  CALL
R0532                    DESIRED TIME
R0533                    LOCSAM
R0534   INPUTS - MPAC = TIME
R0535
R0536   OUTPUTS- VEARTH,VMOON,VSUN,CEARTH,CMOON,CSUN,VEL/C
R0537
R0538   SUBROUTINES- LSPOS,CSMCONIC
R0539
R0540   DEBRIS - VAC AREA,SEE SUBROUTINES
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R0541
 0542   REF   2  LAST  743   14,2000                          SETLOC P50S1
 0543                       14,2225                          BANK

 0544   REF   1                                              COUNT* $$/S50

 0545   REF   1             14,2225              LOCSAM      =      S50
 0546                       14,2225   77620 0    S50         STQ
 0547   REF   4  LAST  743   14,2226   00300 1                       QMAJ
 0548   REF   7  LAST  743   14,2227   36607 0               STCALL  TSIGHT
 0549   REF   1             14,2230   54110 0                       LSPOS
 0550   REF   2  LAST   95   14,2231   26752 0               STOVL   VMOON
 0551                       14,2232   00003 1                       2D
 0552   REF   2  LAST   95   14,2233   16744 1               STODL   VSUN
 0553   REF   8  LAST  749   14,2234   02607 1                       TSIGHT
 0554   REF  40  LAST  743   14,2235   34041 0               STCALL  TDEC1
 0555   REF   5  LAST  596   14,2236   27114 0                       CSMCONIC
 0556                       14,2237   61131 0               SSP     TIX,2
 0557   REF  10  LAST  634   14,2240   00052 0                       S2
 0558                       14,2241   00000 1                       0
 0559   REF   1             14,2242   30265 0                       MOONCNTR
 0560                       14,2243   52375 1    EARTCNTR   VLOAD   VSU
 0561   REF   3  LAST  749   14,2244   02752 0                       VMOON
 0562   REF  23  LAST  743   14,2245   00001 0                       RATT
 0563                       14,2246   77656 1               UNIT
 0564   REF   4  LAST  749   14,2247   26752 0               STOVL   VMOON
 0565   REF  24  LAST  749   14,2250   00001 0                       RATT
 0566                       14,2251   57456 1               UNIT    VCOMP
 0567   REF   3  LAST   95   14,2252   16736 1               STODL   VEARTH
 0568   REF   1             14,2253   32250 1                       RSUBE
 0569                       14,2254   77624 1               CALL
 0570   REF   1             14,2255   30325 0                       OCCOS
 0571   REF   1             14,2256   14017 1               STODL   CEARTH
 0572   REF   1             14,2257   32266 1                       CSS5
 0573   REF   1             14,2260   24023 0               STOVL   CMOON
 0574   REF   3  LAST  749   14,2261   02744 1                       VSUN
 0575                       14,2262   77656 1               UNIT
 0576   REF   4  LAST  749   14,2263   36744 0               STCALL  VSUN
 0577   REF   1             14,2264   30312 1                       ENDSAM
 0578                       14,2265   40575 1    MOONCNTR   VLOAD   VSR8
 0579   REF   5  LAST  749   14,2266   02752 0                       VMOON
 0580                       14,2267   51362 1               VSR1    BVSU
 0581   REF   5  LAST  749   14,2270   02744 1                       VSUN
 0582                       14,2271   77656 1               UNIT
 0583   REF   6  LAST  749   14,2272   25744 1               STOVL   VSUN
 0584   REF   6  LAST  749   14,2273   02752 0                       VMOON
 0585                       14,2274   53455 0               VAD     UNIT
 0586   REF  25  LAST  749   14,2275   00001 0                       RATT
 0587                       14,2276   77676 0               VCOMP
 0588   REF   4  LAST  749   14,2277   26736 1               STOVL   VEARTH
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0589   REF  26  LAST  749   14,2300   00001 0                    RATT
0590                        14,2301   57456 1          UNIT      VCOMP
0591   REF   7  LAST  749   14,2302   16752 0          STODL     VMOON
0592   REF   1               14,2303   32246 0                    RSUBM
0593                        14,2304   77624 1          CALL
0594   REF   2  LAST  749   14,2305   30325 0                    OCCOS
0595   REF   2  LAST  749   14,2306   14023 0          STODL     CMOON
0596   REF   2  LAST  749   14,2307   32266 1                    CSS5
0597   REF   2  LAST  749   14,2310   24017 1          STOVL     CEARTH
0598   REF   7  LAST  749   14,2311   02744 1                    VSUN
0599                        14,2312   77635 1  ENDSAM  VXV
0600   REF   1               14,2313   32256 1                    ECLIPOL
0601   REF   2  LAST  117   14,2314   27474 0          STOVL     VEL/C
0602   REF  22  LAST  743   14,2315   00007 0                    VATT
0603                        14,2316   53361 0          VXSC      VAD
0604   REF   1               14,2317   32254 0                    1/C
0605   REF   3  LAST  750   14,2320   03474 0                    VEL/C
0606   REF   4  LAST  750   14,2321   17474 0          STODL     VEL/C
0607   REF   1               14,2322   32270 0                    CSSUN
0608   REF   1               14,2323   34021 0          STCALL    CSUN
0609   REF   5  LAST  749   14,2324   00300 1                    QMAJ
0610                        14,2325   70471 1  OCCOS   DDV       SR1
0611                        14,2326   00045 0                    360
0612                        14,2327   43336 0          ASIN      DAD
0613   REF   1               14,2330   32252 0                    5DEGREES
0614                        14,2331   70546 1          COS       SR1
0615                        14,2332   77616 0          RVQ
0616   REF   2  LAST  738   15,2000                    SETLOC    P5OS
0617                        15,2245                    BANK
0618                        15,2245   00065 1  RSUBM   2DEC      1738090 B-29     MOON RADIUS IN METERS
0618                        15,2246   01265 1
0619                        15,2247   00302 0  RSUBE   2DEC      6378166 B-29
0619                        15,2250   24533 1
0620                        15,2251   00343 0  5DEGREES 2DEC     .013888889       SCALED IN REVS
0620                        15,2252   21616 0
0621                        15,2253   00000 1  1/C     2DEC      .000042699 B-1   *
0621                        15,2254   13143 0
0622                        15,2255   00000 1  ECLIPOL 2DEC      0                *
0622                        15,2256   00000 1
0623                        15,2257   77777 0          2DEC      -.00007896 B-1   *
0623                        15,2260   53231 1
0624                        15,2261   00001 0          2DEC      .00018209 B-1    *            * FOR USE BY CSM ONLY
0624                        15,2262   17570 0
0625                        15,2263   00001 0  TSIGHT1 2DEC      24000
0625                        15,2264   16700 1
0626                           0016           CEARTH  =         14D
0627                           0020           CSUN    =         16D
0628                           0022           CMOON   =         18D
0629                        15,2265   07760 1  CSS5    2DEC      .2490475         (COS 5)/4
0629                        15,2266   14473 1
```

L   P51-P53   USER'S PAGE NO. 15   E5 S3

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0630                    15,2267   07564 1  CSSUN    2DEC    .24148          COS 15  /4
0630                    15,2270   15042 0
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R0631   PROGRAM NAME - PICAPAR          DATE DEC 20 66
R0632   MOD 1                          LOG SECTION P51-P53
R0633                                  ASSEMBLY  SUNDISK  REV40
R0634   BY KEN VINCENT
R0635
R0636   FUNCTION
R0637     THIS PROGRAM READ THE IMU-CDUS AND COMPUTES THE VEHICLE ORIENTATION
R0638   WITH RESPECT TO INERTIAL SPACE. IT THEN COMPUTES THE SHAFT AXIS (SAX)
R0639   WITH RESPECT TO REFERENCE INERTIAL. EACH STAR IN THE CATALOG IS TESTED
R0640   TO DETERMINE IF IT IS OCCULTED BY EITHER THE EARTH,SUN OR MOON. IF A
R0641   STAR IS NOT OCCULTED  THEN IT IS PAIRED WITH ALL STAR OF LOWER INDEX.
R0642   THE PAIRED STAR  IS TESTED FOR OCCULTATION. PAIRS OF STARS THAT PASS
R0643   THE OCCULTATION TESTS ARE TESTED FOR GOOD SEPARATION.A PAIR OF STARS
R0644   HAVE GOOD SEPARATION IF THE ANGLE BETWEEN THEM IS LESS THAN 66DEGREES
R0645   AND MORE THAN 40DEGREES. THOSE PAIRS OF STARS WITH GOOD SEPARATION
R0646   ARE THEN TESTED TO SEE IF THEY LIE IN CURRENT FIELD OF VIEW.(WITHIN
R0647   33DEGREES OF SAX). THE PAIR WITH MAXIMUM SEPARATION IS CHOSEN FROM
R0648   THOSE WITH GOOD SEPARATION,AND     IN FIELD OF VIEW.
R0649
R0650   CALLING SEQUENCE
R0651   L         TC     BANKCALL
R0652   L+1       CADR   PICAPAR
R0653   L+2       ERROR RETURN - NO STARS IN FIELD OF VIEW
R0654   L+3       NORMAL RETURN
R0655
R0656   OUTPUT
R0657   BESTI,BESTJ -SINGLE PREC,INTEGERS,STAR NUMBERS TIMES 6
R0658   VFLAG - FLAG BIT  SET IMPLIES NO STARS IN FIELD OF VIEW
R0659
R0660   INITIALIZATION
R0661   1)A CALL TO LOCSAM MUST BE MADE
R0662   2)VEARTH = -UNIT(R)  WHERE R HAS BEEN UPDATED TOO APPROXIMATE TIME OF
R0663        SIGHTINGS.
R0664
R0665   DEBRIS
R0666   WORK AREA
R0667   X,Y,ZNB
R0668   SINCDU,COSCDU
R0669   STARAD - STAR +5
 0670   REF   1                                          COUNT  14/PICAP

 0671   REF   3  LAST  749   14,2000                    SETLOC P50S1
 0672                        14,2333                    BANK
 0673   REF   3  LAST  574   14,2333  0 4711 1  PICAPAR TC     MAKECADR
 0674   REF   3  LAST  564   14,2334  55'777 0          TS     QHIN
 0675   REF 175  LAST  746   14,2335  0 6006 1          TC     INTPRET
 0676                        14,2336   77624 1          CALL
 0677   REF   6  LAST  717   14,2337   47477 0                 COUTRIG
 0678                        14,2340   77624 1          CALL
 0679   REF   1              14,2341   34612 0                 CALCSMSC
```

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0680                          14,2342  77601 0          SETPD
0681                          14,2343  00001 0                   0
0682                          14,2344  71214 0          SET      DLOAD          VFLAG = 1
0683  REF   1                 14,2345  01465 1                   VFLAG
0684  REF   1                 14,2346  11566 1                   DPZERO
0685  REF   8  LAST  621      14,2347  24303 1          STOVL    BESTI
0686  REF   4  LAST  431      14,2350  02714 1                   XNB
0687                          14,2351  63361 0          VXSC     PDVL
0688  REF   1                 14,2352  30511 1                   SIN33
0689  REF   4  LAST  424      14,2353  02730 1                   ZNB
0690                          14,2354  74370 0          AXT,1    VXSC
0691                          14,2355  00344 1                   228D           X1 = 37 X 6 +6
0692  REF   1                 14,2356  30513 0                   COS33
0693                          14,2357  77655 1          VAD
0694                          14,2360  53505 1          VXM      UNIT
0695  REF  25  LAST  741      14,2361  01736 1                   REFSMMAT
0696  REF   1                 14,2362  02760 1          STORE    SAX            SAX = SHAFT AXIS
0697                          14,2363  66331 0          SSP      SSP            S1=S2=6
0698  REF  25  LAST  645      14,2364  00051 0                   S1
0699                          14,2365  00006 1                   6
0700  REF  11  LAST  749      14,2366  00052 0                   S2
0701                          14,2367  00006 1                   6
0702                          14,2370  52100 1  PIC1    TIX,1    GOTO           MAJOR STAR
0703  REF   1                 14,2371  30373 0                   PIC2
0704  REF   1                 14,2372  30522 1                   PICEND
0705                          14,2373  45173 0  PIC2    VLOAD*   CALL
0706  REF   2  LAST  631      14,2374  31761 0                   CATLOG,1
0707  REF   1                 14,2375  30466 0                   OCCULT
0708                          14,2376  73014 0          BON      LXA,2
0709  REF   4  LAST  288      14,2377  01710 0                   CULTFLAG
0710  REF   1                 14,2400  30370 0                   PIC1
0711  REF  38  LAST  720      14,2401  00046 0                   X1
0712                          14,2402  52104 0  PIC3    TIX,2    GOTO
0713  REF   1                 14,2403  30405 0                   PIC4
0714  REF   2  LAST  753      14,2404  30370 0                   PIC1
0715                          14,2405  45173 0  PIC4    VLOAD*   CALL
0716  REF   3  LAST  753      14,2406  46016 1                   CATLOG,2
0717  REF   2  LAST  753      14,2407  30466 0                   OCCULT
0718                          14,2410  76614 0          BON      VLOAD*
0719  REF   5  LAST  753      14,2411  01710 0                   CULTFLAG
0720  REF   1                 14,2412  30402 1                   PIC3
0721  REF   4  LAST  753      14,2413  31761 0                   CATLOG,1
0722                          14,2414  45237 0          DOT*     DSU
0723  REF   5  LAST  753      14,2415  46016 1                   CATLOG,2
0724  REF   1                 14,2416  30515 0                   CSS66          SEPERATION LESS THAN 66 DEG.
0725                          14,2417  43240 0          BMN      DAD
0726  REF   2  LAST  753      14,2420  30402 1                   PIC3
0727  REF   1                 14,2421  30517 1                   CSS6640        SEPERATION MORE THAN 40 DEG.
0728                          14,2422  77644 1          BPL
0729  REF   3  LAST  753      14,2423  30402 1                   PIC3
```

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0730                                14,2424   50373 0          VLOAD*  DOT
0731  REF   6  LAST  753            14,2425   31761 0                  CATLOG,1
0732  REF   2  LAST  753            14,2426   02760 1                  SAX
0733                                14,2427   50025 0          DSU     BMN             MAJOR STAR IN CONE
0734  REF   1                       14,2430   30521 1                  CSS33
0735  REF   3  LAST  753            14,2431   30370 0                  PICI
0736                                14,2432   50373 0          VLOAD*  DOT
0737  REF   7  LAST  754            14,2433   46016 1                  CATLOG,2
0738  REF   3  LAST  754            14,2434   02760 1                  SAX
0739                                14,2435   51025 1          DSU     BPL
0740  REF   2  LAST  754            14,2436   30521 1                  CSS33
0741  REF   1                       14,2437   30442 0                  STRATGY
0742                                14,2440   77650 1          GOTO
0743  REF   4  LAST  753            14,2441   30402 1                  PIC3
0744                                14,2442   77614 1  STRATGY BONCLR
0745  REF   2  LAST  753            14,2443   01605 0                  VFLAG
0746  REF   1                       14,2444   30461 1                  NEWPAR
0747                                14,2445   65120 1          XCHX,1  XCHX,2
0748  REF   9  LAST  753            14,2446   00302 0                  BESTI
0749  REF   2  LAST   72            14,2447   00303 1                  BESTJ
0750                                14,2450   47773 1  STRAT   VLOAD*  DOT*
0751  REF   8  LAST  754            14,2451   31761 0                  CATLOG,1
0752  REF   9  LAST  754            14,2452   46016 1                  CATLOG,2
0753                                14,2453   43006 0          PUSH    BOFINV
0754  REF   3  LAST  754            14,2454   01545 1                  VFLAG
0755  REF   1                       14,2455   30445 1                  STRAT -3
0756                                14,2456   45345 1          DLOAD   DSU
0757                                14,2457   77644 1          BPL
0758  REF   5  LAST  754            14,2460   30402 1                  PIC3
0759                                14,2461   67130 1  NEWPAR  SXA,1   SXA,2
0760  REF  10  LAST  754            14,2462   00302 0                  BESTI
0761  REF   3  LAST  754            14,2463   00303 1                  BESTJ
0762                                14,2464   77650 1          GOTO
0763  REF   6  LAST  754            14,2465   30402 1                  PIC3
0764                                14,2466   51321 0  OCCULT  MXV     BVSU
0765  REF   1                       14,2467   02736 1                  CULTRIX
0766  REF   1                       14,2470   00017 1                  CSS
0767                                14,2471   77654 0          BZE
0768  REF   1                       14,2472   30505 1                  CULTED
0769                                14,2473   75240 0          BMN     SIGN
0770  REF   2  LAST  754            14,2474   30505 1                  CULTED
0771  REF 272  LAST  727            14,2475   00160 0                  MPAC +3
0772                                14,2476   75240 0          BMN     SIGN
0773  REF   3  LAST  754            14,2477   30505 1                  CULTED
0774  REF 273  LAST  754            14,2500   00162 1                  MPAC +5
0775                                14,2501   43040 1          BMN     CLRGO
0776  REF   4  LAST  754            14,2502   30505 1                  CULTED
0777  REF   6  LAST  753            14,2503   01630 0                  CULTFLAG
0778  REF  12  LAST  634            14,2504   00052 0                  QPRET
0779                                14,2505   77614 1  CULTED  SETGO
```

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 0780   REF   7  LAST  754   14,2506   01430 1                    CULTFLAG
 0781   REF  13  LAST  754   14,2507   00052 0                    QPRET
 0782   REF   3  LAST  750      0016             CSS      =      CEARTH
 0783                       14,2510   21150 0  SIN33    2DEC   .5376381241
 0783                       14,2511   25157 0
 0784                       14,2512   32766 1  COS33    2DEC   .8431756920
 0784                       14,2513   22713 1
 0785                       14,2514   01736 1  CSS66    2DEC   .060480472      (COS76)/4
 0785                       14,2515   35137 1
 0786                       14,2516   73003 0  CSS6640  2DEC   -.15602587      (COS76 - COS30)/4
 0786                       14,2517   65403 0
 0787                       14,2520   06233 0  CSS33    2DEC   .197002688      COS(1/2(76))/4
 0787                       14,2521   26112 1
 0788                       14,2522   77414 0  PICEND   BOFF   EXIT
 0789   REF   4  LAST  754   14,2523   01745 0                    VFLAG
 0790   REF   1              14,2524   30526 0                    PICGXT
 0791   REF   1              14,2525  0 2530 0           TC       PICBXT
 0792                       14,2526   77776 1  PICGXT   EXIT
 0793   REF   4  LAST  752   14,2527  25'777 1           INCR     QMIN
 0794   REF   5  LAST  755   14,2530  3 1777 1  PICBXT   CA       QMIN
 0795   REF   3  LAST  420   14,2531  0 4666 0           TC       SWCALL
A0796                                          V1       =        120
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P0797   NAME-R51  FINE ALIGN
R0798   FUNCTION-TO ALIGN THE STABLE MEMBER TO REFSMMAT
R0799   CALLING SEQ- CALL  R51
R0800   INPUT- BESTI,BESTJ(PAIR OF STAR NO )
R0801   OUTPUT- GYRO TORQUE PULSES
R0802   SUBROUTINES- R52,R54,R55(SXTNB,NBSM,AXISGEN
 0803   REF   1                                          COUNT  14/R51

 0804                          14,2532   77776 1  R51     EXIT
 0805   REF  54  LAST  739     14,2533  3 5017 1          CAF    BITI
 0806   REF   4  LAST  619     14,2534  54 304 1          TS     STARIND
 0807   REF   6  LAST  619     14,2535  54 301 1          TS     MARKINDX
 0808   REF 176  LAST  752     14,2536  0 6006 1  R51.2   TC     INTPRET
 0809                          14,2537   43014 0  R51.3   CLEAR  CLEAR
 0810   REF   4  LAST  619     14,2540   00666 1          TARG2FLG
 0811   REF   7  LAST  744     14,2541   00665 1          TARG1FLG
 0812                          14,2542   77776 1          EXIT
 0813   REF  65  LAST  741     14,2543  0 5412 0          TC     PHASCHNG
 0814                          14,2544   05024 1          OCT    05024          RESTART  GR 4  FOR R52 - R53
 0815                          14,2545   13000 0          OCT    13000
 0816   REF   5  LAST  756     14,2546  50 304 0          INDEX  STARIND
 0817   REF  11  LAST  754     14,2547  3 0302 0          CA     BESTI
 0818                          14,2550  0 0006 1          EXTEND
 0819   REF   1                14,2551  7 2713 1          MP     176TH
 0820   REF   8  LAST  621     14,2552  54 735 1          TS     STARCODE
 0821   REF   1                14,2553  3 2712 1  R51DSP  CAF    V01N70
 0822   REF 190  LAST  747     14,2554  0 4662 1          TC     BANKCALL
 0823   REF  11  LAST  637     14,2555   21057 0          CADR   GOFLASHR
 0824   REF  54  LAST  747     14,2556  0 4106 1          TC     GOTOPOOH
 0825                          14,2557  0 2564 1          TC     +5
 0826                          14,2560  0 2553 0          TC     -5
 0827   REF  24  LAST  693     14,2561  3 6211 0          CAF    SIX
 0828   REF  11  LAST  626     14,2562  0 5526 0          TC     BLANKET
 0829   REF  90  LAST  746     14,2563  1 5217 1          TCF    ENDOFJOB
 0830   REF   1                14,2564  0 3366 1          TC     CHKSCODE
 0831   REF  11  LAST  627     14,2565  0 4400 1          TC     FALTON
 0832   REF   1                14,2566  0 2553 0          TC     R51DSP
 0833   REF 177  LAST  756     14,2567  0 6006 1          TC     INTPRET
 0834                          14,2570   45034 1          RTB    CALL
 0835   REF  20  LAST  740     14,2571   45510 1                 LOADTIME
 0836   REF   1                14,2572   32340 1                 PLANET
 0837                          14,2573   72131 1          SSP    LXA,1
 0838   REF  26  LAST  753     14,2574   00051 0                 S1
 0839                          14,2575   00000 1                 0
 0840   REF   6  LAST  756     14,2576   00304 0                 STARIND
 0841                          14,2577   77700 0          TIX,1
 0842   REF   1                14,2600   30603 1                 R51ST
 0843   REF   4  LAST  631     14,2601   36617 1          STCALL STARSAV2       2ND STAR
 0844   REF   2  LAST  756     14,2602   30604 0                 R51ST +1
 0845   REF   2  LAST   94     14,2603   02611 0  R51ST   STORE  STARSAV1       1ST STAR
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0846                                14,2604   77776 1          EXIT
0847  REF  13  LAST  688           14,2605  4 1011 1          CS      MODREG          IS THIS P54
0848  REF   1                      14,2606  6 2711 1          AD      OCT66
0849                                14,2607  0 0006 1          EXTEND
0850  REF   1                      14,2610  1 2704 1          BZF     R51B            YES
0851  REF 178  LAST  756           14,2611  0 6006 1          TC      INTPRET
0852                                14,2612   77624 1          CALL
0853  REF   4  LAST  622           14,2613   30011 1                  R52             AOP WILL MAKE CALLS TO SIGHTING
0854                                14,2614   77624 1  R51A    CALL                    COMPUTE LOS IN SM FROM MARK DATA
0855  REF   1                      14,2615   36022 1                  SXTSM
0856  REF   5  LAST  756           14,2616   02617 0          STORE   STARSAV2
0857                                14,2617   77776 1          EXIT
0858  REF 191  LAST  756           14,2620  0 4662 1          TC      BANKCALL
0859  REF   7  LAST  746           14,2621   16063 0          CADR    MKRELEAS
0860  REF 179  LAST  757           14,2622  0 6006 1          TC      INTPRET
0861                                14,2623   45145 0          DLOAD   CALL
0862  REF   9  LAST  749           14,2624   02607 1                  TSIGHT
0863  REF   2  LAST  756           14,2625   32340 1                  PLANET
0864                                14,2626   77776 1          EXIT
0865  REF   7  LAST  756           14,2627  10 304 1          CCS     STARIND
0866  REF   1                      14,2630  0 2671 0          TC      R51.4
0867  REF 180  LAST  757           14,2631  0 6006 1          TC      INTPRET
0868                                14,2632   53521 1          MXV     UNIT
0869  REF  26  LAST  753           14,2633   01736 1                  REFSMMAT
0870  REF   5  LAST  450           14,2634   02736 1          STORE   STARAD
0871                                14,2635   77775 1          VLOAD
0872  REF   6  LAST  757           14,2636   02617 0                  STARSAV2
0873                                14,2637   24007 0          STOVL   6D
0874  REF   3  LAST  756           14,2640   02611 0                  STARSAV1
0875                                14,2641   24015 0          STOVL   12D
0876  REF   2  LAST   93           14,2642   02601 1                  PLANVEC
0877  REF   6  LAST  757           14,2643   36744 0          STCALL  STARAD +6
0878  REF   1                      14,2644   30714 0                  R54             STAR DATA TEST
0879                                14,2645   45014 0          BOFF    CALL
0880  REF   1                      14,2646   00354 0                  FREEFLAG
0881  REF   2  LAST  742           14,2647   30655 1                  R51K
0882  REF   2  LAST  451           14,2650   47401 1                  AXISGEN
0883                                14,2651   77624 1          CALL
0884  REF   1                      14,2652   32271 1                  R55             GYRO TORQUE
0885                                14,2653   77614 1          CLEAR
0886  REF   3  LAST  742           14,2654   01273 0                  PFRATFLG
0887                                14,2655   77776 1  R51K    EXIT
0888  REF   2  LAST  159           14,2656  3 5771 0          CAF     OCT14
0889  REF 192  LAST  757           14,2657  0 4662 1          TC      BANKCALL
0890  REF   5  LAST  741           14,2660   21045 0          CADR    GOPERF1
0891  REF  55  LAST  756           14,2661  0 4106 1          TC      GOTOPOOH
0892                                14,2662  0 2664 1          TC      +2              V33
0893                                14,2663  0 2666 0          TC      +3
0894  REF 193  LAST  757           14,2664  0 4662 1          TC      BANKCALL
0895  REF   3  LAST  741           14,2665   32120 0          CADR    P52C
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0896   REF 181  LAST  757   14,2666  0 6006 1           TC      INTPRET
0897                        14,2667   77650 1           GOTO
0898   REF   1              14,2670   32145 0                   ENDP50S
0899   REF 182  LAST  758   14,2671  0 6006 1  R51.4    TC      INTPRET
0900                        14,2672   53521 1           MXV     UNIT
0901   REF  27  LAST  757   14,2673   01735 1                   REFSMMAT
0902   REF   3  LAST  757   14,2674   26601 1           STOVL   PLANVEC
0903   REF   7  LAST  757   14,2675   02617 0                   STARSAV2
0904   REF   4  LAST  757   14,2676   02611 0           STORE   STARSAV1
0905                        14,2677   77731 1           SSP
0906   REF   8  LAST  757   14,2700   00305 1                   STARIND
0907                        14,2701   00000 1                   0
0908                        14,2702   77650 1           GOTO
0909   REF   1              14,2703   30537 0                   R51.3
0910   REF 183  LAST  758   14,2704  0 6006 1  R51B     TC      INTPRET
0911                        14,2705   77624 1           CALL
0912   REF   1              14,2706   36056 1                   R56
0913                        14,2707   77650 1           GOTO
0914   REF   1              14,2710   30614 1                   R51A
0915                        14,2711   00066 1  OCT66    OCT     00066
0916                        14,2712   00306 1  V01N70   VN      0170
0917                        14,2713   05253 0  1/6TH    DEC     .1666667
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P0918   NAME-R55  GYRO TORQUE
R0919   FUNCTION-COMPUTE AND SEND GYRO PULSES
R0920   CALLING SEQ- CALL R55
R0921   INPUT- X,Y,ZDC- REFSMMAT WRT PRESENT STABLE MEMBER
R0922   OUTPUT- GYRO PULSES
R0923   SUBROUTINES- CALCGTA,GOFLASH,GODSPR,IMUFINE,IMUPULSE,GOPERF1
 0924   REF   3  LAST  750   15,2000                          SETLOC P50S
 0925                        15,2271                          BANK
 0926   REF   1                                              COUNT* $$/R55
 0927                        15,2271   77620 0  R55           STQ
 0928   REF   6  LAST  755   15,2272   02777 1                QMIN
 0929                        15,2273   77624 1                CALL
 0930   REF   4  LAST  741   15,2274   47205 0                CALCGTA
 0931                        15,2275   77776 1  PULSEM        EXIT
 0932   REF   1              15,2276  3 2322 0  R55.1         CAF     V06N93
 0933   REF 194  LAST  757   15,2277  0 4662 1                TC      BANKCALL
 0934   REF  35  LAST  743   15,2300   20720 0                CADR    GOFLASH
 0935   REF  56  LAST  757   15,2301  0 4106 1                TC      GOTOPOOH
 0936   REF   1              15,2302  0 2304 1                TC      R55.2
 0937   REF   1              15,2303  0 2317 0                TC      R55RET
 0938   REF  66  LAST  756   15,2304  0 5412 0  R55.2         TC      PHASCHNG
 0939                        15,2305   00314 1                OCT     00314
 0940   REF   2  LAST  741   15,2306  3 2323 1                CA      R55CDR
 0941   REF 195  LAST  759   15,2307  0 4662 1                TC      BANKCALL
 0942   REF   6  LAST  741   15,2310   17206 0                CADR    IMUPULSE
 0943   REF 196  LAST  759   15,2311  0 4662 1                TC      BANKCALL
 0944   REF   9  LAST  741   15,2312   17577 1                CADR    IMUSTALL
 0945   REF   2  LAST  741   15,2313  0 5757 1                TC      CURTAINS
 0946   REF  67  LAST  759   15,2314  0 5412 0                TC      PHASCHNG
 0947                        15,2315   05024 1                OCT     05024
 0948                        15,2316   13000 0                OCT     13000
 0949   REF 184  LAST  758   15,2317  0 6006 1  R55RET        TC      INTPRET
 0950                        15,2320   77650 1                GOTO
 0951   REF   7  LAST  759   15,2321   02777 1                QMIN
 0952                        15,2322   01535 0  V06N93        VN      0693
 0953   REF  16  LAST  544   15,2323   02757 0  R55CDR        ECADR   OGC
 0954   REF   1              14,2714            R54           =       CHKSDATA
R0955   ROUTINE NAME- CHKSDATA                                        DATE- JAN 9, 1967
R0957   MOD NO- 0                                                     LOG SECTION- P51-P53
R0959   MODIFICATION BY- LONSKE                                       ASSEMBLY-

R0961   FUNCTIONAL DESCRIPTION - CHECKS THE VALIDITY OF A PAIR OF STAR SIGHTINGS. WHEN A PAIR OF STAR SIGHTINGS ARE MADE
R0963   BY THE ASTRONAUT THIS ROUTINE OPERATES AND CHECKS THE OBSERVED SIGHTINGS AGAINST STORED STAR VECTORS IN THE
R0965   COMPUTER TO INSURE A PROPER SIGHTING WAS MADE. THE FOLLOWING COMPUTATIONS ARE PERFORMED_

R0967                    OS1 = OBSERVED STAR 1 VECTOR
R0968                    OS2 = OBSERVED STAR 2 VECTOR
R0969                    SS1 = STORED STAR 1 VECTOR
R0970                    SS2 = STORED STAR 2 VECTOR
R0971                     A1 = ARCCOS(OS1 - OS2)
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R0972                    A2 = ARCCOS(SS1 - SS2)
R0973                     A = ABS(Z(A1 - A2))

R0974   THE ANGULAR DIFFERENCE IS DISPLAYED FOR ASTRONAUT ACCEPTENCE
R0975   EXIT MODE 1. FREEFLAG SET  IMPLIES  ASTRONAUT WANTS TO PROCEED
R0976              2. FREEFLAG RESET IMPLIES ASTRONAUT WANTS TO RECYCLE          ERANCE)
R0978   OUTPUT - 1.VERB 6,NOUN 3- DISPLAYS ANGULAR DIFFERENCE BETWEEN 2 SETS OF STARS.
R0980            2.STAR VECTORS FROM STAR CATALOG ARE LEFT IN 6D AND 12D.

R0981   ERASABLE INITIALIZATION REQUIRED -
R0982            1.MARK VECTORS ARE STORED IN STARAD AND STARAD +6.
R0983            2.CATALOG VECTORS ARE STORED IN 6D AND 12D.
R0984   DEBRIS -
 0985   REF   4  LAST  752   14,2000                          SETLOC P50S1
 0986                        14,2714                          BANK
 0987   REF   1                                              COUNT* $$/R50
 0988                        14,2714   43020 1  CHKSDATA STQ    SET
 0989   REF   8  LAST  759   14,2715   02777 1                 QMIN
 0990   REF   2  LAST  757   14,2716   00074 1                 FREEFLAG
 0991                        14,2717   77760 0  CHKSAB   AXC,1                  SET X1 TO STORE  EPHEMERIS DATA
 0992   REF   7  LAST  757   14,2720   02735 1                 STARAD
R0993
 0994                        14,2721   47773 1  CHKSB    VLOAD* DOT*           CAL. ANGLE THETA
 0995                        14,2722   00001 0                 0,1
 0996                        14,2723   00007 0                 6,1
 0997                        14,2724   65552 0          SL1    ACOS
 0998   REF   1              14,2725   00025 0          STORE  THETA
 0999                        14,2726   43014 0          BOFF   INVERT         BRANCH TO CHKSD IF THIS IS 2ND PASS
 1000   REF   3  LAST  760   14,2727   00354 0                 FREEFLAG
 1001   REF   1              14,2730   30740 1                 CHKSD
 1002   REF   4  LAST  760   14,2731   00174 0                 FREEFLAG       CLEAR FREEFLAG
 1003                        14,2732   71360 1          AXC,1  DLOAD          SET X1 TO MARK ANGLES
 1004                        14,2733   00006 1                 6D
 1005   REF   2  LAST  760   14,2734   00025 0                 THETA
 1006                        14,2735   00023 0          STORE  18D
 1007                        14,2736   77650 1          GOTO
 1008   REF   1              14,2737   30721 0                 CHKSB          RETURN TO CAL. 2ND ANGLE
 1009                        14,2740   45345 1  CHKSD   DLOAD  DSU
 1010   REF   3  LAST  760   14,2741   00025 0                 THETA
 1011                        14,2742   00023 0                 18D            COMPUTE POS DIFF
 1012                        14,2743   47046 0          ABS    RTB
 1013   REF   3  LAST  504   14,2744   45544 0                 SGNAGREE
 1014   REF   1              14,2745   01046 1          STORE  NORMTEM1
 1015                        14,2746   77414 0          SET    EXIT
 1016   REF   5  LAST  760   14,2747   00074 1                 FREEFLAG
 1017   REF 147  LAST  747   14,2750   3 5021 1         CAF    ZERO
 1018   REF 197  LAST  759   14,2751   0 4662 1         TC     BANKCALL
 1019   REF   5  LAST  686   14,2752    20703 1         CADR   CLEANDSP

 1020   REF   1              14,2753   3 2767 0         CAF    V86N5
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 1021   REF 198  LAST  760   14,2754  0 4662 1           TC     BANKCALL
 1022   REF  36  LAST  759   14,2755   20720 0           CADR   GOFLASH
 1023   REF  57  LAST  759   14,2756  1 4106 0           TCF    GOTOPOOH
 1024   REF   1               14,2757  0 2764 0           TC     CHKSDA          PROCEED
 1025   REF 185  LAST  759   14,2760  0 6006 1           TC     INTPRET
 1026                        14,2761   52014 0           CLEAR  GOTO
 1027   REF   6  LAST  760   14,2762   00274 0                  FREEFLAG
 1028   REF   9  LAST  760   14,2763   02777 1                  QMIN
 1029   REF 186  LAST  761   14,2764  0 6006 1  CHKSDA   TC     INTPRET
 1030                        14,2765   77650 1           GOTO
 1031   REF  10  LAST  761   14,2766   02777 1                  QMIN
 1032                        14,2767   01405 1  VB6N5    VN     605
R1033   NAME - CAL53A
R1034   NAME - CAL53A
R1035   FUNCTION - COARSE ALIGN THE IMU, IF NECESSARY.
R1036   CALLING SEQUENCE - CALL CAL53A
R1037   INPUT -  PRESENT GIMBAL ANGLES - COUX,COUY,COUZ
R1038            DESIRED GIMBAL ANGLES - THETAD,+1,+2
R1039   OUTPUT - THE IMU COORDINATES ARE STORED IN REFSMMAT
R1040   SUBROUTINES USED - 1.IMUCOARS 2.IMUSTALL 3.CURTAINS
 1041   REF   2 LAST  760 TO  761:    44    44*          COUNT  14/R50

 1042                        14,2770   77624 1  CAL53A   CALL
 1043   REF   2  LAST  740   14,2771   22331 0                  S52.2           MAKE FINAL COMP OF GIMBAL ANGLES
 1044                        14,2772   66234 1           RTB    SSP
 1045   REF   1               14,2773   32324 0                  RDCDUS          READ CDUS
 1046   REF  27  LAST  756   14,2774   00051 0                  S1
 1047                        14,2775   00001 0                  1
 1048                        14,2776   40370 1           AXT,1  SETPD
 1049                        14,2777   00003 1                  3
 1050                        14,3000   00005 1                  4
 1051                        14,3001   70543 1  CALOOP   DLOAD* SR1
 1052   REF  16  LAST  597   14,3002   01161 0                  THETAD +3D,1
 1053                        14,3003   70523 1           PDDL*  SR1
 1054                        14,3004   00005 1                  4,1
 1055                        14,3005   51425 0           DSU    ABS
 1056                        14,3006   45206 1           PUSH   DSU
 1057   REF   1               14,3007   31066 0                  DEGREE1
 1058                        14,3010   71240 1           BMN    DLOAD
 1059   REF   1               14,3011   31042 0                  CALOOP1
 1060                        14,3012   51025 1           DSU    BPL
 1061   REF   1               14,3013   31067 1                  DEG359
 1062   REF   2  LAST  761   14,3014   31042 0                  CALOOP1
 1063                        14,3015   77776 1  COARFINE EXIT
 1064   REF  68  LAST  759   14,3016  0 5412 0           TC     PHASCHNG
 1065                        14,3017   04024 0           OCT    04024
 1066   REF 199  LAST  761   14,3020  0 4662 1           TC     BANKCALL
 1067   REF   4  LAST  428   14,3021   16663 0           CADR   IMUCOARS        PERFORM COARSE ALIGNMENT
 1068   REF 200  LAST  761   14,3022  0 4662 1           TC     BANKCALL
 1069   REF  10  LAST  759   14,3023   17577 1           CADR   IMUSTALL        REQUEST MODE SWITCH
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1070   REF   3  LAST  759   14,3024  0 5757 1            TC     CURTAINS
1071   REF 201  LAST  761   14,3025  0 4662 1            TC     BANKCALL
1072   REF   1                14,3026   17073 0          CADR   IMUFIN20
1073   REF 202  LAST  762   14,3027  0 4662 1            TC     BANKCALL
1074   REF  11  LAST  761   14,3030   17577 1            CADR   IMUSTALL
1075   REF   4  LAST  762   14,3031  0 5757 1            TC     CURTAINS       TEST FOR MALFUNCTION
1076   REF 187  LAST  761   14,3032  0 6006 1            TC     INTPRET
1077                        14,3033   77234 1            RTB    VLOAD
1078   REF   2  LAST  742   14,3034   31275 0                   SET1/PDT
1079   REF   9  LAST  742   14,3035   11566 1                   ZEROVEC
1080   REF  19  LAST  742   14,3036   01472 1            STORE  GCOMP
1081                        14,3037   52014 0            SET    GOTO
1082   REF   3  LAST  742   14,3040   01060 0                   DRIFTFLG
1083   REF   1                14,3041   31044 0                   FINEONLY
1084                        14,3042   77700 0  CALOOP1   TIX,1
1085   REF   1                14,3043   31001 1                   CALOOP
1086                        14,3044   75160 1  FINEONLY  AXC,1   AXC,2
1087   REF  31  LAST  537   14,3045   02671 0                   XSM
1088   REF  28  LAST  758   14,3046   01735 1                   REFSMMAT
1089                        14,3047   77624 1            CALL
1090   REF   2  LAST  742   14,3050   31053 0                   MATMOVE
1091                        14,3051   77650 1            GOTO
1092   REF   1                14,3052   32116 0                   CAL53RET
1093                        14,3053   77773 1  MATMOVE   VLOAD*                 TRANSFER MATRIX
1094                        14,3054   00001 0                   0,1
1095                        14,3055   10001 1            STORE  0,2
1096                        14,3056   77773 1            VLOAD*
1097                        14,3057   00007 0                   6D,1
1098                        14,3060   10007 1            STORE  6D,2
1099                        14,3061   77773 1            VLOAD*
1100                        14,3062   00015 0                   12D,1
1101                        14,3063   10015 1            STORE  12D,2
1102                        14,3064   77616 0            RVQ
1103                        14,3065   00056 1  DEGREE1   DEC    46
1104                        14,3066   37722 1  DEG359    DEC    16338
1105   REF   4  LAST  759   15,2000                     SETLOC P50S
1106                        15,2324                     BANK
1107                        15,2324  0 0004 0  RDCDUS    INHINT                  READ CDUS
1108   REF  16  LAST  705   15,2325   3 0032 0          CA     CDUX
1109   REF  12  LAST  596   15,2326   50 120 1          INDEX  FIXLOC
1110                        15,2327   54 001 1          TS     1
1111   REF   7  LAST  705   15,2330   3 0033 1          CA     CDUY
1112   REF  13  LAST  762   15,2331   50 120 1          INDEX  FIXLOC
1113                        15,2332   54 002 1          TS     2
1114   REF  10  LAST  705   15,2333   3 0034 0          CA     CDUZ
1115   REF  14  LAST  762   15,2334   50 120 1          INDEX  FIXLOC
1116                        15,2335   54 003 0          TS     3
1117                        15,2336   0 0003 1          RELINT
1118   REF   5  LAST  547   15,2337   0 6030 1          TC     DANZIG                                    +
R1119  NAME - GIMB
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R1120   FUNCTION - DETERMINE AND COMPUTE THE DESIRED GIMBAL ANGLES TO BE USED          FOR COARSE ALIGNMENT.
R1122   CALLING SEQUENCE - CALL GIMB
R1123   INPUT - DESIRED IMU INERTIAL ORIENTATION VECTORS-XSMD,YSMD,ZSMD
R1124   OUTPUT - GIMBAL ANGLES LEFT IN THETAD,+1,+2                                  +
R1125   SUBROUTINES USED - 1.CDUTRIG 2.CALCSMSC 3.CALCGA
 1126   REF   2  LAST  742   16,2000                        SETLOC  P50S2
 1127                        16,2612                        BANK
 1128   REF   1                                            COUNT   14/INFLT

 1129                        16,2612   41345 0  CALCSMSC    DLOAD   DMP
 1130   REF   1              16,2613   00737 1                      SINCDUY
 1131   REF   2  LAST  544   16,2614   00747 0                      COSCDUZ
 1132                        16,2615   77676 0            DCOMP
 1133                        16,2616   70525 1            PDDL    SR1
 1134   REF   2  LAST  544   16,2617   00741 0                      SINCDUZ
 1135                        16,2620   41325 0            PDDL    DMP
 1136   REF   1              16,2621   00745 1                      COSCDUY
 1137   REF   3  LAST  763   16,2622   00747 0                      COSCDUZ
 1138                        16,2623   76466 1            VDEF    VSL1
 1139   REF   5  LAST  753   16,2624   02714 1            STORE   XNB
 1140                        16,2625   41345 0            DLOAD   DMP
 1141   REF   3  LAST  545   16,2626   00743 1                      SINCDUX
 1142   REF   3  LAST  763   16,2627   00741 0                      SINCDUZ
 1143                        16,2630   77752 1            SL1
 1144                        16,2631   00033 1            STORE   26D
 1145                        16,2632   77605 1            DMP
 1146   REF   2  LAST  763   16,2633   00737 1                      SINCDUY
 1147                        16,2634   41325 0            PDDL    DMP
 1148   REF   3  LAST  545   16,2635   00751 1                      COSCDUX
 1149   REF   2  LAST  763   16,2636   00745 1                      COSCDUY
 1150                        16,2637   77625 0            DSU
 1151                        16,2640   41325 0            PDDL    DMP
 1152   REF   4  LAST  763   16,2641   00743 1                      SINCDUX
 1153   REF   4  LAST  763   16,2642   00747 0                      COSCDUZ
 1154                        16,2643   77676 0            DCOMP
 1155                        16,2644   41325 0            PDDL    DMP
 1156   REF   4  LAST  763   16,2645   00751 1                      COSCDUX
 1157   REF   3  LAST  763   16,2646   00737 1                      SINCDUY
 1158                        16,2647   41325 0            PDDL    DMP
 1159   REF   3  LAST  763   16,2650   00745 1                      COSCDUY
 1160                        16,2651   00033 1                      26D
 1161                        16,2652   55415 1            DAD     VDEF
 1162                        16,2653   77772 0            VSL1
 1163   REF   5  LAST  753   16,2654   02730 1            STORE   ZNB
 1164                        16,2655   76435 1            VXV     VSL1
 1165   REF   6  LAST  763   16,2656   02714 1                      XNB
 1166   REF   4  LAST  424   16,2657   02722 1            STORE   YNB
 1167                        16,2660   77616 0            RVQ
R1168   NAME - P51 - IMU ORIENTATION DETERMINATION
R1169   MOD.NO.2  21 DEC 66
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R1173 FUNCTIONAL DESCRIPTION

R1174 DETERMINES THE INERTIAL ORIENTATION OF THE IMU. THE PROGRAM IS SELECTED BY DSKY ENTRY. THE SIGHTING
R1176 ROUTINE IS CALLED TO COLLECT THE CDU COUNTERS AND SHAFT AND TRUNNION ANGLES FOR A SIGHTED STAR. THE DATA IS
R1178 THEN PROCESSED AS FOLLOWS.

R1179 1. SEXTANT ANGLES ARE COMPUTED IN TERMS OF NAVIGATIONAL BASE COORDINATES. LET SA AND TA BE THE SHAFT AND
R1181 TRUNNION ANGLES, RESPECTIVELY. THEN,

R1182 -
R1183 V = (SIN(TA)*COS(SA), SIN(TA)*SIN(SA), COS(TA)) (A COLUMN VECTOR)
R1185 NB
R1186 THE OUTPUT IS A HALF-UNIT VECTOR STORED IN STARM.

R1187 2. THIS VECTOR IN NAV.BASE COORDS. IS THEN TRANSFORMED TO ONE IN STABLE MEMBER COORDINATES.

R1189 - T T T -
R1190 V = Q *Q *Q *V , WHERE
R1191 1 2 3 NB

R1192 (COS(IG) 0 -SIN(IG))
R1193 ( ) THE GIMBAL ANGLES ARE COMPUTED FROM
R1195 Q = (0 1 0), IG=INNER GIMBAL ANGLE THE CDU COUNTERS AT NBSM (USING AXIS-
R1197 1 ( ) ROT AND COULOGIC)
R1199 (SIN(IG) 0 COS(IG))

R1200
R1201 (COS(MG) SIN(MG) 0)
R1202 ( )
R1203 Q = (-SIN(MG) COS(MG) 0), MG=MIDDLE GIMBAL ANGLE
R1204 2 ( )
R1205 (0 0 1)

R1206
R1207 (1 0 0)
R1208 ( )
R1209 Q = (0 COS(OG) SIN(OG)), OG=OUTER GIMBAL ANGLE
R1210 3 ( )
R1211 (0 -SIN(OG) COS(OG))

R1212 3. THE STAR NUMBER IS SAVED AND THE SECOND STAR IS THEN SIMILARLY PROCESSED.

R1214 4. THE ANGLE BETWEEN THE TWO STARS IS THEN CHECKED AT CKSDATA.

R1215 5. REFSMMAT IS THEN COMPUTED AT AXISGEN AS FOLLOWS.
R1216 - -
R1217 LET S AND S BE TWO STAR VECTORS EXPRESSED IN TWO COORDINATE SYSTEMS,A AND B (BASIC AND STABLE MEMBER).
R1219 1 2

```
R1220    DEFINE,     -    -
R1221                U  = S
R1222                 A    A1

R1223                -         -    -
R1224                V  = UNIT(S  X S  )
R1225                 A         A1   A2

R1226                -    -   -
R1227                W = U X V
R1228                 A    A   A
R1229          AND
R1230                -    -
R1231                U  = S
R1232                 B    B1

R1233                -         -    -
R1234                V  = UNIT(S  X S  )
R1235                 B         B1   B2

R1236                -    -   -
R1237                W  = U X V
R1238                 B    B   B
R1239          THEN  -         -         -         -
R1240                X  = U  *U + V  *V + W  *W
R1241                     B1  A   B1  A   B1  A

R1242                -         -         -         -              (REFSMMAT)
R1243                Y  = U  *U + V  *V + W  *W
R1244                     B2  A   B2  A   B2  A

R1245                -         -         -         -
R1246                Z  = U  *U + V  *V + W  *W
R1247                     B3  A   B3  A   B3  A

R1248          THE INPUTS CONSIST OF THE FOUR HALF-UNIT VECTORS STORED AS FOLLOWS

R1249                -
R1250                S   IN 6-11 OF THE VAC AREA
R1251                 A1

R1252                -
R1253                S   IN 12-17 OF THE VAC AREA
R1254                 A2

R1255                -
R1256                S   IN STARAD
R1257                 B1
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R1258                -
R1259                S   IN STARAD +6
R1260                 B2

R1261   CALLING SEQUENCE

R1262     THE PROGRAM IS CALLED BY THE ASTRONAUT BY DSKY ENTRY.

R1263   SUBROUTINES CALLED.

R1264         GOPERF3
R1265         GOPERFIR
R1266         GODSPR
R1267         IMUCOARS
R1268         IMUFIN20
R1269         R53
R1270         SXTNB
R1271         NBSM
R1272         MKRELEAS
R1273         CHKSDATA
R1274         MATMOVE

R1275   ALARMS

R1276         NONE.
R1277   ERASABLE INITIALIZATION

R1278         IMU ZERO FLAG SHOULD BE SET.

R1279   OUTPUT

R1280         REFSMMAT
R1281         REFSMFLG

R1282   DEBRIS

R1283         WORK AREA
R1284         STARAD
R1285         STARIND
R1286         BESTI
R1287         BESTJ

 1288   REF   5  LAST  760   14,2000                        SETLOC P50S1
 1289                       14,3067                        BANK
 1290   REF   1                                            COUNT  14/P5153

 1291   REF   2  LAST  206   14,3067              P53       EQUALS P51
 1292   REF  42  LAST  388   14,3067  4 1320 0    P51       CS     IMODES30
 1293   REF  26  LAST  734   14,3070  7 5007 1              MASK   BIT9
 1294   REF 179  LAST  746   14,3071  10 000 0              CCS    A
```

```
1295   REF   1                  14,3072  0 3076 0          TC     P51A
1296   REF  30  LAST  746       14,3073  0 5650 1          TC     ALARM
1297                             14,3074   00210 1          OCT    210
1298   REF  58  LAST  761       14,3075  0 4106 1          TC     GOTOPOOH
1299   REF 203  LAST  762       14,3076  0 4662 1 P51A     TC     BANKCALL
1300   REF   1                  14,3077   17667 0          CADR   R02ZERO

1301   REF   1                  14,3100  3 5025 0 P51AA    CAF    PRFMSTAQ
1302   REF 204  LAST  767       14,3101  0 4662 1          TC     BANKCALL
1303   REF   6  LAST  757       14,3102   21045 0          CADR   GOPERF1
1304   REF  59  LAST  767       14,3103  0 4106 1          TC     GOTOPOOH       TERM.
1305   REF   1                  14,3104  0 3140 1          TC     P51B           V 33
1306   REF  69  LAST  761       14,3105  0 5412 0          TC     PHASCHNG
1307                             14,3106   05024 1          OCT    05024
1308                             14,3107   13000 0          OCT    13000
1309   REF   1                  14,3110  3 5021 1          CAF    P51ZERO
1310   REF  17  LAST  761       14,3111  55'155 0          TS     THETAD         ZERO THE GIMBALS
1311   REF  18  LAST  767       14,3112  55'156 0          TS     THETAD +1
1312   REF  19  LAST  767       14,3113  55'157 1          TS     THETAD +2
1313   REF   1                  14,3114  3 3273 1          CAF    V6N22
1314   REF 205  LAST  767       14,3115  0 4662 1          TC     BANKCALL
1315   REF   2  LAST  449       14,3116   20673 1          CADR   GODSPRET
1316   REF   1                  14,3117  3 3274 0          CAF    V41K           NOW DISPLAY COARSE ALIGN VERB 41
1317   REF 206  LAST  767       14,3120  0 4662 1          TC     BANKCALL
1318   REF   3  LAST  767       14,3121   20673 1          CADR   GODSPRET
1319   REF 207  LAST  767       14,3122  0 4662 1          TC     BANKCALL
1320   REF   5  LAST  761       14,3123   16663 0          CADR   IMUCOARS
1321   REF 208  LAST  767       14,3124  0 4662 1          TC     BANKCALL
1322   REF  12  LAST  762       14,3125   17577 1          CADR   IMUSTALL
1323   REF   5  LAST  762       14,3126  0 5757 1          TC     CURTAINS       CAGING OR BAD END
1324   REF 209  LAST  767       14,3127  0 4662 1          TC     BANKCALL       SCHEDULE IFAILOK AND IMUFINED TASKS,IN 5
1325   REF   2  LAST  762       14,3130   17073 0          CADR   IMUFIN20       AND 20 SECS. DIRECT RETURN AND NO STALL,
1326   REF 210  LAST  767       14,3131  0 4662 1          TC     BANKCALL       IF CAGING, BUT T4 WILL ZERO C/A ENABLE.
1327   REF  13  LAST  767       14,3132   17577 1          CADR   IMUSTALL       IF PUT TO SLEEP, IMUFINED WILL WAKE US
1328   REF   6  LAST  767       14,3133  0 5757 1          TC     CURTAINS       UP.
1335   REF  70  LAST  767       14,3134  0 5412 0          TC     PHASCHNG
1337                             14,3135   05024 1          OCT    05024
1338                             14,3136   13000 0          OCT    13000
1339   REF   1                  14,3137  1 3100 1          TCF    P51AA          COARSE ALIGN DONE - RECYCLE FOR FINE
```

P1340 DO STAR SIGHTING AND COMPUTE NEW REFSMMAT

```
1341   REF  71  LAST  767   14,3140  0 5412 0  P51B     TC     PHASCHNG
1342                        14,3141   00014 1           OCT    00014
1343   REF 188  LAST  762   14,3142  0 6006 1           TC     INTPRET
1344                        14,3143   40331 1           SSP    SETPD
1345   REF   9  LAST  758   14,3144   00305 1                  STARIND       INDEX-STAR 1 OR 2
1346                        14,3145   00000 1                  0
1347                        14,3146   00001 0                  0
13472                       14,3147   77234 1           RTB    VLOAD
13474  REF   3  LAST  762   14,3150   31275 0                  SET1/PDT
13476  REF  10  LAST  762   14,3151   11566 1                  ZEROVEC
1348   REF  20  LAST  762   14,3152   01472 1           STORE  GCOMP
13482                       14,3153   43014 0           SET    CLEAR
13484  REF   4  LAST  762   14,3154   01060 0                  DRIFTFLG      ENABLE T4 COMPENSATION
13486  REF   5  LAST  756   14,3155   00666 1                  TARG2FLG      SHOW MARK IS STAR - NOT LANDMARK
1349                        14,3156   77776 1           EXIT
1350   REF  55  LAST  756   14,3157  3 5017 1           CAF    BIT1
1351   REF   7  LAST  756   14,3160  54 301 1           TS     MARKINDX      INITIALIZE FOR ONE MARK

1352   REF  72  LAST  768   14,3161  0 5412 0  P51C     TC     PHASCHNG
1353                        14,3162   05024 1           OCT    05024
1354                        14,3163   13000 0           OCT    13000
1355   REF  10  LAST  520   14,3164  0 5364 0           TC     CHECKMM
1356                        14,3165   00065 1           MM     53            BACKUP PROGRAM
1357   REF   1               14,3166  1 3174 1           TCF    P51C.1        NOT P53
1358   REF 189  LAST  768   14,3167  0 6006 1           TC     INTPRET
1359                        14,3170   77624 1           CALL
1360   REF   2  LAST  758   14,3171   36056 1                  R56
1361                        14,3172   77650 1           GOTO
1362   REF   1               14,3173   31177 1                  P51C.2
1363   REF 190  LAST  768   14,3174  0 6006 1  P51C.1   TC     INTPRET
1364                        14,3175   77624 1           CALL
1365   REF   3  LAST  746   14,3176   31300 0                  R53           SIGHTING ROUTINE
1366                        14,3177   77624 1  P51C.2   CALL                 COMPUTE LOS IN SM FROM MARK DATA
1367   REF   2  LAST  757   14,3200   36022 1                  SXTSM
1368                        14,3201   77606 1           PUSH
1369                        14,3202   53135 0           SLOAD  BZE
1370   REF  10  LAST  768   14,3203   00305 1                  STARIND
1371   REF   1               14,3204   31211 1                  P51D
1372                        14,3205   45575 1           VLOAD  STADR
1373   REF   8  LAST  758   14,3206   75160 1           STORE  STARSAV2      DOWNLINK
1374                        14,3207   77650 1           GOTO
1375   REF   1               14,3210   31217 1                  P51E
1376                        14,3211   45575 1  P51D     VLOAD  STADR
1377   REF   5  LAST  758   14,3212   61166 1           STODL  STARSAV1
1378   REF  10  LAST  757   14,3213   02607 1                  TSIGHT
1379                        14,3214   77624 1           CALL
1380   REF   3  LAST  757   14,3215   32340 1                  PLANET
1381   REF   4  LAST  758   14,3216   02601 1           STORE  PLANVEC
```

```
1382                                14,3217   77776 1  P51E     EXIT
1383  REF  73  LAST  768           14,3220   0 5412 0           TC       PHASCHNG
1384                                14,3221    05024 1           OCT      05024
1385                                14,3222    13000 0           OCT      13000
1386  REF 211  LAST  767           14,3223   0 4662 1           TC       BANKCALL
1387  REF   8  LAST  757           14,3224    16063 0           CADR     MKRELEAS       ZERO MARKSTAT
1388  REF  11  LAST  768           14,3225   10 304 1           CCS      STARIND
1389  REF   1                     14,3226   1 3235 1           TCF      P51F           STAR 2
1390  REF  74  LAST  769           14,3227   0 5412 0           TC       PHASCHNG
1391                                14,3230    05024 1           OCT      05024
1392                                14,3231    13000 0           OCT      13000
1393  REF  56  LAST  768           14,3232   3 5017 1           CAF      BIT1
1394  REF  12  LAST  769           14,3233   54 304 1           TS       STARIND
1395  REF   1                     14,3234   1 3161 0           TCF      P51C           GO DO SECOND STAR
1396  REF  75  LAST  769           14,3235   0 5412 0  P51F     TC       PHASCHNG
1397                                14,3236    05024 1           OCT      05024
1398                                14,3237    13000 0           OCT      13000
1399  REF 191  LAST  768           14,3240   0 6006 1           TC       INTPRET
1400                                14,3241    45145 0           DLOAD    CALL
1401  REF  11  LAST  768           14,3242    02607 1                    TSIGHT
1402  REF   4  LAST  768           14,3243    32340 1                    PLANET
1403                                14,3244    24015 0           STOVL    12D
1404  REF   5  LAST  768           14,3245    02601 1                    PLANVEC
1405                                14,3246    24007 0           STOVL    6D
1406  REF   6  LAST  768           14,3247    02611 0                    STARSAV1
1407  REF   8  LAST  760           14,3250    26736 1           STOVL    STARAD
1408  REF   9  LAST  768           14,3251    02617 0                    STARSAV2
1409  REF   9  LAST  769           14,3252    36744 0           STCALL   STARAD +6
1410  REF   2  LAST  759           14,3253    30714 0                    CHKSDATA       CHECK STAR ANGLES IN STARAD AND
1411                                14,3254    77414 0           BON      EXIT
1412  REF   7  LAST  761           14,3255    00314 1                    FREEFLAG
1413  REF   1                     14,3256    31260 1                    P51G
1414  REF   2  LAST  767           14,3257   0 3100 0           TC       P51AA
1415                                14,3260    77624 1  P51G     CALL
1416  REF   3  LAST  757           14,3261    47401 1                    AXISGEN        COME BACK WITH REFSMMAT IN XDC
1417                                14,3262    75160 1           AXC,1    AXC,2
1418  REF   5  LAST  741           14,3263    02713 0                    XDC
1419  REF  29  LAST  762           14,3264    01735 1                    REFSMMAT
1420                                14,3265    45014 0           CLEAR    CALL
1421  REF   8  LAST  742           14,3266    01662 1                    REFSMFLG
1422  REF   3  LAST  762           14,3267    31053 0                    MATMOVE
1423                                14,3270    52014 0           SET      GOTO
1424  REF   9  LAST  769           14,3271    01462 0                    REFSMFLG
1425  REF   2  LAST  758           14,3272    32145 0                    ENDP50S
1426  REF   3  LAST  742              5025               PRFMSTAQ =       OCT15
1427  REF 148  LAST  760              5021               P51ZERO  =       ZERO
1428  REF  16  LAST  698              5022               P51FIVE  =       FIVE
1429                                14,3273    01426 0  V6N22    VN       0622
1430                                14,3274    12200 0  V41K     VN       4100
1431  REF  13  LAST  703           14,3275   3 0025 0  SET1/PDT CA       TIME1
```

L   P51-P53   USER'S PAGE NO. 34   E5 S3

```
 1432   REF  10  LAST  538   14,3276  55'074 1          TS      1/PIPADT
 1433   REF   6  LAST  762   14,3277  1 6030 0          TCF     DANZIG
```

P1434 SXTSM COMPUTES AN LOS VECTOR IN SM COORD FROM OCDU AND ICDU MARK DATA

```
1435  REF   1                 17,2000                        SETLOC P5053
1436                          17,2022                        BANK
1437                          17,2022   77620 0  SXTSM       STQ
1438  REF   6  LAST  750       17,2023   00300 1                    OMAJ
1439                          17,2024   70740 0          LXC,1     DLOAD*
1440  REF  33  LAST  622       17,2025   01330 0                    MARKSTAT
1441                          17,2026   00001 0                    OD,1
1442  REF  12  LAST  769       17,2027   02607 1          STORE     TSIGHT
1443                          17,2030   66744 0          LXC,2     SLOAD*
1444  REF  13  LAST  769       17,2031   00304 0                    STARIND
1445  REF   1                 17,2032   41722 0                    MKDNCDR,2
1446                          17,2033   76744 1          LXC,2     VLOAD*
1447  REF 274  LAST  754       17,2034   00154 1                    MPAC
1448                          17,2035   00001 0                    0,1
1449                          17,2036   10001 1          STORE     0,2
1450                          17,2037   77743 1          DLOAD*
1451                          17,2040   00006 1                    5,1
1452                          17,2041   10006 0          STORE     5,2
1453                          17,2042   77624 1          CALL
1454  REF   4  LAST  578       17,2043   46000 0                    SXTNB          COMPUTE LOS VECTOR FROM OCDU IN MKVAC
1455                          17,2044   62150 1          LXA,1     INCR,1
1456  REF  34  LAST  771       17,2045   01330 0                    MARKSTAT
1457                          17,2046   00002 0                    2              INCREMENT TO BASE ADR OF ICDU
1458                          17,2047   45130 1            SXA,1   CALL
1459  REF  28  LAST  761       17,2050   00050 1                    S1
1460  REF   2  LAST  578       17,2051   47606 1                    NBSM           TRANSFORM LOS TO SM
1461                          17,2052   77650 1          GOTO
1462  REF   7  LAST  771       17,2053   00300 1                    QMAJ
1463  REF  11  LAST  623       17,2054   03674 1  MKDNCDR ECADR     MARKDOWN
1464  REF   2  LAST  173       17,2055   03502 0          ECADR     MARK2DWN
```

```
P1455   PROGRAM DESCRIPTION - R53 - SIGHTING MARK ROUTINE
R1466   MOD.NO.2  21 DEC 66
R1467   MOD BY STURLAUGSON

R1468   FUNCTIONAL DESCRIPTION
R1469           TO PERFORM A SATISFACTORY NUMBER OF SIGHTING MARKS FOR THE REQUESTING PROGRAM (OR ROUTINE). SIGHTINGS
R1471   CAN BE MADE ON A STAR OR LANDMARK. WHEN THE CMC ACCEPTS A MARK IT RECORDS AND STORES 5 ANGLES (3 ICDUS AND 2
R1473   OCDUS) AND THE TIME OF THE MARK.

R1474   CALLING SEQUENCE
R1475     P53 IS CALLED AND RETURNS IN INTERPRETIVE CODE. RETURN IS VIA QPRET.
R1476     THERE IS NO ERROR EXIT IN THIS ROUTINE ITSELF.

R1477   SUBROUTINES CALLED
R1478     SXTMARK
R1479     OPTSTALL
R1480     GOFLASH

R1481   ERASABLE INITIALIZATION
R1482     TARGET FLAG - STAR OR LANDMARK
R1483     MARKINDX - NUMBER OF MARKS WANTED
R1484     STARIND - INDEX TO BESTI OR BESTJ (STAR NUMBER)
R1485   OUTPUT
R1486     MARKSTAT CONTAINS INDEX TO VACANT AREA WHERE MARK DATA IS STORED
R1487     BESTI (INDEXED BY STARIND) CONTAINS STAR NUMBER SIGHTED
R1488   DEBRIS
R1489     MARKINDX CONTAINS NUMBER OF MARKS DESIRED
 1490   REF   2  LAST  631   14,2000                          SETLOC R53
 1491                        14,3300                          BANK

 1492   REF   1                                              COUNT  14/R53

 1493                        14,3300   43020 1  R53          STQ    SET             SET SIGHTING MARK FLAG
 1494   REF   2  LAST  117   14,3301    03501 0               SET    R53EXIT
 1495   REF   2  LAST  744   14,3302    00071 1               SET    R53FLAG
 1496                        14,3303    77776 1               EXIT
 1497   REF   8  LAST  763   14,3304  3 0301 0  R53A         CA     MARKINDX        NUMBER OF MARKS
 1498   REF   2  LAST  202   14,3305  7 5023 1               MASK   LOW3
 1499   REF 212  LAST  769   14,3306  0 4662 1               TC     BANKCALL
 1500   REF   2  LAST  453   14,3307    16002 1               CADR   SXTMARK
 1501   REF 213  LAST  772   14,3310  0 4662 1               TC     BANKCALL
 1502   REF   2  LAST  453   14,3311    17573 0               CADR   OPTSTALL
 1503   REF   7  LAST  767   14,3312  0 5757 1               TC     CURTAINS
 1504   REF  35  LAST  771   14,3313  51'330 0               INDEX  MARKSTAT
 1505   REF  14  LAST  755   14,3314  10 052 1               CCS    QPRET           NUMBER OF MARKS ACTUALLY DONE
 1506   REF   1              14,3315  1 3326 1               TCF    R53B
 1507                        14,3316  1 3320 1               TCF    +2              ZERO
 1508                        14,3317  1 3320 1               TCF    +1              CCS HOLE
 1509   REF 149  LAST  769   14,3320  3 5021 1               CAF    ZERO            HOUSEKEEP VAC AREA SAVE
 1510   REF  36  LAST  772   14,3321  57'330 0               XCH    MARKSTAT         AND MARKSTAT
```

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 1511   REF 180  LAST  766   14,3322  10 000 0          CCS     A
 1512   REF 181  LAST  773   14,3323  50 000 1          INDEX   A
 1513                        14,3324  54 000 0          TS      0
 1514   REF   1              14,3325  1 3304 1          TCF     R53A
 1515   REF  11  LAST  768   14,3326  0 5364 0  R53B    TC      CHECKMM
 1516                        14,3327   00026 0          MM      22
 1517                        14,3330  1 3332 1          TCF     +2
 1518   REF   1              14,3331  1 3361 1          TCF     R53D
 1519   REF  12  LAST  773   14,3332  0 5364 0          TC      CHECKMM
 1520                        14,3333   00027 1          MM      23
 1521   REF   1              14,3334  1 3336 0          TCF     R53C1
 1522   REF   2  LAST  773   14,3335  1 3361 1          TCF     R53D
15221   REF 150  LAST  772   14,3336  3 5021 1  R53C1   CAF     ZERO
15222   REF 214  LAST  772   14,3337  0 4662 1          TC      BANKCALL
15223   REF   6  LAST  760   14,3340   20703 1          CADR    CLEANDSP
 1523   REF   1              14,3341  3 3365 1  R53C    CAF     V01N71
 1524   REF 215  LAST  773   14,3342  0 4662 1          TC      BANKCALL
 1525   REF  37  LAST  761   14,3343   20720 0          CADR    GOFLASH
 1526   REF  60  LAST  767   14,3344  0 4106 1          TC      GOTOPOOH        TERM.
 1527   REF   1              14,3345  1 3347 0          TCF     R53Z
 1528   REF   1              14,3346  0 3341 1          TC      R53C            RECYCLE
 1532   REF   2  LAST  756   14,3347  0 3366 1  R53Z    TC      CHKSCODE
 1533   REF  12  LAST  756   14,3350  0 4400 1          TC      FALTON
 1534   REF   2  LAST  773   14,3351  0 3341 1          TC      R53C
 1535   REF   3  LAST  568   14,3352  4 7713 1          CS      HIGH9
 1536   REF   9  LAST  756   14,3353  7 0735 1          MASK    STARCODE
 1537                        14,3354  0 0006 1          EXTEND
 1538   REF   1              14,3355  7 6211 1          MP      SIGHTSIX
 1539   REF  69  LAST  727   14,3356  56 001 0          XCH     L
 1540   REF  14  LAST  771   14,3357  50 304 0          INDEX   STARIND
 1541   REF  12  LAST  756   14,3360  54 302 1          TS      BESTI
 1542   REF 192  LAST  769   14,3361  0 6006 1  R53D    TC      INTPRET
 1543                        14,3362   77614 1  R53OUT  SETGO
 1544   REF   2  LAST  744   14,3363   03420 1                  TERMIFLG        SET TERMINATE FOR R52
 1545   REF   3  LAST  772   14,3364   03501 0                  R53EXIT
 1546   REF  25  LAST  756      6211            SIGHTSIX =      SIX
 1547                        14,3365   00307 0  V01N71  VN      0171
R1548
R1549     ****** KEEP IN SAME BANK AS R51 AND R53 *********
 1550   REF  10  LAST  773   14,3366  10 735 1  CHKSCODE CCS    STARCODE
 1551   REF   1              14,3367  6 3376 0          AD      NEG47
 1552   REF 182  LAST  773   14,3370  10 000 0          CCS     A
 1553   REF 171  LAST  736   14,3371  0 0002 0          TC      Q               SC < 0 OR SC > 50
 1554                        14,3372  1 3374 0          TCF     +2              SC = + OR - 0
 1555                        14,3373  1 3374 0          TCF     +1              0 <= SC< 50
 1556   REF 172  LAST  773   14,3374  50 002 0          INDEX   Q               SC = 50
 1557                        14,3375  0 0002 0          TC      00002
 1558                        14,3376   77730 0  NEG47   OCT     77730
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P1559   NAME-S52.2
R1560   FUNCTION-COMPUTE GIMBAL ANGLES FOR DESIRED SM AND PRESENT VEHICLE
R1561   CALL-  CALL  S52.2
R1562   INPUT- X,Y,ZSMD
R1563   OUTPUT- OGC,IGC,MGC,THETAD,+1,+2
R1554   SUBROUTINES-CDUTRIG,CALCSMSC,MATMOVE,CALCGA
 1565   REF   1                 11,2000                         SETLOC S52/2
 1566                           11,2331                         BANK

 1567   REF   1                                                 COUNT  13/S52.2
 1568                           11,2331   77620 0  S52.2        STQ
 1569   REF   8  LAST  771      11,2332   00300 1                 QMAJ
 1570                           11,2333   77624 1               CALL
 1571   REF   7  LAST  752      11,2334   47477 0                 CDUTRIG
 1572                           11,2335   77624 1               CALL
 1573   REF   2  LAST  752      11,2336   34612 0                 CALCSMSC
 1574                           11,2337   66370 0               AXT,1  SSP
 1575                           11,2340   00022 1                      18D
 1576   REF  29  LAST  771      11,2341   00051 0                      S1
 1577                           11,2342   00006 1                      6D
 1578                           11,2343   61373 1  S52.2A      VLOAD* VXM
 1579   REF   7  LAST  763      11,2344   02736 1                      XNB +18D,1
 1580   REF  30  LAST  769      11,2345   01736 1                      REFSMMAT
 1581                           11,2346   77656 1               UNIT
 1582   REF   8  LAST  774      11,2347   06736 0               STORE  XNB +18D,1
 1583                           11,2350   77700 0               TIX,1
 1584   REF   1                 11,2351   22343 0                      S52.2A
 1585                           11,2352   75160 1  S52.2.1     AXC,1  AXC,2
 1586   REF   8  LAST  743      11,2353   00306 1                      XSMD
 1587   REF  32  LAST  762      11,2354   02671 0                      XSM
 1588                           11,2355   77624 1               CALL
 1589   REF   4  LAST  769      11,2356   31053 0                      MATMOVE
 1590                           11,2357   77624 1               CALL
 1591   REF   2  LAST  424      11,2360   47311 1                      CALCGA
 1592                           11,2361   77650 1               GOTO
 1593   REF   9  LAST  774      11,2362   00300 1                      QMAJ
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P1594   PROGRAM NAME - SR52.1              DATE DEC 20  66
R1595   MOD 1                             LOG SEC  P51-P53
R1596   BY  KEN VINCENT                   ASSEMBLY  SUNDISK  REV 40
R1597
R1598   FUNCTION
R1599    TARG1 AND TARG2 FLAGS ARE LOOKED AT TO DETERMINE IF THE TARGET IS THE
R1600    LEM, STAR OR LANDMARK. IN CASE OF LEM OR LMK,THE PRESENT TIME PLUS
R1601    2 SECONDS IS SAVED IN AOPTIME (ALIAS STARAD ,+1 ). IF THE LEM  IS
R1602    THE TARGET  THEN CONIC UPDATES     OF THE CSM AND LEM ARE MADE TO
R1603    THE TIME IN AOPTIME. THE UNIT OF THE DIFFERENCE OF LEM AND CSM
R1604    POSITION VECTORS BECOMES THE REFERENCE SIGHTING VECTOR  USED IN THE
R1605    COMMON PART OF THIS PROGRAM.
R1606    IN THE CASE OF LANDMARK, THE CSM IS UPDATED CONICALLY. THE RADIUS
R1607    VECTOR FOR THE LANDMARK IS OBTAINED FROM LALOTORV. BOTH OF THESE ARE
R1608    FOUND FOR THE TIME IN AOPTIME. THE UNIT OF THE DIFFERENCE BETWEEN
R1609    THE LANDMARK AND CSM RADIUS VECTORS BECOMES THE REFERENCE SIGHTING
R1610    VECTOR FOR THE COMMON PART OF THIS ROUTINE.
R1611    IF A STAR IS THE TARGET, THE PROPER STAR IS OBTAINED FROM THE CATALOG
R1612    AND THIS VECTOR BECOMES THE REFERENCE SIGHTING VECTOR.
R1613    THE COMMON PART OF THIS PROGRAM  TRANSFORMS THE REFERENCE SIGHTING
R1614    VECTOR INTO STABLE MEMBER COORDINATES. IT READS THE IMU-CDUS AND USES
R1615    THIS DATA IN A CALL TO CALCSXA. ON RETURN FROM CALCSXA A TEST IS
R1616    MADE TO SEE IF THE TRUNNION ANGLE IS GREATER THAN  90DEG OR 38DEG.
R1617    MADE TO SEE IF THE TRUNNION ANGLE IS GREATER THAN 90DEG. OR 50DEG.

R1618   CALLING SEQUENCE
R1619   L+4      RETURN WHEN SHAFT OR TRUNION NOT WITHIN 5DEG OF DESIRED
R1620   L        TC     BANKCALL
R1621   L+1      CADR   SR52.1
R1622   L+2      ERROR RETURN   TRUNNION GREATER THAN 90DEG
R1623   L&3      ERROR RETURN   TRUNNION GREATER THAN 50DEG
R1624   L+4      NORMAL RETURN
R1625
R1626   OUTPUT
R1627   SAC -SINGLE PREC,2S COMP,SCALED AT HALF REVS- SHAFT ANGLE DESIRED
R1628   PAC -SINGLE PREC,2S COMP SCALED AT EIGTH REVS - TRUNNION ANGLE DESIRED
R1629
R1630   INITIALIZATION
R1631   IF TARG1FLG =1 THEN TARGET IS LEM -NO OTHER INPUT REQUIRED
R1632   IF TARG1FLG =0 AND TARG2FLG =0 THE TARGET IS STAR, STARIND SHOULD
R1633   0 OR 1 DENOTING BESTI OR BESTJ RESPECTIVELY AS STAR CODE. STAR CODES
R1634   ARE 6 TIMES STAR NUMBER.
R1635   IF TARG1FLG=0 AND TARG2FLG=1 THEN TARGET IS LANDMARK. SEE ROUTINE
R1636   LALOTORV FOR INPUT REQUIREMENTS. HERE FIXERAD=1 FOR CONSTANT EARTH
R1637   RADIUS
R1638
R1639   DEBRIS
R1640    WORK AREA
R1641    STARAD - STAR+5 (STAR IS DESIRED LOS IN STABLE MEMBER COORDINATES)
 1642   REF   1                                          COUNT* $$/SR521
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1643   REF   1                 13,2000                          SETLOC  SR52/1
1644                           13,2244                          BANK

1645   REF   4  LAST  752       13,2244  0 4711 1  SR52.1        TC      MAKECADR
1646   REF  11  LAST  761       13,2245  55'777 0                 TS      QMIN
1647   REF 193  LAST  773       13,2246  0 6006 1                 TC      INTPRET
1648                           13,2247   43234 0                 RTB     DAD
1649   REF  21  LAST  756       13,2250   45510 1                         LOADTIME
1650   REF   1                 13,2251   26365 0                         1.3SECDP
1651   REF   3  LAST   91       13,2252   02356 0                 STORE   AOPTIME
1652                           13,2253   43014 0                 BON     BON
1653   REF   8  LAST  756       13,2254   00705 0                         TARG1FLG
1654   REF   1                 13,2255   26262 0                         LEM52
1655   REF   6  LAST  768       13,2256   00706 0                         TARG2FLG
1656   REF   1                 13,2257   26272 1                         LMK52
1657                           13,2260   77650 1                 GOTO
1658   REF   1                 13,2261   26313 1                         STAR52
1659                           13,2262   77745 1  LEM52          DLOAD
1660   REF   4  LAST  776       13,2263   02356 0                         AOPTIME
1661   REF  41  LAST  749       13,2264   34041 0                 STCALL  TDEC1
1662   REF   4  LAST  596       13,2265   27126 1                         LEMCONIC
1663                           13,2266   77775 1                 VLOAD
1664   REF  27  LAST  750       13,2267   00001 0                         RATT
1665                           13,2270   77650 1                 GOTO
1666   REF   1                 13,2271   26302 1                         LMKLMCOM
1667                           13,2272   71214 0  LMK52          BON     DLOAD
1668   REF   3  LAST  747       13,2273   04305 0                         ADVTRK
1669   REF   1                 13,2274   54000 0                         ADVTRACK
1670   REF   5  LAST  776       13,2275   02356 0                         AOPTIME
1671                           13,2276   77624 1                 CALL
1672   REF   7  LAST  743       13,2277   26441 1                         LALOTORV
1673                           13,2300   77775 1                 VLOAD
1674   REF  12  LAST  743       13,2301   02152 0                         ALPHAV
1675   REF   8  LAST  452       13,2302   16766 1  LMKLMCOM       STODL   STAR
1676   REF   6  LAST  776       13,2303   02356 0                         AOPTIME
1677   REF  42  LAST  776       13,2304   34041 0                 STCALL  TDEC1
1678   REF   6  LAST  749       13,2305   27114 0                         CSMCONIC
1679                           13,2306   52375 1                 VLOAD   VSU
1680   REF   9  LAST  776       13,2307   02766 1                         STAR
1681   REF  29  LAST  776       13,2310   00001 0                         RATT
1682                           13,2311   52056 0                 UNIT    GOTO
1683   REF   1                 13,2312   26326 1                         COM52
1684                           13,2313   72131 1  STAR52         SSP     LXA,1
1685   REF  30  LAST  774       13,2314   00051 0                         S1
1686                           13,2315   00000 1                         0
1687   REF  15  LAST  773       13,2316   00304 0                         STARIMD
1688                           13,2317   77700 0                 TIX,1
1689   REF   1                 13,2320   26324 0                         ST52ST
1690                           13,2321   52175 0                 VLOAD   GOTO
1691   REF  10  LAST  769       13,2322   02617 0                         STARSAV2
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1692  REF   2  LAST  776   13,2323   26325 1                    COM52
1693                       13,2324   77775 1  ST52ST   VLOAD
1694  REF   7  LAST  769   13,2325   02611 0                    STARSAV1
1695                       13,2326   53521 1  COM52    MXV      UNIT
1696  REF  31  LAST  774   13,2327   01736 1                    REFSMMAT
1697  REF  10  LAST  776   13,2330   02765 1           STORE    STAR
1698                       13,2331   45001 1           SETPD    CALL
1699                       13,2332   00001 0                    0
1700  REF   8  LAST  774   13,2333   47477 0                    CDUTRIG        COMPUTES SINES AND COSINES FOR CALCSXA
1701                       13,2334   77624 1           CALL                      NOW EXPECT TO SEE THE CDU ANGLES.
1702  REF   1              13,2335   46034 1                    CALCSXA
1703                       13,2336   77414 0           BOFF     EXIT
1704  REF   8  LAST  755   13,2337   01750 1                    CULTFLAG
1705  REF   1              13,2340   26342 0                    TRUN38
1706  REF   1              13,2341   0 2360 0          TC       SR52E1
1707                       13,2342   45345 1  TRUN38   DLOAD    DSU
1708  REF   8  LAST  745   13,2343   02776 0                    PAC
1709  REF   1              13,2344   26363 0                    38TRDEG
1710                       13,2345   71244 0           BPL      DLOAD
1711  REF   1              13,2346   26353 0                    SR52E22
1712  REF   9  LAST  777   13,2347   02776 0                    PAC
1713                       13,2350   51025 1           DSU      BPL
1714  REF   1              13,2351   26367 1                    20DEGSMN
1715  REF   1              13,2352   26355 0                    SR52E3
1716                       13,2353   77776 1  SR52E22  EXIT
1717  REF   1              13,2354   0 2357 1          TC       SR52E2
1718                       13,2355   77776 1  SR52E3   EXIT
1719  REF  12  LAST  776   13,2356   25'777 1          INCR     QMIN
1720  REF  13  LAST  777   13,2357   25'777 1  SR52E2   INCR     QMIN
1721  REF  14  LAST  777   13,2360   3 1777 1  SR52E1   CA       QMIN
1722  REF   4  LAST  755   13,2361   0 4666 0          TC       SWCALL
1723                       13,2362   25252 0  38TRDEG  2DEC     .66666667      CORESPONDS TO 50 DEGS IN TRUNION
1723                       13,2363   25254 0
1724                       13,2364   00000 1  1.3SECOP 2DEC     130
1724                       13,2365   00202 1
1725                       13,2366   61740 0  20DEGSMN DEC      -07199
1726                       13,2367   77777 0           DEC      -0
```

```
P1727      THE ADVTRACK ROUTINE IS USED TO COMPUTE AN OPTICS LOS VECTOR TO
R1728   A POINT ON THE GROUND TRACK 60 DEGRESS FORWARD OF THE LOCAL VERTICAL
R1729   OF AN ADVANCED ORBIT A SPECIFIED NUMBER OF REVOLUTIONS FROM NOW

 1730   REF   1                26,2000                        SETLOC 26P50S
 1731                         26,2000                        BANK
 1732                         26,2000   77601 0  ADVTRACK    SETPD
 1733                         26,2001   00001 0                  0
 1734                         26,2002   41575 0              VLOAD  PUSH          INITIALIZE FOR RP-TO-R
 1735   REF   2  LAST   34     26,2003   15327 0                     UNITZ        UZ VEC IN PD 0-5
 1736                         26,2004   41434 1              RTB    PUSH          TIME IN PD 6-7
 1737   REF  22  LAST  776     26,2005   45510 1                     LOADTIME
 1738   REF   7  LAST  776     26,2006   36356 1              STCALL AOPTIME       TIME ALSO IN AOPTIME FOR CSMCONIC
 1739   REF   4  LAST  743     26,2007   55344 1                     RP-TO-R      GET MOON ROTATION VEC IN REF
 1740   REF  11  LAST  777     26,2010   16765 1              STODL  STAR
 1741   REF   8  LAST  778     26,2011   02356 0                     AOPTIME      PICK UP TIME
 1742   REF  43  LAST  776     26,2012   34041 0              STCALL TDEC1        UPDATE STATE TO TIME
 1743   REF   7  LAST  776     26,2013   27114 0                     CSMCONIC
 1744                         26,2014   47375 0              VLOAD  VXV
 1745   REF  23  LAST  750     26,2015   00007 0                     VATT
 1746   REF  29  LAST  776     26,2016   00001 0                     RATT
 1747                         26,2017   77656 1              UNIT
 1748                         26,2020   24031 0              STOVL  24D           SAVE -UNIT(V X R) FOR 2ND ROTATION
 1749   REF  30  LAST  778     26,2021   00001 0                     RATT
 1750                         26,2022   57456 1              UNIT   VCOMP
 1751                         26,2023   41401 1              SETPD  PUSH          PUSH LOS=-UNIT(RVEC)  PD 0-5
 1752                         26,2024   00001 0                     0
 1753                         26,2025   77776 1              EXIT
 1754   REF  22  LAST  624     26,2026   3 1751 0             CA     LANDMARK
 1755   REF  13  LAST  604     26,2027   7 5023 1             MASK   SEVEN         GET NUMBER OF ADVANCE PERIODS
 1756                         26,2030   0 0006 1             EXTEND
 1757   REF  21  LAST  731     26,2031   7 5005 0             MP     BIT11         GET N/16
 1758   REF  70  LAST  773     26,2032   56 001 0             XCH    L
 1759   REF  15  LAST  762     26,2033   50 120 1             INDEX  FIXLOC
 1760                         26,2034   54 036 0             TS     30D           TEMP STORE N/16
 1761   REF 194  LAST  776     26,2035   0 6006 1             TC     INTPRET
 1762                         26,2036    41335 1             SLOAD  DMP
 1763                         26,2037    00037 0                    30D
 1764   REF   1                26,2040    14107 1                    MPERIOD
 1765   REF   9  LAST  778     26,2041    36356 1             STCALL AOPTIME       ROTATE ANG ABOUT UR
 1766   REF   1                26,2042    54057 1                    ROTA
 1767                         26,2043    77775 1             VLOAD
 1768                         26,2044    00031 0                    24D           PICK UP 2ND ROTATION AXIS
 1769   REF  12  LAST  778     26,2045    16766 1             STODL  STAR
 1770   REF   1                26,2046    14105 0                    DP1/6
 1771                         26,2047    77625 0             DSU
 1772   REF  10  LAST  778     26,2050    02356 0                    AOPTIME       2ND RAT ANGLE = 60 - A
 1773   REF  11  LAST  778     26,2051    36356 1             STCALL AOPTIME
 1774   REF   2  LAST  778     26,2052    54057 1                    ROTA          GO ROTATE 2ND TIME
 1775                         26,2053    77775 1             VLOAD
```

```
1776                        26,2054   00001 0                 0
1777   REF  13  LAST  778   26,2055   36766 0          STCALL STAR        STORE FINAL LOS IN STAR
1778   REF   3  LAST  777   26,2056   26326 1                 COM52      RETURN TO SR52.1

1779                        26,2057   73545 1  RDTA    DLOAD  SIN
1780   REF  12  LAST  778   26,2060   02356 0                 ADPTIME
1781                        26,2061   47315 0          PDVL   VXV         PUSH 1/2SIN(A)  PD  6-7
1782   REF  14  LAST  779   26,2062   02766 1                 STAR         UR VEC
1783                        26,2063   00001 0                 0            LOS
1784                        26,2064   72561 0          VXSC   VSL2        1/2SIN(A)(URXLOS)  PD 6-11
1785                        26,2065   50315 0          PDVL   DOT
1786   REF  15  LAST  779   26,2066   02766 1                 STAR
1787                        26,2067   00001 0                 0
1788                        26,2070   72561 0          VXSC   VSL2
1789   REF  16  LAST  779   26,2071   02766 1                 STAR
1790                        26,2072   71525 0          PDDL   COS         1/2(UR . LOS)UR  12-17
1791   REF  13  LAST  779   26,2073   02356 0                 ADPTIME
1792                        26,2074   51315 1          PDVL   BVSU        PUSH 1/2COS(A)  18-19
1793                        26,2075   00015 0                 12D
1794                        26,2076   00001 0                 0
1795                        26,2077   76561 1          VXSC   VSL1        UP 18-19
1796                        26,2100   53255 0          VAD    VAD         UP 12-17  UP 6-11
1797                        26,2101   40256 1          UNIT   SETPD
1798                        26,2102   00001 0                 0
1799                        26,2103   43406 1          PUSH   RVQ

1800                        26,2104   05252 1  DP1/6   2DEC   .16666666
1800                        26,2105   25251 0
1801                        26,2106   01414 1  MPERIOD 2DEC   .047619          APPROX LUNAR ROT ANG IN 2HRS X 16
1801                        26,2107   06044 1
```

```
P1802   NAME-S52.3
R1803   FUNCTION- XSMD= UNIT(YSMD X ZSMD)
R1804             YSMD= UNIT(V X R)
R1805             ZSMD= UNIT(-R)
R1806   CALL      DLOAD  CALL
R1807                    TALIGN
R1808                    S52.3
R1809   INPUT-    TIME OF ALIGNMENT IN MPAC
R1810   OUTPUT-   X,Y,ZSMD
R1811   SUBROUTINES- CSMCONIC
 1812   REF   3  LAST  763    16,2000                          SETLOC P50S2
 1813                         16,2661                          BANK

 1814   REF   1                                                COUNT  15/S52.3
 1815                         16,2661   77620 0  S52.3        STQ
 1816   REF  10  LAST  774    16,2662   00300 1                       QMAJ
 1817   REF  44  LAST  778    16,2663   34041 0                STCALL TDEC1
 1818   REF   7  LAST  743    16,2664   27071 1                       CSMPREC
 1819                         16,2665   77601 0                SETPD
 1820                         16,2666   00001 0                       0
 1821                         16,2667   57575 1                VLOAD  VCOMP
 1822   REF  31  LAST  778    16,2670   00001 0                       RATT
 1823                         16,2671   77656 1                UNIT
 1824   REF   4  LAST  743    16,2672   24323 0                STOVL  ZSMD
 1825   REF  24  LAST  778    16,2673   00007 0                       VATT
 1826                         16,2674   53435 0                VXV    UNIT
 1827   REF  32  LAST  780    16,2675   00001 0                       RATT
 1828   REF   5  LAST  743    16,2676   00315 0                STORE  YSMD
 1829                         16,2677   53435 0                VXV    UNIT
 1830   REF   5  LAST  780    16,2700   00323 0                       ZSMD
 1831   REF   9  LAST  774    16,2701   34307 1                STCALL XSMD
 1832   REF  11  LAST  780    16,2702   00300 1                       QMAJ
```

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PI833   PROGRAM DESCRIPTION - R56 - ALTERNATE LOS SIGHTING MARK ROUTINE

R1834   FUNCTIONAL DESCRIPTION
R1835           TO PERFORM SIGHTING MARKS FOR THE BACK-UP ALIGNMENT PROGRAMS (P53,P54).  THE ASTRONAUT KNOWS THE
R1837   COORDINATES (OPTICS) OF THE ALTERNATE LINE OF SIGHT HE MUST USE FOR THIS ROUTINE.  WHEN THE ASTRONAUT KEYS IN
R1839   ENTER IN RESPONSE TO THE FLASHING V50 N25 R1-XXXXX THE CMC STORES THE THREE ICDU ANGLES AND TWO ANGLES DISPLAYED
R1841   IN N92.

R1842   CALLING SEQUENCE
R1843           CALL
R1844                   R56

R1845   SUBROUTINES CALLED
R1846           A PORTION OF SXTMARK (VAC.AREA SEARCH)
R1847           GOFLASH
R1848           GOPERF1

R1849   ERASABLE INITIALIZATION
R1850           STARIND-INDEX TO STAR NUMBER

R1851   OUTPUT
R1852           MARKSTAT-INDEX TO VAC.AREA WHERE OUTPUT IS STORED.
R1853           BESTI (INDEXED BY STARIND) CONTAINS STAR NUMBER.
R1854           ICDU AND OCDU ANGLES IN VAC. AREA AS FOLLOWS-
R1855              VAC +2  CDUY
R1856              VAC +3  CDUS
R1857              VAC +4  CDUZ
R1858              VAC +5  CDUT
R1859              VAC +6  CDUX

 1860   REF   1                                                    COUNT* $$/R56
 1861   REF   2  LAST  771   17,2000                               SETLOC P50S3
 1862                        17,2056                               BANK
 1863                        17,2056   77420 1  R56      STQ     EXIT
18631   REF   4  LAST  773   17,2057   03501 0                    R53EXIT
 1864   REF   1               17,2060  3 2146 0          CAF     V06N94B
 1865   REF 216  LAST  773    17,2061  0 4662 1          TC      BANKCALL
 1866   REF  38  LAST  773    17,2062   20720 0          CADR    GOFLASH
 1867   REF  61  LAST  773    17,2063  0 4106 1          TC      GOTOPOOH        TERM.
 1868   REF   1               17,2064  0 2066 0          TC      R56A            PROCEED - ANGLES OK
 1869                        17,2065  0 2060 0          TC      -5              ENTER - NEW ANGLES
 1870   REF 217  LAST  781    17,2066  0 4662 1  R56A    TC      BANKCALL
 1871   REF   3  LAST  772    17,2067   16004 1          CADR    SXTMARK +2      INHIBIR EXT VB ACT AND FIND VAC AREA

 1872   REF 151  LAST  773    17,2070  3 5021 1          CAF     ZERO
 1873   REF 218  LAST  781    17,2071  0 4662 1          TC      BANKCALL
 1874   REF   7  LAST  773    17,2072   20703 1          CADR    CLEANDSP

 1875   REF   1               17,2073  3 2145 0  R56A1   CAF     V853            DISPLAY V53 REQUESTING ALTERNATE MARK
 1876   REF 219  LAST  781    17,2074  0 4662 1          TC      BANKCALL
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1877   REF   3  LAST  573   17,2075   20564 1          CADR   GOMARK2
1878   REF  62  LAST  781   17,2076  1 4106 0          TCF    GOTOPOOH       V34-TERMINATE
1879   REF   1               17,2077  1 2073 0          TCF    R56A1          V33-DONT PROCEED-JUST ENTER TO MARK
1880   REF 195  LAST  778   17,2100  0 6006 1          TC     INTPRET
1881                         17,2101   77745 1          DLOAD
1882   REF  36  LAST  585   17,2102   03731 1                 MRKBUF1 +3
1883   REF  10  LAST  746   17,2103   16774 1          STODL  SAC
1884   REF  37  LAST  782   17,2104   03733 0                 MRKBUF1 +5
1885   REF  10  LAST  777   17,2105   02776 0          STORE  PAC
1886                         17,2106   77776 1          EXIT
1887                         17,2107  0 0004 0          INHINT
1888                         17,2110  0 0006 1          EXTEND
1889   REF  25  LAST  739   17,2111  3 0025 0          DCA    TIME2
1890   REF  37  LAST  772   17,2112  51'330 0          INDEX  MARKSTAT
1891                         17,2113  52 001 1          DXCH   0
1892   REF   8  LAST  762   17,2114  3 0033 1          CA     CDUY           ENTER-THIS IS A BACKUP SYSTEM MARK
1893   REF  38  LAST  782   17,2115  51'330 0          INDEX  MARKSTAT
1894                         17,2116  54 002 1          TS     2
1895   REF  11  LAST  782   17,2117  3 1773 0          CA     SAC
1896   REF  39  LAST  782   17,2120  51'330 0          INDEX  MARKSTAT
1897                         17,2121  54 003 0          TS     3
1898   REF  11  LAST  762   17,2122  3 0034 0          CA     CDUZ
1899   REF  40  LAST  782   17,2123  51'330 0          INDEX  MARKSTAT
1900                         17,2124  54 004 1          TS     4
1901   REF  11  LAST  782   17,2125  3 1775 0          CA     PAC
1902   REF  41  LAST  782   17,2126  51'330 0          INDEX  MARKSTAT
1903                         17,2127  54 005 0          TS     5
1904   REF  17  LAST  762   17,2130  3 0032 0          CA     CDUX
1905   REF  42  LAST  782   17,2131  51'330 0          INDEX  MARKSTAT
1906                         17,2132  54 006 0          TS     6
1907                         17,2133  0 0003 1          RELINT
1908   REF   5  LAST  746   17,2134  0 5536 1          TC     CLEARMRK       ENABLE EXTENDED VERBS
1909   REF   1               17,2135  3 4333 0          CAF    OCT16
1910   REF 220  LAST  781   17,2136  0 4662 1          TC     BANKCALL
1911   REF   7  LAST  767   17,2137   21045 0          CADR   GOPERF1
1912   REF  63  LAST  782   17,2140  0 4106 1          TC     GOTOPOOH       TERM.
1913   REF   1               17,2141  1 2143 1          TCF    R56B           PROCEED-MARK COMPLETED
1914   REF   2  LAST  781   17,2142  1 2070 0          TCF    R56A +2         RECYCLE - DO ANOTHER MARK - LIKE REJECT
1918   REF 221  LAST  782   17,2143  0 4662 1  R56B    TC     BANKCALL
1919   REF   2  LAST  773   17,2144   31336 0          CADR   R53C1
1933                         17,2145   15200 1  V853    VN     05300          ALTERNATE MARK VERB
1935                         17,2146   01536 0  V06N94B VN     00694
1936   REF   5  LAST  762   15,2000                    SETLOC P50S
1937                         15,2340                    BANK

1938   REF  13  LAST  771   15,2340   02607 1  PLANET  STORE  TSIGHT
1939                         15,2341   45020 1          STQ    CALL
1940   REF  15  LAST  777   15,2342   02777 1                 QMIN
1941   REF   2  LAST  740   15,2343   30225 1                 LOCSAM
1942                         15,2344   77775 1          VLOAD
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1943   REF   5  LAST  749   15,2345   02736 1                 VEARTH
1944                        15,2346   24001 0          STOVL  OD
1945   REF   8  LAST  750   15,2347   02744 1                 VSUN
1946   REF   6  LAST  783   15,2350   26736 1          STOVL  VEARTH
1947                        15,2351   00001 0                 OD
1948   REF   9  LAST  783   15,2352   02744 1          STORE  VSUN
1949                        15,2353   77776 1  NOSAM   EXIT
1950   REF   4  LAST  773   15,2354  4 7713 1          CS     HIGH9
1951   REF  11  LAST  773   15,2355  7 0735 1          MASK   STARCODE
1952                        15,2356  0 0006 1          EXTEND
1953   REF   2  LAST  773   15,2357  7 6211 1          MP     SIGHTSIX
1954   REF  71  LAST  778   15,2360  56 001 0          XCH    L
1955   REF  16  LAST  776   15,2361  50 304 0          INDEX  STARIND
1956   REF  13  LAST  773   15,2362  54 302 1          TS     BESTI
1957   REF 183  LAST  773   15,2363  10 000 0          CCS    A
1958   REF   1              15,2364  1 2401 1          TCF    NOTPLAN
1959   REF   1              15,2365  3 2431 0          CAF    VNPLANV
1960   REF 222  LAST  782   15,2366  0 4662 1          TC     BANKCALL
1961   REF  39  LAST  781   15,2367   20720 0          CADR   GOFLASH
1962   REF  64  LAST  782   15,2370  0 4106 1          TC     GOTOPOOH
1963                        15,2371  0 2373 1          TC     +2
1964                        15,2372  0 2365 0          TC     -5
1965   REF 196  LAST  782   15,2373  0 6006 1          TC     INTPRET
1966                        15,2374   74375 0          VLOAD  VXSC
1967   REF   5  LAST  631   15,2375   03705 0                 STARSAV3
19671  REF   2  LAST  631   15,2376   32433 1                 1/SOR3
1968                        15,2377   52056 0          UNIT   GOTO
1969   REF   1              15,2400   32424 1                 CORPLAN
1970   REF 184  LAST  783   15,2401  4 0000 0  NOTPLAN CS     A
1971   REF   1              15,2402  6 2430 1          AD     DEC227
1972                        15,2403  0 0006 1          EXTEND
1973   REF   1              15,2404  6 2415 0          BZMF   CALSAM1
1974   REF  17  LAST  783   15,2405  50 304 0          INDEX  STARIND
1975   REF  14  LAST  783   15,2406  3 0302 0          CA     BESTI
1976   REF  16  LAST  778   15,2407  50 120 1          INDEX  FIXLOC
1977   REF  39  LAST  753   15,2410  54 046 1          TS     X1
1978   REF 197  LAST  783   15,2411  0 6006 1          TC     INTPRET
1979                        15,2412   52173 0          VLOAD* GOTO
1980   REF  10  LAST  754   15,2413   31761 0                 CATLOG,1
1981   REF   2  LAST  783   15,2414   32424 1                 CORPLAN
1982   REF 198  LAST  783   15,2415  0 6006 1  CALSAM1 TC     INTPRET
1983                        15,2416   70740 0          LXC,1  DLOAD*
1984   REF  18  LAST  783   15,2417   00304 0                 STARIND
1985   REF  15  LAST  783   15,2420   00303 1                 BESTI,1
1986                        15,2421   76740 0          LXC,1  VLOAD*
1987   REF 275  LAST  771   15,2422   00154 1                 MPAC
1988   REF  10  LAST  769   15,2423   02372 0                 STARAD -2280,1
1989                        15,2424   53455 0  CORPLAN VAD    UNIT
1990   REF   5  LAST  790   15,2425   03474 0                 VEL/C
1991                        15,2426   77650 1          GOTO
```

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1992  REF  16  LAST  782   15,2427   02777 1                    QMIN
1993                       15,2430   00343 0  DEC227   DEC     227
1994                       15,2431   01530 0  VNPLANV  VN      0688
1995                       15,2432   22363 1  1/SQR3   2DEC    .57735021
1995                       15,2433   11623 0
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L LUNAR AND SOLAR EPHEMERIDES SUBROUTINES USER'S PAGE NO. 1 E0 S3

P0001 LUNAR AND SOLAR EPHEMERIDES SUBROUTINES

R0002 FUNCTIONAL DESCRIPTION

R0003 THESE SUBROUTINES ARE USED TO DETERMINE THE POSITION AND VELOCITY
R0004 VECTORS OF THE SUN AND THE MOON RELATIVE TO THE EARTH AT THE
R0005 SPECIFIED GROUND ELAPSED TIME INPUT BY THE USER.

R0006 THE POSITION OF THE MOON IS STORED IN THE COMPUTER IN THE FORM OF
R0007 A NINTH DEGREE POLYNOMIAL APPROXIMATION WHICH IS VALID OVER A 15
R0008 DAY INTERVAL BEGINNING SHORTLY BEFORE LAUNCH. THEREFORE THE TIME
R0009 INPUT BY THE USER SHOULD FALL WITHIN THIS 15 DAY INTERVAL.

R0010 LSPOS COMPUTES THE POSITION VECTORS OF THE SUN AND THE MOON.

R0011 LUNPOS COMPUTES THE POSITION VECTOR OF THE MOON.

R0012 LUNVEL COMPUTES THE VELOCITY VECTOR OF THE MOON.

R0013 SOLPOS COMPUTES THE POSITION VECTOR OF THE SUN.

R0014 CALLING SEQUENCE

R0015 DLOAD CALL
R0016 TIME GROUND ELAPSED TIME
R0017 SUBROUTINE LSPOS OR LUNPOS OR LUNVEL OR SOLPOS

R0018 INPUT

R0019 1) SPECIFIED GROUND ELAPSED TIME IN CS X B-28 LOADED IN MPAC.

R0020 2) TIMEMO - TIME AT THE CENTER OF THE RANGE OVER WHICH THE LUNAR
R0021 POSITION POLYNOMIAL IS VALID IN CS X B-42.

R0022 3) VECOEM - VECTOR COEFFICIENTS OF THE LUNAR POSITION POLYNOMIAL
R0023 LOADED IN DESCENDING SEQUENCE IN METERS/CS**N X B-2

R0024 4) RESO - POSITION VECTOR OF THE SUN RELATIVE TO THE EARTH AT
R0025 TIMEMO IN METERS X B-38.

R0026 5) VESO - VELOCITY VECTOR OF THE SUN RELATIVE TO THE EARTH AT
R0027 TIMEMO IN METERS/CS X B-9.

R0028 6) OMEGAES - ANGULAR VELOCITY OF THE VECTOR RESO AT TIMEMO IN
R0029 REV/CS X B+26.

R0030 ALL EXCEPT THE FIRST INPUT ARE INCLUDED IN THE PRE-LAUNCH
R0031 ERASABLE DATA LOAD.

R0032 OUTPUT - LSPOS

```
R0033          1) 20 OF VAC AREA CONTAINS THE POSITION VECTOR OF THE SUN RELATIVE
R0034             TO THE EARTH AT TIME INPUT BY THE USER IN METERS X B-38.

R0035          2) MPAC CONTAINS THE POSITION VECTOR OF THE MOON RELATIVE TO THE
R0036             EARTH AT TIME INPUT BY THE USER IN METERS X B-29.

R0037    OUTPUT - LUNPOS

R0038          MPAC CONTAINS THE POSITION VECTOR OF THE MOON RELATIVE TO THE
R0039          EARTH AT THE TIME INPUT BY USER IN METERS X B-29.

R0040    OUTPUT - LUNVEL

R0041          MPAC CONTAINS THE VELOCITY VECTOR OF THE MOON RELATIVE TO THE
R0042          EARTH AT TIME INPUT BY THE USER IN METERS/CS X B-7.

R0043    OUTPUT - SOLPOS

R0044          MPAC CONTAINS THE POSITION VECTOR OF THE SUN RELATIVE TO THE EARTH
R0045          AT TIME INPUT BY THE USER IN METERS X B-38.

R0046    SUBROUTINES USED

R0047          NONE

R0048    REMARKS

R0049          THE VAC AREA IS USED FOR STORAGE OF INTERMEDIATE AND FINAL RESULTS
R0050          OF COMPUTATIONS.

R0051          S1, X1 AND X2 ARE USED BY THESE SUBROUTINES.
R0052          PRELAUNCH ERASABLE DATA LOAD ARE ONLY ERASABLE STORAGE USED BY
R0053          THESE SUBROUTINES.
R0054          RESTARTS DURING OPERATION OF THESE SUBROUTINES MUST BE HANDLED BY
R0055          THE USER.

 0056                                36,2466                          BANK   36
 0057    REF   1                     26,2000                          SETLOC EPHEM
 0058                                26,2110                          BANK

 0059    REF   1                                                      COUNT* $$/EPHEM
 0060    REF   2  LAST  216          E7,1777                          EBANK= END-E7
 0061                                26,2110   77774 0  LSPOS   AXT,2
 0062    REF   1                     26,2111   54161 0                  RESA
 0063                                26,2112   52170 0          AXT,1   GOTO
 0064    REF   1                     26,2113   54143 0                  RES
 0065    REF   1                     26,2114   54126 0                  LSTIME
 0066                                26,2115   52170 0  LUNPOS  AXT,1   GOTO
 0067    REF   1                     26,2116   54162 0                  REM
 0068    REF   2  LAST  786          26,2117   54126 0                  LSTIME
```

COMPUTES POSITION VECTORS OF BOTH THE SUN AND THE MOON. THE POSITION VECTOR OF THE SUN IS STORED IN 20 OF THE VAC AREA. THE POSITION VECTOR OF THE MOON IS STORED IN MPAC.

COMPUTES THE POSITION VECTOR OF THE MOON AND STORES IT IN MPAC.

```
0069                              26,2120  52170 0  LUNVEL   AXT,1   GOTO          COMPUTES THE VELOCITY VECTOR OF THE MOON
0070  REF   1                    26,2121  54173 0                   VEM           AND STORES IT IN MPAC.
0071  REF   3  LAST  786         26,2122  54126 0                   LSTIME
0072                              26,2123  76020 1  SOLPOS   STQ     AXT,1         COMPUTES THE POSITION VECTOR OF THE SUN
0073  REF  19  LAST  720         26,2124  00047 1                   X2            AND STORES IT IN MPAC.
0074  REF   2  LAST  786         26,2125  54143 0                   RES
0075                              26,2126  54201 0  LSTIME   SETPD   SR
0076                              26,2127  00001 0                   0D
0077                              26,2130  20617 0                   14D
0078                              26,2131  57571 0           TAD     DCOMP
0079  REF  12  LAST  539         26,2132  01707 0                   TEPHEM
0080                              26,2133  57571 0           TAD     DCOMP
0081  REF   2  LAST   88         26,2134  02034 1                   TIMEMO
0082                              26,2135  66261 1           SL      SSP
0083                              26,2136  20221 1                   16D
0084  REF  31  LAST  776         26,2137  00051 0                   S1
0085                              26,2140  00006 1                   6D
0086                              26,2141  77650 1           GOTO
0087  REF  40  LAST  783         26,2142  00046 0                   X1
0088                              26,2143  41206 0  RES      PUSH    DMP                                          PD- 2
0089  REF   1                    26,2144  02147 1                   OMEGAES
0090                              26,2145  71406 0           PUSH    COS                                          PD- 4
0091                              26,2146  65361 0           VXSC    PDDL                                         PD- 8
0092  REF   2  LAST   89         26,2147  02133 1                   RESO
0093                              26,2150  63356 1           SIN     PDVL                                         PD-10
0094  REF   3  LAST  787         26,2151  02133 1                   RESO
0095                              26,2152  53406 0           PUSH    UNIT                                         PD-16
0096                              26,2153  53435 0           VXV     UNIT
0097  REF   3  LAST  625         26,2154  02141 1                   VESO
0098                              26,2155  76435 1           VXV     VSL1                                         PD-10
0099                              26,2156  53361 0           VXSC    VAD                                          PD-02
0100                              26,2157  52172 1           VSL1    GOTO          RES IN METERS X B-38 IN MPAC.
0101  REF  20  LAST  787         26,2160  00047 1                   X2.
0102                              26,2161  14003 1  RESA     STODL   2D            RES IN METERS X B-38 IN 2D OF VAC.  PD- 0
0103                              26,2162  63370 0  REM      AXT,1   PDVL                                         PD- 2
0104                              26,2163  00066 1                   54D
0105  REF   2  LAST   88         26,2164  02037 1                   VECDEM
0106                              26,2165  52761 0  REMA     VXSC    VAD*
0107                              26,2166  00001 0                   0D
0108  REF   3  LAST  787         26,2167  02133 1                   VECDEM +60D,1
0109                              26,2170  72500 1           TIX,1   VSL2          REM IN METERS X B-29 IN MPAC.
0110  REF   1                    26,2171  54165 1                   REMA
0111                              26,2172  77616 0           RVQ
0112                              26,2173  65370 0  VEM      AXT,1   PDDL                                         PD- 2
0113                              26,2174  00060 1                   48D
0114  REF   1                    26,2175  14214 0                   NINEB4
0115                              26,2176  74206 0           PUSH    VXSC                                         PD- 4
0116  REF   4  LAST  787         26,2177  02037 1                   VECDEM
0117                              26,2200  77761 1  VEMA     VXSC
0118                              26,2201  00001 0                   0D
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0119                        26,2202   14005 1           STODL   4D                                          PD- 2
0120                        26,2203   41425 1           DSU     PUSH                                        PD- 4
0121  REF   1               26,2204   14216 1           ONEB4
0122                        26,2205   53357 0           VXSC*   VAD
0123  REF   5  LAST  787    26,2206   02125 0           VECOEM +54D,1
0124                        26,2207   00005 1           4D
0125                        26,2210   72500 1           TIX,1   VSL2          VEM IN METERS/CS X B-7 IN MPAC.
0126  REF   1               26,2211   54200 1           VEMA
0127                        26,2212   77616 0           RVQ
0128                        26,2213   22000 1 NINEB4    2DEC    9.0 B-4
0128                        26.2214   00000 1
0129                        26,2215   02000 0 ONEB4     2DEC    1.0 B-4
0129                        26,2216   00000 1
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R0001   PROGRAM:              P61
R0002   MOD NO.:              0    MAR. 13, 1967
R0003   MOD BY:               R. HIRSCHKOP
R0004   MOD NO:  1            MOD BY:  RR BAIRNSFATHER      DATE:  22 JUN 67     RESTARTS.
R0006   MOD NO:  2            MOD BY:  RR BAIRNSFATHER      DATE:  17 JAN 68     COLOSSUS GSOP CHANGES.
R0008   MOD NO:  3            MOD BY:  RR BAIRNSFATHER      DATE:   8 MAY 68     DELETE CMSM MANEUVER (PCR 50)
R0010   FUNCTION:             TO CALCULATE AND DISPLAY EMS INITIALIZATION DATA
R0011   CALLING SEQUENCE-     BY V37
R0012   EXIT-                 TO P62
R0013   SUBROUTINE CALLS-     S61.1 , S61.3 , GOFLASH , FLAGUP , R02BOTH

R0014   ERASABLE INITIALIZATION:
R0015           EMSALT  (-29) M        .05G ALTITUDE ABOVE FISCHER ELLIPSOID   PAD LOADED.
R0017           ALFAPAD  /180          HYPERSONIC CM TRIM ANGLE OF ATTACK      PAD LOADED
R0019   OUTPUT: THE FOLLOWING REGISTERS ARE WRITTEN IN FOR USE BY DISPLAYS
R0020           GMAX   100 GMAX  (-14)  G.S     MAXIMUM ACCELERATION
R0021           VPRED  (-7)  M/CS      PREDICTED VELOCITY AT 400K FT
R0022           GAMMAEI  GAMMA/360     PREDICTED GAMMA    AT 400K FT
R0023           RTGO   THETAH/360      RANGE ANGLE TO SPLASH FROM EMSALT       EMSALT IS PAD LOADED
R0025           VIO    (-7) M/CS       INERTIAL VELOCITY  AT      EMSALT       EMSALT IS PAD LOADED
R0027           TTE    (-28) CS        TIME     TO                 EMSALT       EMSALT IS PAD LOADED
R0029           LAT(SPL)  /360         TARGET LOCATION                         LEFT BY DSKY
R0031           LNG(SPL)  /360         TARGET LOCATION                         LEFT BY DSKY
R0033           HEADSUP   (0)          +1 = LIFT DOWN,  -1 = LIFT UP           LEFT BY DSKY
R0035   DEBRIS: SEE SUBROUTINES.

 0036                          26,2217                  BANK   26
 0037   REF   1                26,2000                  SETLOC P60S
 0038                          26,2217                  BANK

 0039   REF  15  LAST  539     E6,1661                  EBANK= AOG

 0040   REF   1                                         COUNT* $$/P61

 0041   REF  41  LAST  736     26,2217  3 5002 0  P61    CA     BIT14           EXTENDED VERB SHOULD BE FREE THIS CLOSE
 0042   REF  18  LAST  570     26,2220  55'044 1          TS     EXTVBACT        TO V37
A0043                                                                           LOCK OUT EXTENDED VERBS SO CAN USE TFF
A0044                                                                           ROUTINES.EXT VERB ERASE IS USED

 0045   REF  91  LAST  733     26,2221  4 5017 0          CS     ONE             REMOVE IF HEADSUP EVER ON UPLINK DATA
 0046   REF   3  LAST  280     26,2222  55'726 1          TS     HEADSUP         PRELOAD

 0047   REF   1                26,2223  0 2544 0          TC     S61.1           CHECK STATE VECTOR AND IMU ORIENTATION
A0048                                                                      RV 60GENRET. DOES PHASCHNG, GROUP 4.

 0049   REF   1                26,2224  3 2425 0          CA     V06N61          LAT(SPL)     LNG(SPL)     HEADSUP
A0050                                                                           XXX.XX DEG   XXX.XX DEG   XXXXX.
 0051   REF 223  LAST  783     26,2225  0 4662 1          TC     BANKCALL
 0052   REF  12  LAST  756     26,2226   21057 0          CADR   GOFLASHR
 0053   REF  65  LAST  733     26,2227  0 4106 1          TC     GOTOPOOH
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 0054   REF   1                 26,2230  0 2235 1           TC     P61.4
 0055                           26,2231  0 2224 1           TC     -5

 0056   REF  76  LAST  769      26,2232  0 5412 0  P61.3    TC     PHASCHNG
 0057                           26,2233   00014 1           OCT    00014

 0058   REF  91  LAST  756      26,2234  0 5217 0           TC     ENDOFJOB

 0061                           26,2235  22 007 0  P61.4    ZL
 0062   REF   4  LAST  789      26,2236  11'726 1           CCS    HEADSUP        C(HEADSUP)=  +1/-1
 0063   REF  42  LAST  789      26,2237  3 5002 0           CA     BIT14          IF HEADSUP POS,ROLLC =180 DEG.(LIFT DWN)
 0064                           26,2240  12 241 0           NOOP                  IF HEADSUP NEG,ROLLC=0 (LIFT UP)
 0065   REF   6  LAST  281      26,2241  53'716 1           DXCH   ROLLC          ROLLC IS USED BY S62.3: GIM ANG AT .05G

 0066   REF 199  LAST  783      26,2242  0 6006 1           TC     INTPRET
 0067                           26,2243   77745 1  NEWRNVN  DLOAD
 0068   REF   9  LAST  724      26,2244   01205 1           PIPTIME        SAVE TIME OF RN,VN TO DETERMINE IF AN
 0069   REF   2  LAST  118      26,2245   37651 1           STCALL MM      UPDATE HAS OCCURRED
 0070   REF   1                 26,2246   52063 0           STARTEN1       INITIALIZE
 0071                           26,2247   77775 1           VLOAD
 0072   REF  10  LAST  724      26,2250   01171 1           RN
 0073   REF  15  LAST  644      26,2251   02327 0           STORE  RONE
 0074                           26,2252   77656 1           UNIT
 0075   REF   1                 26,2253   26343 1           STOVL  URONE
 0076   REF  10  LAST  701      26,2254   01177 1           VN
 0077   REF  11  LAST  522      26,2255   02335 0           STORE  VONE
 0078                           26,2256   53435 0           VXV    UNIT
 0079   REF   2  LAST  790      26,2257   02343 1           URONE
 0080   REF   2  LAST  118      26,2260   03502 0           STORE  UNI
 0081                           26,2261   45345 1  DUMPP61  DLOAD  DSU
 0082   REF   3  LAST  790      26,2262   03651 0           MM             INITIAL VALUE OF PIPTIME
 0083   REF  10  LAST  790      26,2263   01205 1           PIPTIME
 0084                           26,2264   45040 1           BMN    CALRB
 0085   REF   1                 26,2265   54243 0           NEWRNVN        UPDATED... GO TRY AGAIN
 0086   REF   1                 26,2266   54651 1           S61.2          GET DISPLAY DATA FOR N60 AND N63
A0087                                                                      AND RETURN IN BASIC, BELOW.
 0089   REF   6  LAST  782      26,2267  0 5536 1  P61.1    TC     CLEARMRK
 0090   REF   1                 26,2270  3 2424 1           CA     V06N60         GMAX          VPRED          GAMMAEI
A0091                                                                      XXX.XX G      XXXXX. FPS     XXX.XX DEG
 0092   REF 224  LAST  789      26,2271  0 4662 1           TC     BANKCALL
 0093   REF  40  LAST  783      26,2272   20720 0           CADR   GOFLASH

 0094   REF  66  LAST  789      26,2273  0 4106 1           TC     GOTOPOOH
 0095   REF   1                 26,2274  0 2276 0           TC     P61.2          PROCEED
 0096                           26,2275  0 2270 0           TC     -5

 0097   REF 200  LAST  790      26,2276  0 6006 1  P61.2    TC     INTPRET        CORRECT  TTE  FOR TIME LAPSE DURING
A0098                                                                      ABOVE DISPLAY.
 0099                           26,2277   45234 0           RTB    DSU
 0100   REF  23  LAST  778      26,2300   45510 1           LOADTIME       CURRENT TIME.
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 0101   REF   4  LAST  790   26,2301   03651 0              MM              PIPTIME FOR RONE & VONE.
 0102                        26,2302   77615 0      DAD
 0103   REF   2  LAST  120   26,2303   03733 0              TTE1            NEGATIVE OF FREE FALL TIME.
 0104   REF   5  LAST  281   26,2304   03727 0      STORE   TTE             DECREMENTED

 0105                        26,2305   77776 1      EXIT

 0106   REF   1              26,2306   3 2426 0     CA      V06N63          RTGO          VIO           TTE
A0107                                                                       XXXX.X NM     XXXXX. FPS    XXBXX M,S
 0108   REF 225  LAST  790   26,2307   0 4662 1     TC      BANKCALL
 0109   REF  41  LAST  790   26,2310    20720 0     CADR    GOFLASH
 0110   REF  67  LAST  790   26,2311   0 4106 1     TC      GOTOPOOH
 0111                        26,2312   0 2314 0     TC      +2
 0112   REF   2  LAST  790   26,2313   0 2276 0     TC      P61.2           REDO

R0113                                 .... THEN FALL INTO P62
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R0114   PROGRAM-              P62
R0115   MOD NO.-              0    MAR. 13, 1967
R0116   MOD BY-               R. HIRSCHKOP
R0117   MOD NO:  1           MOD BY:  RR BAIRNSFATHER      DATE: 21 MAR 67
R0118   MOD NO:  2           MOD BY:  RR BAIRNSFATHER      DATE:  22 JUN 67     RESTARTS.
R0120   MOD NO:  3           MOD BY:  RR BAIRNSFATHER      DATE:  17 JAN 68     COLOSSUS GSOP CHANGES.
R0122   MOD NO:  4           MOD BY:  RR BAIRNSFATHER      DATE:   8 MAY 68     MOVE START OF DESIRED GIMBAL CALC.
R0124   FUNCTION-            1) TO NOTIFY CREW WHEN GNC SYSTEM IS PREPARED FOR CM/SM SEPARATION
R0126                        2) TO ORIENT THE CM TO THE CORRECT ATTITUDE FOR ATMOSPHERIC ENTRY
R0128   CALLING SEQUENCE-    BY V37 OR DIRECTLY FROM P61
R0129   EXIT-                TO P63
R0130   ERASABLE INITIALIZATION:
R0131           ALFAPAD                                          LEFT BY PAD LOAD
R0132           LADPAD                                           LEFT BY PAD LOAD
R0133           LODPAD                                           LEFT BY PAD LOAD
R0134           LAT(SPL)     (MAY BE CHANGED BELOW)              LEFT BY DSKY, VIA P61
R0136           LNG(SPL)     (MAY BE CHANGED BELOW)              LEFT BY DSKY, VIA P61
R0138           HEADSUP      (MAY BE CHANGED BELOW)              LEFT BY DSKY, VIA P61
R0140   SUBROUTINE CALLS:    NEWMODEX , S61.1 , CM/DAPIC , CM/DAPON , R02BOTH , GOPERF1 , GOFLASH , GODSPR

 0142   REF   1                                          COUNT* $$/P62

 0143   REF   7  LAST  536   26,2314  0 5354 0          TC     NEWMODEX        MODE CHANGE IF CAME FROM P61.
 0144                        26,2315   00076 0          MM     62              MODE CHANGE AUTOMATIC VIA V 37.
 0145   REF  92  LAST  789   26,2316  3 5017 1          CA     ONE
 0146   REF   5  LAST  536   26,2317  54 332 1          TS     DNLSTCOD

 0147   REF   2  LAST  789   26,2320  0 2544 0  P62     TC     S61.1           CHECK STATE VECTOR AND IMU ORIENTATION.

 0148   REF 201  LAST  790   26,2321  0 6006 1          TC     INTPRET
 0149                        26,2322   47131 1          SSP    RTB
 0150   REF   2  LAST  112   26,2323   03325 0                 POSEXIT
 0151   REF   1              26,2324   54401 0                 P62.3           CALCULATE DESIRED .05G GIMBAL ANGLES.
A0152                                                                          WITHOUT DISPLAY.
 0153   REF   1              26,2325   41672 1                 CM/DAPIC        START CM/POSE AND BODY RATE CALC

A0154                                                                  DOES 2PHSCHNG. OCT 40116. OCT 05024, OCT 13000.
A0155                                                                          CM/DAPIC SETS EBANK = EBA0G

A0156                                                                          AND RETURNS IN BASIC TO P62.2.
 0157                        26,2326  0 0006 1  P62.2   EXTEND
 0158   REF   1              26,2327  3 2432 0          DCA    POSECADR        CONTINUE WITH CM/POSE AFTER AV G.
 0159   REF   8  LAST  691   26,2330  53'223 1          DXCH   AVEGEXIT

 0160   REF   1              26,2331  3 4270 0          CAF    OCT41           REQUEST SEPARATION
 0161   REF 226  LAST  791   26,2332  0 4662 1          TC     BANKCALL
 0162   REF   1              26,2333   21125 1          CADR   GOPERF1R
 0163   REF  68  LAST  791   26,2334  0 4106 1          TC     GOTOPOOH
 0164                        26,2335  0 2340 1          TC     +3              PROCEED
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A0165                                                          NOTE:  NODOFLAG WILL BE SET IN CM/DAPON. <<<
 0166                        26,2336  0 2331 1          TC     -5              ENTER
 0167  REF   1              26,2337  0 2232 0          TC     P61.3           FOR PHASCHNG AND ENDOFJOB.

 0168  REF  48  LAST  734   26,2340  0 4701 0  +3      TC     POSTJUMP
 0169  REF   1              26,2341   41612 1          CADR   CM/DAPON        DISABLE RCS DAP, ENABLE ENTRY DAP AND
A0170                                                                        DO ATTITUDE HOLD.

A0171                                                          WILL IDLE UNTIL CM/POSE DOES ONE UPDATE.
A0172                                                          CM/DAPON DOES NO PHASCHNG.

 0173  REF   2  LAST  789   26,2342  3 2425 0  P62.1   CA     V06N61          LAT(SPL)     LNG(SPL)     HEADSUP
A0174                                                                        XXX.XX DEG   XXX.XX DEG   OOOOX.

A0175                                                             TERMINATE  ATTITUDE HOLD. SET UP COMMANDS:
A0176                                                             ROLLC,  ALFACOM,  BETACOM.   BEGIN MANUVER TO
A0177                                                             ENTRY ATTITUDE.

 0178  REF 227  LAST  792   26,2343  0 4662 1          TC     BANKCALL
 0179  REF  42  LAST  791   26,2344   20720 0          CADR   GOFLASH
 0180                        26,2345  0 2342 0          TC     -3
 0181                        26,2346  0 2350 0          TC     +2
 0182                        26,2347  0 2342 0          TC     -5

 0183  REF  77  LAST  790   26,2350  0 5412 0          TC     PHASCHNG
 0184                        26,2351   04024 0          OCT    04024           USE ENTRYVN FOR DISPLAY BELOW.

A0185                                                                       EBANK WAS SET IN CM/DAPON TO EBAOG

 0186  REF   5  LAST  790   26,2352  11'726 1          CCS    HEADSUP         C(HEADSUP) = +/- 1
 0187  REF  43  LAST  790   26,2353  3 5002 0          CA     BIT14           IF HEADSUP POS,ROLLC=180 DEG (LIFT DWN)
 0188                        26,2354  12 355 1          NOOP                   IF HEADSUP NEG,ROLLC=0 DEG  (LIFT UP)
 0189  REF   7  LAST  790   26,2355  55'715 1          TS     ROLLC
 0190  REF   1              26,2356  3 1411 1          CA     ALFAPAD         NOMINAL ALFATRIM PAD LOADED, NEG. NO.
 0191                        26,2357  22 007 0          ZL
 0192  REF   2  LAST  112   26,2360  53'604 0          DXCH   ALFACOM         SET ALFACOM = ALFA TRIM, BETACOM=0

 0193  REF  93  LAST  792   26,2361  3 5017 1          CA     ONE             PERMITS EXDAP2 TO CHANGE FLAG TO +0
 0194  REF   1              26,2362  55'727 0          TS     P63FLAG         AS INDICATOR. STARTS UP P63.

 0195  REF   2  LAST  398   26,2363  3 5052 0          CA     V06N22          SET UP DISPLAY FOR CDU DESIRED VALUES
 0196  REF   2  LAST   80   26,2364  55'263 0          TS     ENTRYVN         FROM ENTRY ATTITUDE CALC, THAT IS
A0197                                                                       ALREADY GOING.
 0198  REF  47  LAST  744   26,2365  0 5546 0          TC     UPFLAG          TURN ON ENTRY DISPLAY
 0199  REF   1              26,2366   00134 1          ADRES  ENTRYDSP        ENTRYDSP = 92D  BIT 13  FLAG 6
A01991                                  SKIP
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 0200   REF   4  LAST  177   26,2367  4 1700 0          CS     CMDAPMOD        GO DIRECTLY TO P63 IF BODY ATTITUDE
 0201   REF  94  LAST  793   26,2370  7 5017 0          MASK   ONE             IS SUCH THAT THE DELAY TASK: WAKEP62
 0202                        26,2371  0 0006 1          EXTEND                 WILL BE OMITTED.
 0203   REF   1              26,2372  1 2421 0          BZF    P63.1           DISABLE GRP 4, GO TO ENDOFJOB.

A0204                                                                        (IE, CONTINUE IF CMDAPMOD = -1, OR +0)
 0205   REF   1              26,2373  0 2405 1          TC     P63

A0206                                                                       PUT JOB TO SLEEP UNTIL VEHICLE MANUVER HAS
A0207                                                                       REDUCED ALFA TO +/-45 DEG. CONSIDER REMAINING
A0208                                                                       65 DEG (25 DEG IF ALFA NEG) TO ALFA TRIM TO
A0209                                                                       OCCUR AT 3 DEG/SEC, AND TERMINATE P62 AT THAT
A0210                                                                       TIME.
A0211                                                                       TASK WAKEP62 IS CALLED FROM ENTRY DAP.

 0212   REF   2  LAST  619   26,2374  3 5065 1  WAKEP62  CA     PRIO13
 0213   REF  24  LAST  707   26,2375  0 5134 1           TC     NOVAC
 0214   REF  16  LAST  789   E6,1661                     EBANK= AOG
 0215   REF   2  LAST  794   26,2376   02405 1          2CADR  P63
 0215                        26,2377   54066 0
 0216   REF  41  LAST  731   26,2400  0 5324 1          TC     TASKOVER

A0218                                                                       EACH 2 SEC, CALCULATE GIMBAL ANGLES FOR ENTRY CON-
A0219                                                                       DITIONS THAT WILL HOLD IF REORIENTATION WERE MADE
A0220                                                                       AT PRESENT RN, VN. COME HERE FROM CM/POSE AND ALSO
A0221                                                                       IN KEPLER PHASE OF ENTRY.
 0222                        26,2401   52131 0  P62.3    SSP    GOTO            SET RETURN ADDRESS SO THAT   ROUTINE
 0223   REF  15  LAST  772   26,2402   00053 1           QPRET                  GOES DIRECTLY TO ENTRY GUIDANCE EXIT
 0224   REF   1              26,2403   53576 0           ENDEXIT                THAT DOES ENTRY DISPLAY .GRP 5.
 0225   REF   1              26,2404   20376 1           S62.3                   PUT DESIRED COU VALUES IN CPHI'S FOR
A0226                                                                       N22 DISPLAY.
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P0227            P63
R0228  PROGRAM-              P63
R0229  MOD NO.-              0    MAR. 13, 1967
R0230  MOD BY-               R. HIRSCHKOP
R0231  MOD NO:  1            MOD BY:  RR BAIRNSFATHER     DATE:  22 JUN 67    RESTARTS.
R0233  MOD NO:  2            MOD BY:  RR BAIRNSFATHER     DATE:  14 JUL 67    REVISED RESTARTS
R0235  FUNCTION-             1) TO INITIALIZE THE ENTRY EQUATIONS
R0236                        2) TO CONTINUE TO HOLD THE CM TO THE CORRECT ATTITUDE WITH RESPECT TO THE ATMOSPHERE FOR
R0238                           THE ONSET OF ENTRY DECELERATION. ROLL ANGLE IS LIFT UP/DOWN AS SPECIFIED BY HEADSUP.
R0240                        3) TO SENSE .05 G
R0241  CALLING SEQUENCE-     DIRECTLY FROM P62
R0242  EXIT-                 TO ENDOFJOB
R0243  SUBROUTINE CALLS-     NEWMODEX , GOODSPR

 0244  REF   1                                          COUNT* $$/P63

 0245  REF   8  LAST  792    26,2405  0 5354 0  P63     TC     NEWMODEX
 0246                        26,2406   00077 1          MM     63

A0247                                                                 ARRIVE WITH EBANK = A0G.

 0248  REF   1              26,2407  3 2430 1          CA     ENTCADR     CONTINUE AT STARTENT AFTER CM/POSE .
A0249                                                                 AT END OF STARTENT, CHANGE ADDRESS IN GOTOADDR
A0250                                                                 TO CONTINUE AT  SCALEPOP  THEREAFTER.

 0251  REF   3  LAST  792    26,2410  55'724 0         TS     POSEXIT

 0252  REF   1              26,2411  3 2427 1          CA     V06N64      G           VI          R TO SPLSH
A0253                                                                 XXX.XX G    XXXXX. FPS   XXXX.X NM
 0254  REF   3  LAST  793    26,2412  55'263 0         TS     ENTRYVN     FOR DISPLAY CALL IN OVERNOUT.

 02541 REF  95  LAST  794    26,2413  4 5017 0         CS     ONE         IN CASE FLAG IS LEFT AT +1 BY DAP. THE
 02542 REF   2  LAST  793    26,2414  55'727 0         TS     P63FLAG     -1 ASSURES THAT EXO-ATM DAP WILL NOT
A02543                                                               CALL P63 OUT OF SEQUENCE IN P66 .

 02545 REF  78  LAST  793    26,2415  0 5412 0         TC     PHASCHNG    THIS IS REQUIRED TO PRESERVE CLEANDSP
 02546                       26,2416   00004 0          OCT    00004       RETURN IN EVENT OF AN EXTENDED VERB..

 02547 REF 228  LAST  793    26,2417  0 4662 1         TC     BANKCALL    FLUSH 'N22' DISPLAY, IF ON. (OMIT
 02548 REF   8  LAST  781    26,2420   20703 1         CADR   CLEANDSP    DISPLAY DURING 'STARTENT' PASS.)

 0255  REF  79  LAST  795    26,2421  0 5412 0  P63.1   TC     PHASCHNG
 0256                        26,2422   00004 0          OCT    00004       DISABLE. DISPLAY RESTARTED VIA ENTRY.

 0257  REF  92  LAST  790    26,2423  0 5217 0         TC     ENDOFJOB

 0258                        26,2424   01474 1  V06N60  VN     0660
 0259                        26,2425   01475 0  V06N61  VN     0661
 0260                        26,2426   01477 1  V06N63  VN     0663
```

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0261                          26,2427   01500 0  V06N64    VN      0664
0262   REF   1                26,2430   52000 0  ENTCADR   CADR    STARTENT

0263   REF   6  LAST  294      E7,1451                     EBANK=  RTINIT          TO CARY OVER INTO ENTRY STEERING.
0264   REF   1                26,2431   03470 1  POSECADR  2CADR   CM/POSE
0264   REF   1                26,2432   76067 1
```

L P61-P67 USER'S PAGE NO. 9 E6 S3

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R0265   PROGRAM-              P64
R0266   MOD NO.-              1     SEPT. 19, 1967
R0267   MOD BY-               R. HIRSCHKOP
R0268   MOD NO:  2            MOD BY:  RR BAIRNSFATHER      DATE:   8 MAY 68     REVISED COMMENTS FOR COLOSSUS
R02691  MOD NO:  3            MOD BY: RR BAIRNSFATHER       DATE: 1 MAR '69  N74
R0270   FUNCTION-             1.  TO START ENTRY GUIDANCE AT .05G SELECTING ROLL  ATTITUDE, CONSTANT DRAG LEVEL, AND
R0272                         DRAG THRESHOLD,  KA   , WHICH ARE KEYED TO THE .05G POINT.
R0274                         2.  SELECT FINAL PHASE P67 IF V < 27000 FPS WHEN .2G OCCURS.
R0276                         3.  ITERATE FOR UP-CONTROL SOLUTION  P65  IF V > 27000 FPS AND IF ALTITUDE RATE AND DRAG
R0278                         LEVEL CONDITIONS ARE SATISFIED. ENTER P65 WHEN CONSTANT DRAG CONTROLLER HAS BROUGHT RANGE
R0280                         AS PREDICTED TO WITHIN 25 NM OF DESIRED RANGE.
R0281                         4.  SELECT FINAL PHASE  P67  IF NO UP-CONTROL SOLUTION EXISTS WITH VL > 18000 FPS.
R0283   CALLING SEQUENCE-     BY RTB FROM REENTRY CONTROL
R0284   EXIT-                 BACK TO REENTRY CONTROL
R0285   SUBROUTINE CALLS-     NEWMODEX


 0286                         26,2433                       BANK   26
 0287   REF   1               26,2000                       SETLOC P60S1
 0288                         26,2433                       BANK

R0289           THIS DISPLAY IS CALLED EACH PASS THROUGH STEERING. RESTART PROTECTION IS VIA STEERING.

 0291   REF   1                                             COUNT* $$/P64

 0292   REF   9  LAST  795   26,2433  0 5354 0  P64        TC     NEWMODEX       ENTER VIA RTB WHEN .05G IS EXCEEDED.
 0293                        26,2434   00100 0              MM     64
 0294   REF   1              26,2435  3 2440 0              CA     V06N74         ROLLC          VI             D
A0295                                                                            XXX.XX DEG     XXXXX. FPS     XXX.XX G
 0296   REF   4  LAST  795   26,2436  55'263 0              TS     ENTRYVN        DISPLAY VIA OVERNOUT.

 0297   REF   7  LAST  770   26,2437  0 6030 1              TC     DANZIG         ... AND CONTINUE IN INITROLL ...


 0298                        26,2440   01512 0  V06N74      VN     0674
```

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P0299   PROGRAM:            P65
R0300   MOD NO:  0          MOD BY:  RR BAIRNSFATHER     DATE:  17 JAN 68     COLOSSUS GSOP ADDITION.
R0302   FUNCTION:           TO CONTINUE ENTRY GUIDANCE, USING THE UP-CONTROL PHASE TO STEER TO A CONTROLLED EXIT
R0304                       CONDITION. THIS PHASE TERMINATES  A) IF D  < Q7 FPSS, GO TO P66   ,
R0306                                                         B) IF ROOT NEG, AND IF V < VL +500FPS. GO TO P67.
R0308
R0309   CALLING SEQUENCE:   BY RT8 FROM REENTRY CONTROL
R0310   EXIT:               BACK TO REENTRY CONTROL, OR TO ENDOFJOB.
R0311   SUBROUTINE CALLS:   NEWMODEX

 0312   REF   1                                          COUNT* $$/P65

 0313   REF  10  LAST  797  26,2441  0 5354 0  P65      TC     NEWMODEX       ENTER VIA RT8 WHEN RANGE < 25 N M OF
 0314                       26,2442   00101 1           MM     65             TARGET.

 0315   REF   3  LAST  794  26,2443  3 5065 1           CA     PRIO13
 0316   REF  25  LAST  794  26,2444  0 5134 1           TC     NOVAC
 0317   REF   5  LAST  797     1263                     EBANK= ENTRYVN
 0318   REF   2  LAST  216  26,2445   02457 0           2CADR  P65.1
 0318                       26,2446   54062 1
 0319   REF  24  LAST  709  26,2447  0 5372 1           TC     2PHSCHNG       2 PHASE CHG REQUIRED TO PREVENT RE-
 0320                       26,2450   00554 0           OCT    00554          STARTING FLASHING DISPLAY TWICE.
 0321                       26,2451   10035 0           OCT    10035          4.55 SPOT AND SERVICER, HERE.
 0322   REF 202  LAST  792  26,2452  0 6006 1           TC     INTPRET
 0323                       26,2453   47131 1           SSP    RT8
 0324   REF   2  LAST  118  26,2454   03646 0                  GOTOADDR       CHANGE ENTRY MODE TO UPCONTRL.
 0325   REF   1              26,2455   53035 1                  UPCONTRL
 0326   REF   1              26,2456   52120 0                  REFAZE10       GO HERE TO REESTABLISH ENTRY SEQUENCER.
A0327                                                                         AND CONTINUE AT UPCONTRL...

 0328   REF  54  LAST  745  26,2457  0 5560 1  P65.1    TC     DOWNFLAG
 0329   REF   2  LAST  793  26,2460   00134 1           ADRES  ENTRYDSP       ENTRYDSP = 92D  BIT 13 FLAG 6
A0329A1
 0330   REF   1              26,2461  3 2473 0           CA     V16N69         ROLLC        DL  (Q7)      VL
 0331   REF 229  LAST  795  26,2462  0 4662 1           TC     BANKCALL       XXX.XX DEG   XXX.XX G     XXXXX. FPS
 0332   REF  13  LAST  789  26,2463   21057 0           CADR   GOFLASHR
 0333                       26,2464  0 2461 0           TC     -3             NODOFLAG IS SET..
 0334                       26,2465  0 2470 0           TC     +3
 0335                       26,2466  0 2461 0           TC     -5
 0336   REF   2  LAST  793  26,2467  0 2232 0           TC     P61.3          EST. GRP 4 FOR DSPLAY AND DO ENDOFJOB
A0337                                                                        IF PROCEED, CONTINUE.
 0338   REF  48  LAST  793  26,2470  0 5546 0           TC     UPFLAG
 0339   REF   3  LAST  798  26,2471   00134 1           ADRES  ENTRYDSP       ENTRYDSP = 92D   BIT13 FLAG 6
A0339A1
 0340   REF   2  LAST  794  26,2472  0 2421 1           TC     P63.1          DISABLE GRP 4,START UP ENTRY DISPLAY

A0341                                                                        N06V68 VIA OVERNOUT, AS USED IN P64.

 0342                       26,2473   04105 1  V16N69    VN     1669
```

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P0343   PROGRAM:            P66
R0344   MOD NO:  0          MOD BY:  RR BAIRNSFATHER      DATE:  17 JAN 68     COLOSSUS GSOP ADDITIONS.
R0346   FUNCTION:           KEEP CM ATTITUDE IN TRIM TO THE RELATIVE VELOCITY VECTOR. ENTRY GUIDANCE STOPS GENERATING
R0348                       ROLL COMMANDS UNTIL DRAG BUILDS UP TO  Q7+0.5 FPSS.
R0349
R0350   CALLING SEQUENCE:   VIA RTB FROM REENTRY CONTROL.
R0351   EXIT:               BACK TO REENTRY CONTROL.
R0352   SUBROUTINE CALLS:   NEWMODEX

 0353   REF   1                                                COUNT* $$/P66

 0354   REF  11  LAST  798  26,2474  0 5354 0  P66      TC     NEWMODEX        ENTER VIA RTB WHEN D < Q7 FPSS
 0355                       26,2475   00102 1           MM     66

 0356   REF   3  LAST  793  26,2476  3 5052 0          CA     V06N22          OGA          IGA          MGA
A0357                                                                        XXX.XX DEG   XXX.XX DEG   XXX.XX DEG
 0358   REF   1             26,2477  0 2503 0          TC     P66END          IN CASE CAME FROM P65. GO DISABLE GRP4.
A0359                                                                       AND SET ENTRYDSP TO DO DISPLAY VIA
A0360                                                                       OVERNOUT.
A0361                                                                       ... AND CONTINUE AT KEP2
```

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P0362 P67

R0363 PROGRAM- P67
R0364 MOD NO.- 0 MAR. 16, 1967
R0365 MOD BY- R. HIRSCHKOP
R0366 FUNCTION- TO TERMINATE STEERING WHEN THE CM VELOCITY WRT EARTH = 1000 FT/SEC
R0368 CALLING SEQUENCE-
R0369 EXIT- TO POOH
R0370 SUBROUTINE CALLS- GOFLASH

R0371 THIS DISPLAY IS CALLED EACH PASS THROUGH STEERING. RESTART PROTECTION IS VIA STEERING.

```
 0373   REF   1                                          COUNT* $$/P67

 0374   REF  12  LAST  799   26,2500  0 5354 0  P67      TC     NEWMODEX        ENTER VIA RTB
 0375                        26,2501   00103 0           MM     67
 0376   REF   1              26,2502  3 2511 0           CA     V06N66          ROLLC        XRNGERR      DNRNGERR
A0377                                                                          XXX.XX DEG   XXXX.X NM    XXXX.X NM
 0378   REF   6  LAST  798   26,2503  55*263 0  P66END   TS     ENTRYVN         DISPLAY VIA OVERNOUT.

 0379   REF  49  LAST  798   26,2504  0 5546 0          TC     UPFLAG          (IN CASE CAME FROM P65. ENTRY DISPLAY
 0380   REF   4  LAST  798   26,2505   00134 1          ADRES  ENTRYDSP        WILL FLUSH FLASHING DISP. IF STILL ON)
A0380                                                                          BIT 13 FLAG 6
 0381   REF  80  LAST  795   26,2506  0 5412 0  KILLGRP4 TC     PHASCHNG        DISABLE GRP4. IN CASE CAME FROM HUNTEST.
 0382                        26,2507   00004 0           OCT    00004           (COME TO KILLGRP4 VIA RTB,RET TO CALLER)

 0383   REF   8  LAST  797   26,2510  0 6030 1          TC     DANZIG          ... AND CONTINUE AT PREDICT3 ...

 0384                        26,2511   01502 1  V06N66   VN     0666

 0385                        26,2512                    BANK   26
 0386   REF   1              26,2000                    SETLOC P60S2
 0387                        26,2512                    BANK

 0388   REF   1              26,2512  3 2543 1  P67.1    CA     V16N67          RTOGO        LAT          LONG
A0389                                                                          XXXX.X NM    XXX.XX DEG   XXX.XX DEG
 0390   REF 230  LAST  798   26,2513  0 4662 1          TC     BANKCALL
 0391   REF  43  LAST  793   26,2514   20720 0          CADR   GOFLASH
 0392                        26,2515  0 2520 1          TC     +3              EFFECTIVE GOTOPOOH
 0393                        26,2516  0 2520 1          TC     +2
 0394   REF   2  LAST  215   26,2517  0 2512 0          TC     P67.1           REDO

 0395   REF  27  LAST  739   26,2520  4 6214 1          CS     THREE           TURN OFF ENTRY DAP
 0396                        26,2521  0 0004 0          INHINT
 0397   REF   1              26,2522  7 0102 0          MASK   CM/FLAGS        CM/DSTBY , GAMDIFSW
 0398   REF   2  LAST  800   26,2523  54 102 0          TS     CM/FLAGS
 0399                        26,2524  0 0003 1          RELINT
 0400                        26,2525  0 0006 1          EXTEND
 0401   REF   1              26,2526  3 2643 1          DCA    SERVCAD2
```

```
0402  REF   9  LAST  792   26,2527  53'223 1          DXCH   AVEGEXIT
0403  REF  69  LAST  792   26,2530  1 4106 0          TCF    GOTOPOOH
```

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0404                                  26,2531   43175 0  P67.2    VLOAD  CLEAR          CALC PRESENT LAT, LONG, ALT.
0405  REF  11  LAST  790               26,2532   01171 1                    RN
0406  REF   9  LAST  747               26,2533   00662 0                    ERADFLAG       USE PAD RAD FOR ALT.(NOT SEEN ANYWAY)
0407  REF  13  LAST  776               26,2534   16152 0           STODL    ALPHAV
0408  REF  11  LAST  790               26,2535   01205 1                    PIPTIME        USE TIME OF RN
0409                                  26,2536   45014 0           CLEAR    CALL
0410  REF  18  LAST  747               26,2537   01663 0                    LUNAFLAG
0411  REF   5  LAST  743               26,2540   26370 1                    LAT-LONG
0412                                  26,2541   77634 0  P67.3    RTB                     ENTRY EXIT THAT OMITS DISPLAY.
0413  REF   1                         26,2542   53611 1                    SERVNOUT

0414                                  26,2543   04103 1  V16N67   VN       1667
0415  REF   2  LAST  374                4270             OCT41    =        33DEC
0416  REF   1                         26,2642            SERVCAD2 =        SERVCAD1
```

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P0417   SUBROUTINE NAME:     S61.1
R0418   MOD NO:  0                                                    DATE:           21 FEB 67
R0420   MOD BY:  RR BAIRNSFATHER                                      LOG SECTION:    P61-P67
R0422   MOD NO:  1          MOD BY:  RR BAIRNSFATHER      DATE:  22 JUN 67     RESTARTS.
R0424   FUNCTIONAL DESCRIPTION:     CALLED BY BOTH P61 AND P62
R0425           FIRST,TEST TO SEE IF   AVERAGEG   IS ON. IF NOT, UPDATE THE STATE VECTOR TO PRESENT TIME + TOLERANCE
R0427           AND TURN ON   AVERAGEG   AT THAT TIME, AND CONTINUE.   OTHERWISE CONTINUE:   SEE IF  IMU Y AXIS IS
R0429           WITHIN 30 DEG OF V*R.  IF YES, EXIT SUBROUTINE S61.1.    IF NO,  SEE IF -Y AXIS OF IMU IS WITHIN
R0431           30 DEG OF V*R.   IF YES, DISPLAY ALARM:  01427   IMU REVERSED.
R0432                            IF NO, DISPLAY ALARM:   01426   IMU UNSATISFACTORY.
R0434           IN EITHER OF THESE LAST 2 CASES, WAIT  10 SEC  AND THEN EXIT SUBROUTINE  S61.1.

R0436   REMARK:              THERE WILL BE A SHORT 10 SEC DELAY IF AN ALARM EXIT IS TAKEN. THE DELAY FOR INTEGRATION IS
R0433                        AS SHORT AS CAN BE MADE, BUT IS ARBITRARY SINCE IT  DEPENDS ON THE AGE OF THE STATE VECTOR.

R0440   CALLING SEQUENCE:  CALL
R0441                            S61.1
R0442                       C(MPAC) UNSPECIFIED
R0443                       PUSHLOC UNSPECIFIED

R0444   SUBROUTINES CALLED:  LOADTIME, CSMPREC, TPAGREE,
R0445                        WAITLIST, JOBSLEEP, JOBWAKE, PREREAD, ALARM, GODSPR, BANKCALL, DELAYJOB
R0447   NORMAL EXIT MODES:   RVQ
R0448   ALARMS:  01426      IMU UNSATISFACTORY
R0449            01427      IMU REVERSED
R0450   OUTPUT:  POSSIBLE ALARMS
R0451            POSSIBLY TDEC1, RATT, VATT, RN, VN
R0452   ERASABLE INITIALIZATION REQUIRED:
R0453            AVEGFLAG                  AVERAGEG ON OR OFF                    LEFT BY SERVICER
R0455            PIPTIME  (-28) CS         TIME OF PIPA UPDATE                   LEFT BY READACCS
R0457            RN     (-29) M            STATE VECTOR                          LEFT BY AVERAGEG
R0459            VN     (-7) M/CS          STATE VECTOR                          LEFT BY AVERAGEG
R0461            REFSMMAT  (-1)            .5 REF TO SM MATRIX                   LEFT BY LAST IMU ALIGNMENT
R0463   DEBRIS:  QPRET
R0464            POSSIBLY PIPTIME1, RATT, VATT, TDEC1, RN1, VN1, QTEMP, X1      IF UPDATED
R0466            PUSH LIST LOCS USED BY CSMPREC

 0467   REF  17  LAST  794   E6,1661                    EBANK= AOG            FOR 60GENRET , S61DT
 0468                        26,2544                    BANK   25
 0469   REF   1              26,2000                    SETLOC P60S3
 0470                        26,2544                    BANK

 0471   REF   1                                         COUNT* $$/S61.1

 0472                        26,2544  0 0006 1  S61.1   EXTEND
 0473   REF   2  LAST  116   26,2545  23773 0           QXCH   60GENRET       SAVE RET ADDR IN EB 6
 0474   REF 231  LAST  800   26,2546  0 4662 1          TC     BANKCALL
 0475   REF   7  LAST  739   26,2547   17653 1          CADR   R02BOTH
 0476   REF 203  LAST  798   26,2550  0 6006 1          TC     INTPRET
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0477                                26,2551   45014 0          BON     CALRB
0478   REF   2  LAST  515           26,2552   00716 1                  AVEGFLAG        IS AVERAGEG ON
0479   REF   2  LAST  216           26,2553   54604 1                  S61.1A          YES
0480   REF   2  LAST  691           26,2554   27543 0                  MIDTOAV2        GET FUTURE STATE VECTOR SOON AS CAN

0481   REF 276  LAST  783           26,2555   3 0155 0         CA      MPAC +1         RETURN INHINTED ***
0482   REF   3  LAST  215           26,2556   55'774 0         TS      S61DT           FOR RESTART.
0483   REF  36  LAST  708           26,2557   0 5245 1         TC      WAITLIST
0484   REF  10  LAST  536           E7,1431                    EBANK=  DVCNTR
0485   REF   2  LAST  215           26,2560    02565 0         2CADR   S61.1C
0485                                26,2561    54067 1
0486   REF  81  LAST  800           26,2562   0 5412 0         TC      PHASCHNG
0487                                26,2563    40434 0         OCT     40434
0488   REF  93  LAST  795           26,2564   0 5217 0         TC      ENDOFJOB

0489   REF   4  LAST  798           26,2565   3 5065 1  S61.1C CA      PRIO13
0490   REF  26  LAST  746           26,2566   0 5147 0         TC      FINDVAC
0491   REF  18  LAST  803           E6,1661                    EBANK=  ADG
0492   REF   3  LAST  804           26,2567    02603 0         2CADR   S61.1A -1
0492                                26,2570    54066 0

0493                                26,2571   0 0006 1         EXTEND
0494   REF   2  LAST  802           26,2572   3 2643 1         DCA     SERVCAD1        HE WHO STARTS AVERAGEG MUST SERVICE
0495   REF  10  LAST  801           26,2573   53'223 1         DXCH    AVEGEXIT        THE EXIT.

0496   REF  25  LAST  798           26,2574   0 5372 1         TC      2PHSCHNG
0497                                26,2575    00454 1         OCT     00454
0498                                26,2576    00415 1         OCT     00415

04981  REF   1                      26,2577   3 5060 1         CA      EBENTRY         SET EB= 7 FOR PREREAD.
04982  REF  34  LAST  705           26,2600   54 003 0         TS      EBANK

0499   REF  49  LAST  793           26,2601   0 4701 0         TC      POSTJUMP
0500   REF   3  LAST  693           26,2602    76701 0         CADR    PREREAD         PREREAD DOES TC TASKOVER.

0501   REF 204  LAST  803           26,2603   0 6006 1         TC      INTPRET
0502                                26,2604    77204 1  S61.1A BOVB    VLOAD
0503   REF   2  LAST  294           26,2605    57352 1                 TCDANZIG        TURN OFF OVFIND, IF ON
0504   REF  11  LAST  790           26,2606    01177 1                 VN              VN   (-7) M/CS
0505                                26,2607    64235 1         VXV     MXV
0506   REF  12  LAST  802           26,2610    01171 1                 RN              RN  (-29)  M
0507   REF  32  LAST  777           26,2611    01736 1                 REFSMMAT        .5 UNIT MATRIX
0508                                26,2612    71256 0         UNIT    DLOAD
0509   REF 277  LAST  804           26,2613    00160 0                 MPAC +3         GET  COS(THETA)/2
0510                                26,2614    43240 0         BMN     DAD
0511   REF   1                      26,2615    54622 0                 S61.1B          DO TEST ON -YSM
0512   REF   1                      26,2616    14645 0                 C(30)LIM        = 1.0 -.5 COS(30)
0513                                26,2617    47004 0         BOVB    RTB
0514   REF   1                      26,2620    54641 0                 RETRN1
0515   REF   1                      26,2621    54626 1                 RETRN3
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0516                                26,2622   43276 0  S61.1B   DCOMP  DAD
0517  REF   2  LAST  804   REF 2    26,2623   14645 0           C(30)LIM       = 1.0- .5 COS(30)
0518                                26,2624   77404 1           BOVB   EXIT
0519  REF   1                       26,2625   54631 1           RETRN2

0520  REF  31  LAST  767   REF 31   26,2626  0 5650 1  RETRN3   TC     ALARM
0521                                26,2627   01426 0           OCT    01426          IMU UNSATISFACTORY
0522  REF   2  LAST  805   REF 2    26,2630  0 2633 0           TC     RETRN2 +2

0523  REF  32  LAST  805   REF 32   26,2631  0 5650 1  RETRN2   TC     ALARM
0524                                26,2632   01427 1           OCT    01427          IMU REVERSED

0525  REF   6  LAST  741   REF 6    26,2633  3 5050 1  +2       CAF    V05N09
0526  REF 232  LAST  803   REF 232  26,2634  0 4662 1           TC     BANKCALL
0527  REF   4  LAST  745   REF 4    26,2635   20576 1           CADR   GODSPR          DO DISPLAY
0528  REF   1                       26,2636  3 2646 1           CA     10SECS
0529  REF 233  LAST  805   REF 233  26,2637  0 4662 1           TC     BANKCALL
0530  REF  12  LAST  745   REF 12   26,2640   01732 0           CADR   DELAYJOB

0531  REF   3  LAST  803   REF 3    26,2641  0 1773 0  RETRN1   TC     GOGENRET

0532  REF  11  LAST  804   REF 11   E7,1431                     EBANK= DVCNTR
0533  REF   3  LAST  701   REF 3    26,2642   03227 0  SERVCAD1 2CADR  SERVEXIT
0533                                26,2643   76067 1
0534                                26,2644   22111 0  C(30)LIM 2DEC   .566985        = 1.0 -.5 COS(30)
0534                                26,2645   17335 1
0535                                26,2646   01750 1  10SECS   DEC    1000           1000 CS
0536                                26,2647   00000 1  60SECDP  2DEC   6000 B-28       6000 CS
0536                                26,2650   13560 0
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P0537

R0538   PROGRAM NAME:      S61.2                                                DATE:            14 FEB 67
R0540   MOD NO:  1                                                             LOG SECTION:     P61-P67
R0542   MOD BY:  MORTH / BAIRNSFATHER
R0543   MOD NO:  2           MOD BY:  MORTH/BAIRNSFATHER   DATE:  11 MAY 67   ADD 2ND ITER FOR ERAD AT 400K FT.
R0545   MOD NO:  3           MOD BY:  RR BAIRNSFATHER      DATE:  21 NOV 67   VARIABLE MU ADDED.
R0547   MOD NO:  4           MOD BY:  RR BAIRNSFATHER      DATE:  21 MAR 68   DIFFERENT EARTH/MOON SCALES IN TFF'S
R0549   FUNCTIONAL DESCRIPTION:      CALLED BY P61.  PROVIDES DISPLAYS FOR NOUNS  N60  AND  N63  .
R0551           PROGRAM CALCULATES ENTRY DISPLAY OF MAXIMUM ACCELERATION EXPECTED  (GMAX)  AND ALSO THE EXPECTED
R0553           INERTIAL VELOCITY (VPRED) AND ENTRY ANGLE  (GAMMAEI)  THAT WILL OBTAIN AT 400K FT ABOVE THE FISCHER
R0555           ELLIPSOID.  PROGRAM ALSO CALCULATES A SECOND DISPLAY RELATIVE  TO THE EMSALT  ABOVE FISCHER ELLIPSOID
R0557           AND CONSISTS OF RANGE TO SPLASH FROM NOW (RTGO) , PREDICTED INERTIAL VELOCITY (VIO) , AND THE TIME TO
R0559           GO FROM NOW (TTE) .
R0560   CALLING SEQUENCE:  CALL
R0561                              S61.2
R0562           C(MPAC) UNSPECIFIED
R0563           PUSHLOC WILL BE SET TO ZERO.

R0564   SUBROUTINES CALLED:  TFFCONIC,  CALCTFF,  TFF/TRIG,  FISHCALC,  GETERAD,  VGAMCALC
R0565   NORMAL EXIT MODES,  PTB   P61.1
R0567   ALARMS:  NONE
R0568   OUTPUT:  THE FOLLOWING REGISTERS ARE WRITTEN IN FOR USE BY DISPLAYS
R0569           GMAX   100 GMAX  (-14)  G,S      MAXIMUM ACCELERATION
R0570           VPRED  (-7)  M/CS       PREDICTED VELOCITY AT 400K FT
R0571           GAMMAEI  GAMMA/360      PREDICTED GAMMA    AT 400K FT
R0572                                   FOR TM, DP(GAMMAEI) = (GAMMAEI, RTGO) / 360
R0574           RTGO   THETAH/360       RANGE ANGLE TO SPLASH FROM EMSALT       EMSALT IS PAD LOADED
R0576           VIO    (-7) M/CS        INERTIAL VELOCITY  AT      EMSALT       EMSALT IS PAD LOADED
R0578           TTE    (-28) CS         TIME     TO                EMSALT       EMSALT IS PAD LOADED

R0580           PUSHLOC = 0
R0581           CONIC PARAMETERS STORED IN VAC AREA (SEE TFF SUBROUTINES)
R0582   ERASABLE INITIALIZATION REQUIRED:
R0583           RONE   (-29) M          STATE VECTOR                            LEFT BY USER
R0585           VONE   (-7)  M/CS       STATE VECTOR                            LEFT BY USER
R0587           URONE  UR/2                                                     LEFT BY USER
R0589           UNI    (-1)             UNIT NORMAL V*R                         LEFT BY ENTRY / P61
R0591           THETAH  THETAH/360      RANGE ANGLE                             LEFT BY ENTRY / P61
R0593           UNITW  (0)              UNIT POLAR VECTOR                       LEFT BY  PAD LOAD
R0595           EMSALT  (-29) M         EMS INTERFACE ALTITUDE                  LEFT BY  PAD LOAD
R0597                                   ORBITAL REENTRY:  284643 FT,  LUNAR REENTRY:  297431 FT.
R0599   DEBRIS:  QPRET,
R0600           ALL PDL LOCATIONS ABOVE 120, INCLUDING X1,X2,S1,S2
R0601           ALSO PDL+0  ...  PDL+5,  WHERE INITIAL PUSHLOC = PDL
```

P0602

R0603 THE FOLLOWING PUSH LIST LOCATIONS HAVE BEEN RESERVED FOR TFF ROUTINES AND ARE REPEATED HERE FOR CONVENIENCE.

R0605 OF COURSE FOR S61.2 USAGE, EARTH ORIGIN SCALING IS USED.

A0606 BELOW E: IS USED FOR EARTH ORIGIN SCALE
A0607 M: IS USED FOR MOON ORIGIN SCALE

A0608	RTERM	=	18D	TERMINAL RADIUS M E: (-29) M: (-27)
A0609	NRTERM	=	16D	TERMINAL RADIUS M E: (-29+NR)
A0610				M: (-27+NR)
A0611	RMAG1	=	12D	PRESENT RADIUS M E: (-29) M: (-27)
A0612	NRMAG	=	32D	PRESENT RADIUS M E: (-29+NR)
A0613				M: (-27+NR)
A0614	SDELF/2			SIN(THETA) /2
A0615	CDELF/2	=	14D	COS(THETA) /2
A0616	TFFX	=	34D	X, ARGUMENT OF SERIES T(X).
A0617	TFFTEM	=	36D	ARG FOR TRANSFER ANGLE CALCULATION.
A0618	TFFNP	=	28D	LC P M E: (-38+2NR) M: (-36+2NR)
A0619	TFF/RTMU	=	30D	1/SQRT(MU) E: (17) M: (14)
A0620	TFFVSQ	=	20D	-(VN.VN/MU) 1/M E: (20) M: (18)

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P0621

 0622                          34,3763                    BANK   34
 0623   REF   2  LAST  800     26,2000                    SETLOC P60S2
 0624                          26,2651                    BANK

 0625   REF   1                                          COUNT* $$/S61.2

A0626                                                                  PDL LEFT AT ZERO BY TARGETNG

 0627                          26,2651   45345 1  S61.2   DLOAD  DSU
 06271  REF   1                26,2652   02020 1                  EMSALT
 06272  REF   1                26,2653   15001 1                  290KFT
 06273                         26,2654   71244 0          BPL     DLOAD
 06274  REF   1                26,2655   54775 0                  LUNENT
 0628   REF   1                26,2656   17354 0                  1/RTMU        ESTABLISH MU FOR ORBITAL ENTRIES
 06281                         26,2657   77624 1  CALLCON CALL
 0629   REF   1                26,2660   56757 1                  TFFCONIC      FILL VAC AREA WITH CONIC PARAMETERS

 0630                          26,2661   45145 0          DLOAD   CALL
 0631   REF   1                26,2662   15021 0                  RTRIAL        1 ST GUESS AT TERMINAL RADIUS  (-29)
 0632   REF   2  LAST  523     26,2663   57067 1                  CALCTFF       SAVES MPAC IN RTERM  (18D)

 0633                          26,2664   77624 1          CALL                   CALC SDELF/2,  CDELF/2
 0634   REF   2  LAST  643     26,2665   56631 0                  TFF/TRIG      RETURN WITH S(THETA) IN MPAC

 0635                          26,2666   77624 1          CALL                   GET FISCHER RADIUS (-29) M
 0636   REF   1                26,2667   55030 1                  FISHCALC      ANS IN MPAC AND IN ERADM.

 0637                          26,2670   45015 1          DAD     CALL
 0638   REF   2  LAST  808     26,2671   02020 1                  EMSALT
 0639   REF   3  LAST  808     26,2672   57067 1                  CALCTFF       SAVES MPAC IN  RTERM  (18D)

 0640                          26,2673   77676 0          DCOMP                  NEGATIVE AS IN COUNTDOWN.
 0641   REF   3  LAST  791     26,2674   03733 0          STORE   TTE1          DECR TTE FROM BASE TTE1. (RESTART)
A0642                                                                  DNLIST AND DSKY WILL USE TTE.
 0643   REF   6  LAST  791     26,2675   37727 1          STCALL  TTE           LET MISS CONTRL DECR BY ELAPSED TIME
A0644                                                                  TTE= TIME FROM NOW TO EMSALT +FISCHER

 0645   REF   3  LAST  808     26,2676   56631 0                  TFF/TRIG      S(THETA) IN MPAC ON RETURNING
A0646                                                                  AND THETA= RANGE FROM NOW TO EMSALT
 0647                          26,2677   77624 1          CALL
 0648   REF   2  LAST  808     26,2700   55030 1                  FISHCALC
 0649                          26,2701   77624 1          CALL
 0650   REF   1                26,2702   56664 0                  VRCALC
 0651                          26,2703   77624 1          CALL
 06511  REF   1                26,2704   56651 0                  DISPTARG
 06512                         26,2705   77624 1          CALL
 06513  REF   2  LAST  808     26,2706   56651 0                  DISPTARG
 06514  REF   5  LAST  281     26,2707   37714 1          STCALL  RTGO
```

```
 0652   REF   2  LAST  643   26,2710   55051 0                VGAMCALC

 0653                       26,2711   77605 1        DMP                    MPAC = GAMMA
A0654                                                                      PDLO HAS VGAM.
 0655                       26,2712   43265 1        BDDV   DAD
 0656   REF   1             26,2713   15027 0               VEMSCON         -HS D 180/PI (-14)
 0657                       26,2714   00001 0               0               VGAM FROM PDLO.
 0658   REF   5  LAST  281  26,2715   17725 1        STODL  VIO             PREDICTED VELOCITY AT EMSALT.

A0659                                                          GAMMA AND VGAM AT 300K FT ARE REQUIRED BY  GMAX
A0660                                                          ALGORITHM.

 0661   REF   5  LAST  609  26,2716   02241 1                VRADM           EARTH RADIUS FROM GETERAD     (-29) M
A0662                                                                      = FISCHER RADIUS  (-29)
 0663                       26,2717   77615 0        DAD
 0664   REF   1             26,2720   06462 1               300KFT          M  (-29)
 0665   REF   1             26,2721   34023 1        STCALL RTERM           TERMINAL RADIUS  M  (-29)

 0666   REF   1             26,2722   55046 0                PREVGAM         VGAMCALC WITH NEW RTERM

A0667                                                                      VBAR = (V(FPS)  - 36KF/S) / 20KF/S
R0668    GMAX = (4/(1+ 4.8 VBARSQ))(GAM -6.05 -2.4 VBARSQ) -10(L/D -.3) +10  ASSUME L/D = 0.3, BANK =0.

A0670                                                  GMAXCALC
 0671                       26,2723   45325 1        PDDL   DSU             GAM TO PDL2
 0672                       26,2724   00001 0               0               VGAM IS IN PDLO  (-7)
 0673   REF   1             26,2725   15005 0               36KFT/S         (-7)   M/CS
 0674                       26,2726   63471 0        DDV    DSQ
 0675   REF   1             25,2727   15007 1               20KFT/S         (-6)   M/CS
 0676                       26,2730   00001 0        STORE  0               VBARSQ  (-2)  TO PDLO

 0677                       26,2731   43205 1        DMP    DAD
 0678   REF   1             26,2732   15011 0               KR1
A0679                                                                      GAM,    POS DOWN, FROM PDL2
 0680                       26,2733   41215 1        DAD    DMP
 0681   REF   1             26,2734   15013 1               -6.05DEG
 0682   REF   1             26,2735   15015 1               KR2
 0683                       26,2736   77725 1        PDDL                   XCH PDL+0 FOR VBARSQ  (-2)
 0684                       26,2737   43271 1        DDV    DAD
 0685   REF   1             26,2740   15025 1               KR4
 0686   REF   1             26,2741   17366 1               DP2(-4)
 0687                       25,2742   77665 1        BDDV
A0688                                                                      NUM FROM PDL+0
 0689                       26,2743   51015 1        DAD    BPL
 0690   REF   1             26,2744   15017 0               KR3
 0691                       26,2745   54750 1               +3
 0692                       26,2746   77745 1        DLOAD
 0693   REF  23  LAST  722  26,2747   15335 0               HI6ZEROS
 0694   REF   3  LAST  280  26,2750   17722 0        STODL  GMAX            100 GMAX  (-14)
```

R0695 DISPLAY USES GMAX AS SP, SO LO WORD IS WRITTEN OVER BY VPRED.

```
 0696   REF   6  LAST  809   26,2751   02241 1                 ERADM          = FISCHER RADIUS  (-29) M
 0697                        26,2752   45015 1          DAD    CALL           2 ND  ITERATION FOR FISCHER RADIUS
 0698   REF   1              26,2753   15023 1                 400KFT
 0699   REF   4  LAST  808   26,2754   57067 1                 CALCTFF        ESTABLISH TRANSFER ANGLE DATA.
 0700                        26,2755   77624 1          CALL
 0701   REF   4  LAST  808   26,2756   56631 0                 TFF/TRIG       GET SIN, COS DELF
 0702                        26,2757   77624 1          CALL
 0703   REF   3  LAST  808   26,2760   55030 1                 FISHCALC       GET CORRESPONDING FISCHER RADIUS.

 0704                        26,2761   73015 1          DAD    LXA,2          SAVE HI=WORD FOR DOWNLIST.
 0705   REF   2  LAST  810   26,2762   15023 1                 400KFT         M  (-29)
 0706   REF   6  LAST  808   26,2763   03713 1                 RTGO           (RANGE ANGLE FROM EMSALT)/360
 0707   REF   2  LAST  809   26,2764   34023 1          STCALL RTERM
 0708   REF   2  LAST  809   26,2765   55046 0                 PREVGAM        VGAMCALC WITH NEW RTERM

 0709                        26,2766   67076 1          DCOMP  SXA,2          HI=WORD OF EACH ON DOWNLIST.
 0710   REF 278  LAST  804   26,2767   00155 0                 MPAC  +1
 0711   REF   6  LAST  280   26,2770   17771 0          STODL  GAMMAEI        CONIC GAMMA/360 AT 400K FT.   ( HI-WORD)
A0712                                                                         CONIC RTGO/360 FROM EMSALT    (LOW-WORD)
A0713                                                                         FOR TM, DP(GAMMAEI)= (GAMMA, RTGO)/360

A0714                                                                         VGAM FROM POL+0   (-7)
 0715                        26,2771   77626 0                 STADR
 0716   REF   6  LAST  280   26,2772   74010 0                 STORE  VPRED   CONIC VELOCITY AT 400K FT

 0717                        26,2773   77634 0                 RTB
 0718   REF   1              26,2774   54267 0                        P61.1
A0719                                                                         POL BACK TO ZERO.

 07192                       26,2775   52145 0 LUNENT   DLOAD  GOTO
 07193  REF   3  LAST  519   26,2776   06456 0                 1/RTMUE        ESTABLISH MU FOR LUNAR TYPE ENTRIES
 07194  REF   1              26,2777   54657 1                 CALLCON
 07195                       26,3000   00002 0 290KFT   2DEC   88392.0 B-29
 07195                       26,3001   26244 1
 07196                       26,3002   00052 0 KTETA1   2DEC*  .421844723 E2 B-14*      1100 2PI/16384(163.84)
 07196                       26,3003   05716 1
 0720                        26,3004   33335 1 36KFT/S  2DEC   109.728 B-7      (-7) M/CS = 36 KFT/S (-7)
 0720                        26,3005   05707 1
 0721                        26,3006   36365 1 20KFT/S  2DEC   121.92 B-7       (-6) M/CS  = 2 20KFT/S  (-7)
 0721                        26,3007   30244 0
 0722                        26,3010   77113 1 KR1      2DEC   -.026666667      =- 2.4  4 / 360
 0722                        26,3011   42770 1
 0723                        26,3012   77354 0 -6.05DEG 2DEC   -.016805556      = -6.05 / 360
 0723                        26,3013   65030 1
 0724                        26,3014   21450 0 KR2      2DEC   .54931641        =(360/4) 100 (-14) =  9000 B-14
 0724                        26,3015   00001 0
 0725                        26,3016   01750 1 KR3      2DEC   1000  B-14       = 100  (10.0)  (-14)   G.S
 0725                        26,3017   00000 1
```

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A0726                                                                ASSUMES L/D = 0.3. BANK =0.
 0727                    26,3020   00305 1  RTRIAL   2DEC   6460097.18 B-29  RPAD +284643 FT =21 194 545 FT
 0727                    26,3021   04541 0
A0728                                                          RPAD DEFINED AS 20 909 901.57 FT =6 373 338 M
 0729                    26,3022   00003 1  400KFT   2DEC   121920 B-29     METERS
 0729                    26,3023   27040 0

R0730  300KFT   2DEC   91440 B-29      (-29)  M

R0731  EMSALT   2DEC   86759.2 B-29    284643 FT (-29) M    (ORBITAL REENTRY)

R0732  EMSALT   2DEC   90657 B-29      297431 FT (-29) M    (LUNAR REENTRY)

 0733                    26,3024   32525 1  KR4      2DEC   .833333333
 0733                    26,3025   12525 0
 0734  REF  3 LAST 519   23,2461             300KFT   EQUALS MINPERE
 0735                    26,3026   77777 0  VEMSCON  2DEC   -.0389676 B-14   = -HS 0  /2  PI  (-14)    M SQ/ CS SQ
 0735                    26,3027   76601 1
A0736                                                                =- 16369   .05G  32.2  .3048  .3048/2 PI    (-14)
```

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P0737   SUBROUTINE NAME:   FISHCALC              (USED BY  S61.2)              DATE:           01.21.67
R0739   MOD NO:  0                                                             LOG SECTION:    P61-P67
R0741   MOD BY:  MORTH / BAIRNSFATHER
R0742   MOD NO:  1           MOD BY:  RR BAIRNSFATHER      DATE:  11 MAY 67    INCLUDE  GETERAD  CALL
R0744   FUNCTIONAL DESCRIPTION:  GIVEN THE PRESENT POSITION, UNITR, CALCULATE A  NEW UNITR THAT IS ROTATED THROUGH
R0746            TRANSFER ANGLE, THETA, ALONG TRAJECTORY. THEN CALCULATE  SIN(LAT)  AND USE TO OBTAIN FISCHER RADIUS.

R0748            SINCE FISHCALC USES UNI (LEFT BY ENTRY) EARTH SCALING IS ASSUMED.(WILL IMPROVE FOR SUITABLE TENNANT)

R0750   CALLING SEQUENCE:  CALL
R0751                          FISHCALC
R0752            ENTER WITH .5 SIN(THETA) IN MPAC.
R0753            PUSHLOC IS AT PDL+0, AN ARBITRARY BASE VALUE IF LEQ 8D

R0754   SUBROUTINES CALLED:  GETERAD
R0755   NORMAL EXIT MODE:    RVQ
R0756   EXIT MODES:           NONE
R0757   OUTPUT:  ERADM  (-29) M   IN MPAC ON RETURNING
R0758            NEW UNIT VECTOR NOT SAVED.
R0759            SIN(LAT) NOT SAVED.
R0760            PUSHLOC AT PDL+0
R0761   ERASEABLE INITIALIZATION REQUIRED:
R0762            SDELF/2     =SIN(THETA)  /2,   IN MPAC                       LEFT BY TFF/TRIG
R0764            CDELF/2     =COS(THETA) /2, STORED IN PDL 14D                LEFT BY TFF/TRIG
R0766            RONE   (-29) M                                               LEFT BY USER
R0768            VONE   (-7)  M/CS                                            LEFT BY USER
R0770            URONE  UR/2                                                  LEFT BY USER
R0772            UNI          .5 UNIT( V*R)                                   LEFT BY ENTRY / P61
R0774            UNITW        UNIT NORTH POLE                                 LEFT BY PAD LOAD
R0776   DEBRIS:  QPRET,    PDL+0 ... PDL+5
R0777

A0779
 0779                                26,3030   47315 0  FISHCALC PDVL   VXV          URPR = UR CDELF + UHOR SDELF
 0780   REF   3  LAST  790   26,3031   02343 1                    URONE
 0781   REF   3  LAST  790   26,3032   03502 0                    UNI
 0782                        26,3033   76561 1           VXSC     VSL1
A0783                                                                        SIN(THETA) /2 FROM PDL+0
 0784                        26,3034   74315 0           PDVL     VXSC      TO PDL+0,  +5
 0785   REF   4  LAST  812   26,3035   02343 1                    URONE
 0786   REF   2  LAST  643   26,3036   00017 1                    CDELF/2   COS(THETA) /2
 0787                        26,3037   45455 1           VAD      STADR
 07871  REF   1              26,3040   74235 0           STORE    URH       FOR USE IN RTGO FROM EMS DISPLAY
 0788                        26,3041   72441 0           DOT      SL1
 0789   REF   7  LAST  538   26,3042   01714 1                    UNITW     FULL UNIT VECTOR    UNIT NORTH
 0790   REF  14  LAST  802   26,3043   02156 1           STORE    ALPHAV +4  = .5 SIN(LAT)
 0791                        26,3044   77650 1  DUMPFISH GOTO
 0792   REF   2  LAST  627   26,3045   26505 0                    GETERAD   SAVES FISCHER RAD (-29) M IN ERADM AND
A0793                                                                        IN MPAC. RETURNS TO CALLER VIO QPRET.
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P0794   SUBROUTINE NAME:   VGAMCALC              (USED BY  S61.2)          DATE:          01.21.67
R0796   MOD NO:    0                                                       LOG SECTION:   P61-P67
R0798   MOD BY:  MORTH / BAIRNSFATHER
R0799   MOD NO:  1          MOD BY:  RR BAIRNSFATHER     DATE:  11 APR 67
R0800   MOD NO:  2          MOD BY:  RR BAIRNSFATHER     DATE:  21 NOV 67    VARIABLE MU ADDED.
R0802   MOD NO:  3          MOD BY:  RR BAIRNSFATHER     DATE:  21 MAR  68   ACCEPT DIFFERENT EARTH/MOON SCALE
R0804   FUNCTIONAL DESCRIPTION:      EARTH CENTERED VIS VIVA CALCULATION OF TERMINAL VELOCITY AND GAMMA (REL TO
R0806           HORIZONTAL)  GIVEN  THE SCALAR QUANTITIES:  PRESENT RADIUS AND VELOCITY AND THE TERMINAL RADIUS.
R0808           THE USER MUST APPEND PROPER SIGN TO GAMMA, SINCE IT IS CALCULATED AS A POSITIVE NUMBER.
R0810           THE EQUATIONS ARE

R0811                   VGAM = SQRT(VN VN/MU + 2(RN-RTERM)/(RN RTERM)  )  RTMU

R0812                   COSGAM = H /RTERM VGAM  = SQRT(LCP)/ (RTERM VGAM/RTMU)


R0813           VGAMCALC ASSUMES THAT THE TERMINAL RADIUS IS LESS THAN THE PRESENT RADIUS. BOTH CALCTFF AND CALCTPER
R0815           MAKE THIS ASSUMPTION.

R0816   CALLING SEQUENCE:  CALL                          STCALL RTERM
R0817                          VGAMCALC                        PREVGAM
R0818           PUSHLOC AT PDL+0, ARBITRARY  IF LEQ 12D
R0819           C(MPAC) UNSPECIFIED                    C(MPAC)=NEW RTERM

R0820   SUBROUTINES CALLED:  NONE
R0821   NORMAL EXIT MODE:    RVQ
R0822   ALARMS:     NONE
R0823   OUTPUT:     GAMMA / 360 IN MPAC, POSITIVE NUMBER
R0824               VGAM E:(-7)  M:(-5)    M/CS  IN PDL+0
R0825               PUSHLOC AT PDL+2
R0826   ERASABLE INITIALIZATION REQD:
R0827           TFF/RTMU E:(17) M:(14)   1/SQRT(MU)                          LEFT BY TFFCONIC.
R0829           RMAGI  E:(-29) M:(-27)   M   PRESENT RADIUS LENGTH          LEFT BY TFFCONIC
R0831           NRMAG  E: (-29+NR)       M  NORM LENGTH OF PRESENT POSITION  LEFT BY TFFCONIC
R0833                  M: (-27+NR)
R0834           RTERM  E:(-29) M:(-27)   M  TERMINAL RADIUS LENGTH          LEFT BY CALCTFF
R0836           NRTERM E: (-29+NR)       M  NORM LENGTH OF TERMINAL RADIUS   LEFT BY CALCTFF
R0838                  M: (-27+NR)
R0839           TFFVSQ E:(20)  M:(18)  1/M   -(V SQ/MU): PRESENT VELOCITY,NORM LEFT BY TFFCONIC
R0841           TFFNP  E: (-38+2NR)      M  LCP, SEMI-LATUS RECTUM, WEIGHT NR  LEFT BY TFFCONIC
R0843                  M: (-36+2NR)
R0844   DEBRIS:  QPRET,   PDL+0 ... PDL+3
R0845           RTERM,  NRTERM  IF PREVGAM ENTERED.
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P0846
 0847                          26,3046   77657 0  PREVGAM  SL*                ENTER WITH NEW  RTERM IN MPAC
                                                                               E: (-29)  M: (-27)
A0848
 0849                          26,3047   20201 0                    0,1       X1 = -NR
 0850  REF  1                 26,3050   00021 1           STORE    NRTERM    RTERM  M          E:(-29+NR)   M:(-27+NR)

 0851                          26,3051   41345 0  VGAMCALC DLOAD    DMP
 0852  REF  1                 26,3052   00041 1                    NRMAG     RMAG  M          E:(-29+NR)   M:(-27+NR)
 0853  REF  2  LAST  814      26,3053   00021 1                    NRTERM    RTERM  M         E:(-29+NR)   M:(-27+NR)
 0854                          26,3054   45325 1           PDDL     DSU       RMAG RTERM M     E:(-58+2NR)  M:(-54+2NR)
 0855  REF  2  LAST  814      26,3055   00041 1                    NRMAG     RMAG  M          E:(-29+NR)   M:(-27+NR)
 0856  REF  3  LAST  814      26,3056   00021 1                    NRTERM    RTERM  M         E:(-29+NR)   M:(-27+NR)
 0857                          26,3057   56257 1           SL*      DDV       2(RN-RTERM)      E:(-30+NR)   M:(-28+NR)
 0858                          26,3060   20171 1                    0 -8D,1   (-8+NR)
A0859                                                                          PUSH UP PRODUCT.
 0860                          26,3061   77625 0           DSU
 0861  REF  1                 26,3062   00025 0                    TFFVSQ    -(V SQ/MU)           E: (20)   M: (18)
 0862                          26,3063   41566 1           SQRT     PUSH      SAVE VGAM/RT(MU) FOR NOW. E:(10) M:(9)
 0863                          26,3064   65271 0           DDV      PDDL      XCH PDL+0, LEAVING VGAM FOR OUTPUT.
                                                                               VGAM TO PDL M/CS   E: (-7)   M: (-2)
A0864
 0865  REF  4  LAST  519      26,3065   00037 0                    TFF/RTMU  E: (17)  M: (14)
 0866                          26,3066   65205 0           DMP      PDDL      RTERM VGAM/RTMU  E:(-19+NR)  M:(-18+NR)
 0867  REF  4  LAST  814      26,3067   00021 1                    NRTERM    RTERM  M         E:(-29+NR)   M:(-27+NR)
 0868  REF  1                 26,3070   00035 1                    TFFNP     LC P =H.H/MU  M  E:(-38+2NR)  M:(-36+2NR)
 0869                          26,3071   56366 1           SQRT     DDV                        E:(-19+NR)   M:(-18+NR)
A0870                                                                          PUSH UP DEN      E:(-19+NR)   M:(-18+NR)
A08701                                                                         USE DDV OVFL AS LIMITER (|COS| <1.0)
 0871                          26,3072   65542 1           SR1      ACOS
 0872                          26,3073   77616 0  DUMPVGAM RVQ

A08721                                                                         CALLER MUST SUPPLY OWN SIGN ...

A0873                                                                                                  22W     27MS
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R0874   SUBROUTINE NAME:     TFF/TRIG            (USED BY  S61.2)            DATE     01.17.67
R0876   MOD NO:  0                                                           LOG SECTION:    P61-P67
R0878   MOD BY:  RR BAIRNSFATHER
R0879   MOD NO:  1            MOD BY:  RR BAIRNSFATHER      DATE:  14 APR 67
R0880   MOD NO:  2            MOD BY:  RR BAIRNSFATHER      DATE:  21 MAR  68    ACCEPT DIFFERENT EARTH/MOON SCALE
R0882   FUNCTIONAL DESCRIPTION:      USED BY ENTRY DISPLAY TO CALCULATE SIN(THETA), COS(THETA) FROM DATA LEFT IN
R0884           PDL BY TFF SUBROUTINES. THE EQNS ARE
R0885                   COS(THETA) = 1-2 ABS(ARG) /(RN RTERM (1+X)  )
R0886                                                 2
R0887                   SIN(THETA) = SGN(ARG) SQRT(1-COS (THETA) )
R0888           WHERE  THETA = TRANSFER ANGLE
R0889           AND    ARG = P Z ABS(Z)                                     IF ALFA ZZ   LEQ 1
R0891                  ARG = (P / ALFA)  SGN(Q1 + R I/Z)                    IF ALFA Z Z   G  1
R0893           AND  ARG  HAS BEEN AFFIXED WITH THE SIGN OF SIN(THETA).
R0894   CALLING SEQUENCE:  CALL
R0895                              TFF/TRIG
R0896           PUSHLOC AT PDL+0, ARBITRARY IF NOT EQ 14D
R0897           C(MPAC) UNSPECIFIED

R0898   SUBROUTINES CALLED:  NONE
R0899   NORMAL EXIT MODES:   RVQ
R0900   ALARMS:  NONE
R0901   OUTPUT:  C(MPAC) = .5 SIN(THETA)
R0902           CDELF/2 = .5 COS(THETA)          (IN PDL 14D)
R0903           PUSHLOC AT PDL+0
R0904   ERASABLE INITIALIZATION REQUIRED:
R0905           TFFX                    X                                    LEFT BY CALCTFF OR CALCTPER
R0907           TFFTEM E: (-59+2NR)     ARG                                  LEFT BY CALCTFF OR CALCTPER
R0909                  M: (-55+2NR)     WHERE ARG = LCP ZZ SGN(DELF) OR ARG = LCP/ALFA  SGN(DELF)
R0911           NRTERM E: (-29+NR)        M  NORM LENGTH OF TERMINAL RADIUS  LEFT BY CALCTFF OR CALCTPER
R0913                  M: (-27+NR)
R0914           NRMAG  E: (-29+NR)        M  NORM LENGTH OF PRESENT POSITION LEFT BY TFFCONIC
R0916                  M: (-27+NR)
R0917   DEBRIS:  QPRET, CDELF/2

 09172                          27,2631                    BANK   27
 09173  REF   1                 27,2000                    SETLOC P60S5
 09175                          27,2631                    BANK
 0918                           27,2631   70545 1  TFF/TRIG DLOAD  SR1
 0919   REF   1                 27,2632   00043 0           TFFX
 0920                           27,2633   41215 1           DAD    DMP
 0921   REF   8  LAST  644      27,2634   15333 0           HIDPHALF
 0922   REF   3  LAST  814      27,2635   00041 1           NRMAG          RMAG  M          E:(-29+NR)  M:(-27+NR)
 0923                           27,2636   55205 0           DMP    BDDV
 0924   REF   5  LAST  814      27,2637   00021 1           NRTERM         RTERM  M         E:(-29+NR)  M:(-27+NR)
 0925   REF   1                 27,2640   00045 0           TFFTEM         P ZSQ OR P/ALFA  E:(-59+2NR) M:(-55+2NR)
 0926                           27,2641   44246 1           ABS    BDSU    THE SIGN IS FOR SDELF.
 0927   REF   9  LAST  815      27,2642   15333 0           HIDPHALF
 0928   REF   3  LAST  812      27,2643   00017 1           STORE  CDELF/2 .5 COS(THETA)
 0929                           27,2644   57516 1           DSQ    DCOMP   KEEP HONEST FOR SQRT.
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 0930                          27,2645   75415 0           DAD     SQRT
 0931   REF   1                27,2646   15325 1                   HIDP1/4
 0932                          27,2647   43565 0 DUMPTRIG  SIGN    RVQ
 0933   REF   2  LAST  815     27,2650   00045 0                   TFFTEM          AFFIX SIGN(DELE/2)
A0934                                                                             RETURN WITH .5 SIN(THETA) IN MPAC

A0935                                                                                    16W             15 MS

 0936                          27,2651   77620 0 DISPTARG  STQ                     C(MPAC) = TRGO  ESTIMATE
 0937   REF   4  LAST  805     27,2652   03373 0                   60GENRET
 0939                          27,2653   45205 1           DMP     DSU
 0940   REF   1                27,2654   15003 0                   KTETA1
 0944   REF   4  LAST  808     27,2655   03733 0                   TTE1
 0945   REF   6  LAST  294     27,2656   37606 0           STCALL  DTEARDT
 0946   REF   2  LAST  294     27,2657   46225 0                   EARRDT2
 0947                          27,2660   77624 1           CALL
 0948   REF   2  LAST  808     27,2661   56664 0                   VRCALC
 0949                          27,2662   77650 1           GOTO
 0950   REF   5  LAST  816     27,2663   03373 0                   60GENRET
 0951                          27,2664   50375 0 VRCALC    VLOAD   DOT
 0952   REF   2  LAST  812     27,2665   03542 1                   URH
 0953   REF   3  LAST  294     27,2666   03474 0                   RT
 0954                          27,2667   65512 1           SL2     ACOS
 0956                          27,2670   77616 0           RVQ
R0957   END OF PROGRAM  S61.2
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P0958
R0959   PROGRAM DESCRIPTION S62.3        DATE 10JAN67
R0960   MOD NO 1          LOG SECTION P60-P67
R0961   MOD BY ZELDIN
R0962   MOD NO:  2              MOD BY:  RR BAIRNSFATHER      DATE: 15 MAY 67      CHANGED TO REF COORDS.
R0964   MOD NO:  3              MOD BY:  RR BAIRNSFATHER      DATE:  17 JAN 68     ALFAPAD CHANGES MADE.
R0966   FUNCTIONAL DESCRIPTION
R0967             COMPUTE  DESIRED GIMBOL ANGLES FOR ENTRY ATTITUDE
R0968             THE FOLLOWING TRAJECTORY TRIAD IS AVAILABLE IN MEMORY AND IS COMPUTED EACH 2 SECONDS BY  CM/POSE  IN
R0970             REFERENCE COORDINATES (V = VELOCITY RELATIVE TO EARTH) :

R0971                       UXA = -UNIT(V)
R0972                       UYA =  UNIT(V*R)
R0973                       UZA =  UXA*UYA

R0974             GENERATE A DESIRED BODY TRIAD FOR TRIMMED FLIGHT WITH RESPECT TO THE RELATIVE VELOCITY VECTOR, USING
R0976             ROLL COMMAND AND TRIM ANGLE OF ATTACK:

R0977                       UXD = UNIT(UYD*UXA) SIN(ALFATRIM) + UXA COS(ALFATRIM)
R0978                       UYD = UYA COS(ROLLC) + UZA SIN(ROLLC)
R0979                       UZD = UXD * UYD

R0980             USE THE DESIRED SET (IN REFERENCE COORDS) AND  REFSMMAT  TO CALL   CALCGA   AND OBTAIN GIMBAL ANGLES
R0982             IN 2S,C IN MPAC, +2 AND THETAD, +2.

R0983   CALLING SEQUENCE
R0984           L   CALL
R0985         L+1         S62.3
R0986   NORMAL EXIT MODE
R0987             RETURN VIA QPRET DIRECTLY FROM CALCGA.
R0988   SUBROUTINES CALLED
R0989             CALCGA
R0990   ALARM OR ABORT MODES
R0991             NONE
R0992   ERASABLE INITIALIZATION REQUIRED
R0993             ROLLC  ROLL COMMAND                          DP 1:S COMP AT 1REV
R0994             ALFAPAD   SP 1S,C      /180                   LEFT BY PAD LOAD    ALFATRIM IS NEGATIVE.
R0996             UXA/2  REF COORDS                            LEFT BY CM/POSE
R0997             UYA/2  REF COORDS                            LEFT BY CM/POSE
R0998             UZA/2  REF COORDS                            LEFT BY CM/POSE
R0999   OUTPUT
R1000             CPHI   GIMBAL ANGLES (O,I,M) 2:S COMP TP (O,I,M)/180
R1001   DEBRIS
R1002           QTEMP, QPRET,PUSHLIST
R1003

 1004                          10,2376                        BANK   10
 1005   REF   1                10,2000                        SETLOC P60S4
 1005                          10,2376                        BANK
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 1007   REF   1                                          COUNT* $$/S62.3

 1008                          10,2376   67201 0  S62.3   SETPD  SLOAD
 1009                          10,2377   00001 0          0
 1010   REF   2  LAST  793     10,2400   03012 1          ALFAPAD      ALFATRIM /180 , ALFA IS NEG.
 1011                          10,2401   41542 1          SR1    PUSH
 1012                          10,2402   65346 0          COS    PDDL         XCH PDL, COS TO PDL0
 1013                          10,2403   65356 1          SIN    PDDL         SIN TO PDL2
 1014   REF   8  LAST  793     10,2404   03316 0          ROLLC
 1015                          10,2405   74346 0          COS    VXSC
 1016   REF   2  LAST  118     10,2406   03550 1          UYA/2                                REF COORDS
 1017                          10,2407   73525 1          PDDL   SIN          PUSH VECTOR INTO PDL4,.9
 1018   REF   9  LAST  818     10,2410   03316 0          ROLLC
 1019                          10,2411   53361 0          VXSC   VAD
 1020   REF   2  LAST  118     10,2412   03556 1          UZA/2                                REF COORDS
A1021                                                                      VECTOR FROM PDL4, 9
 1022                          10,2413   77772 0          VSL1
 1023   REF   5  LAST  763     10,2414   02722 1          STORE  YNB          = UYD            REF COORDS

 1024                          10,2415   76435 1          VXV    VSL1
 1025   REF   3  LAST  118     10,2416   03542 1          UXA/2                                REF COORDS
 1026                          10,2417   65361 0          VXSC   PDDL
A1027                                                                      SIN TRIM FROM PDL2
A1028                                                                      XCH PDL0 FOR COS TRIM
 1029                          10,2420   53361 0          VXSC   VAD
 1030   REF   4  LAST  818     10,2421   03542 1          UXA/2                                REF COORDS
A1031                                                                      FROM PDL0
 1032                          10,2422   77772 0          VSL1
 1033   REF   9  LAST  774     10,2423   02714 1          STORE  XNB          X SC AXIS (.5 UNIT)      REF COORDS

 1034                          10,2424   76435 1          VXV    VSL1
 1035   REF   6  LAST  818     10,2425   02722 1          YNB
 1036   REF   6  LAST  763     10,2426   26730 1          STOVL  ZNB          Z SC IN REF COOR. SCALED AT 2
 1037   REF  33  LAST  804     10,2427   01736 1          REFSMMAT
 1038   REF  33  LAST  774     10,2430   26672 0          STOVL  XSM
 1039   REF  34  LAST  818     10,2431   01744 1          REFSMMAT +6
 1040   REF   4  LAST  443     10,2432   26700 1          STOVL  YSM
 1041   REF  35  LAST  818     10,2433   01752 0          REFSMMAT +12D
 1042   REF   3  LAST  443     10,2434   02706 1          STORE  ZSM

 1043                          10,2435   52014 0          CLEAR  GOTO
 1044   REF   1                10,2436   00260 0                 CPHIFLAG     CAUSE CALCGA TO STORE ANS IN TP CPHI
 1045   REF   3  LAST  774     10,2437   47311 1                 CALCGA
A1046                                                                      CALCGA WILL RETURN TO ORIGINAL CALLER
A1047                                                                      VIA QPRET WITH 2,S COMP. ANGLES IN CPHI
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R0001   PROGRAM NAME - PREREAD, READACCS, SERVICER, AVERAGE G.

R0002   MOD NO.  00   BY M.HAMILTON   DEC.12, 1966

R0003   FUNCTIONAL DESCRIPTION

R0004   THE ROUTINES DESCRIBED BELOW ARE USED TO CALCULATE VALUES OF RN, VN, AND GDT/2 DURING ACCELERATED FLIGHT.
R0006   THE SEVERAL ROUTINES COMPRISE A PACKAGE AND ARE NOT MEANT TO BE USED AS SEPARATE SUBROUTINES.

R0008   GENERAL REFERENCES TO  SERVICER  OR  AVERAGE G  ARE UNDERSTOOD TO REFER TO THE ENTIRE SET OF ROUTINES INCLUDING
R0010   READACCS, SERVICER, AVERAGE G, INTEREAD, SMOOTHER, AND ANY ADDITIONAL ROUTINES ATTACHED AT AVGEXIT (SEE BELOW).

R0012   PROGRAMS INITIATING SERVICER ARE REQUIRED TO MAKE A WAITLIST CALL FOR PREREAD (OR, IF LIFTOFF, FOR BIBIBIAS)
R0014   AT 2 SECONDS BEFORE THE FIRST AVERAGE G UPDATE IN ORDER TO INITIALIZE THE SEQUENCE, WHICH WILL RECUR EVERY
R0016   2 SECONDS FROM THAT TIME ON AS LONG AS AVEGFLAG REMAINS SET.

R0017   THE USE OF ERASABLE AVGEXIT ALLOWS VARIOUS ROUTINES TO BE PERFORMED AS PART OF THE NORMAL CYCLE (SEE
R0019   EXPLANATION OF AVGEXIT BELOW).

R0020   DESCRIPTIONS OF INDIVIDUAL ROUTINES FOLLOW.

R0021       PREREAD

R0022           PREVIOUSLY EXTRAPOLATED VALUES COPIED FROM RN1, VN1, AND PIPTIME1 INTO RN, VN, AND PIPTIME.
R0024           LASTBIAS JOB SCHEDULED.
R0025           PIPS READ AND CLEARED VIA PIPASR SUBROUTINE.
R0026           AVERAGE G FLAG SET ON.
R0027           DRIFT FLAG SET OFF.
R0028           V37 FLAG SET ON.
R0029           INITIALIZATION OF   1) THRUST MONITOR (DVMON) - DVCNTR SET TO ONE.
R0031                               2) TOTAL ACCUMULATED DELV VALUE (DVTOTAL) - SET TO ZERO.
R0033                               3) AXIS VECTOR (AXIS) - SET TO (.5,0,0).
R0034           NORMLIZE JOB SCHEDULED.
R0035           READACCS TASK CALLED IN 2 SECONDS.

R0036       NORMLIZE

R0037           GDT/2 INITIALIZED VIA CALCGRAV SUBROUTINE.

R0038       READACCS

R0039           IF ONMON FLAG SET QUIKREAD ROUTINE IS PERFORMED BEFORE PIPASR ZEROS THE PIPA REGISTERS, AND THE 1/2 SEC
R0041           ONMONITOR LOOP IS INITIATED TO PROVIDE DOWNLINK INFORMATION DURING ENTRY.
R0043           PIPS READ AND CLEARED BY PIPASR SUBROUTINE.
R0044           IF CM/OSTBY IS ON, ENTRY VARIABLES INITIALIZED AND SETJTAG TASK CALLED.
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R0047           IF AVERAGEG FLAG ON    READACCS CALLED TO RECYCLE IN 2 SECONDS.
R0048           IF AVERAGEG FLAG OFF   AVERAGE G EXIT (AVGEXIT) SET TO 2CADR AVGEND FOR FINAL PASS.
R0050           SERVICER JOB SCHEDULED.


R0051           TEST CONNECTOR OUTBIT TURNED ON.


R0052   ONMNITOR

R0053           A SEQUENCE OF THREE PASSES THROUGH QUICKREAD FOLLOWING A CALL TO READACCS WITH ONMONFLG SET AT 1/2
R0055           SEC INTERVALS. INTERVALS ARE COUNTED OUT BY PIPCTR, INITIALISED AT 3 BY READACCS

R0057       QUIKREAD

R0058         READS CURRENT PIPS INTO X,Y,ZPIPBUF. READS OLD X,Y,ZPIPBUF INTO X,Y,ZOLDBUF. VALUES ARE SENT TO
R0060           DOWNLIST DURING ENTRY.
R0061       SERVICER
R0062           DELV VALUES CHECKED TO DETECT RUNAWAY PIP -
R0063                 IF BAD PIP   1) ALARM SENT.
R0064                              2) COMPENSATION, DVTOTAL ACCUMULATION, AND DVMON BYPASSED.  CONTROL
R0066                                 TRANSFERRED TO AVERAGE G.
R0067           PIPS COMPENSATED VIA 1/PIPA SUBROUTINE.
R0069           DVTOTAL INCREMENTED BY ABSOLUTE VALUE OF DELV.
R0069           THRUST MONITOR (DVMON) PERFORMED UNLESS IDLE FLAG IS ON.
R0070           CONTROL TRANSFERRED TO AVERAGE G.


R0071           DVMON

R0072             THRESHOLD VALUE (PLACED IN DVTHRUSH BY USER) CHECKED AGAINST ABSOLUTE VALUE OF DELV TO CHECK
R0074             THRUST LEVEL.
R0075                 IF THRUST     1) ULLAGE OFF ROUTINE PERFORMED.
R0076                                2) STEERING FLAG TURNED ON AT FIRST DETECTION OF THRUST.
R0078                                3) CONTROL TRANSFERRED TO AVERAGE G.
R0079                 IF NO THRUST  1) ON FIRST PASS THROUGH MONITOR, CONTROL TRANSFERRED TO AVERAGE G.
R0081                                2) ON SUBSEQUENT PASSES. CONTROL TRANSFERRED TO ENGINE FAIL ROUTINE IF THRUST
R0083                                   HAS FAILED FOR 3 CONSECUTIVE PASSES.


R0084           ENGINE FAIL

R0085             ENGFAIL1 TASK CALLED IN 2.5 SECONDS.  THIS WILL RETURN CONTROL TO TIG-5 SO THAT THE IGNITION
R0087                 SEQUENCE MAY BE REPEATED.
R0088             ENGINOF3 PERFORMED.
R0089             DAP SET UP FOR RCS.


R0090       AVERAGE G
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R0091           RN1, VN1, GDT1/2 CALCULATED VIA CALCRVG ROUTINE BY UPDATING RN, VN WITH DELV AND AN AVERAGED VALUE
R0093           OF GDT/2.
R0094           RN1, VN1, GDT1/2, PIPTIME1 COPIED INTO RN, VN, GDT/2, PIPTIME FOR RESTART PROTECTION.
R0096           CONTROL TRANSFERRED TO ADDRESS SPECIFIED BY USER (OR BY READACCS FOR LAST PASS) IN AVGEXIT.
R0098           LAST PASS (AVGEND)  1) FREE FALL GYRO COMPENSATION SET UP.
R0099                               2) DRIFT FLAG TURNED ON.
R0100                               3) STATE VECTOR TRANSFERRED VIA AVETOMID ROUTINE.
R0102                               4) ONMONITOR FLAG RESET.
R0103                               5) V37 FLAG RESET.
R0104                               6) TEST CONNECTOR OUTBIT RESET.
R0105                               7) CONTROL TRANSFERRED TO CANV37 TO CONTINUE MM CHANGE ROUTINE (R00).

R0108   CALLING SEQUENCE

R0109           PREREAD ENTERED DIRECTLY FROM TIG-30 VIA POSTJUMP.
R0110           READACCS CALLED AS WAITLIST TASK.

R0112   SUBROUTINES CALLED

R0113           UTILITY ROUTINES - PHASCHNG FLAGUP FLAGDOWN NOVAC FINDVAC WAITLIST ALARM NEWPHASE 2PHSCHNG

R0115           OTHER - PIPASR  I/PIPA  CALCGRAV  CALCRVG  AVETOMID

R0116   NORMAL EXIT MODES

R0117           ENDOFJOB  TASKOVER  CANV37

R0118           AVGEXIT - THIS IS A DOUBLE PRECISION ERASABLE LOCATION BY WHICH CONTROL IS TRANSFERRED AT THE END
R0120                     OF EACH CYCLE OF AVERAGE G.
R0121                     THE 2CADR OF A ROUTINE TO BE PERFORMED AT THAT TIME (E.G., STEERING EQUATIONS TO BE PERFORMED
R0123                     AT 2 SECOND INTERVALS) MAY BE SET BY THE USER INTO AVGEXIT.
R0125                     ALL SUCH ROUTINES SHOULD RETURN TO SERVEXIT, WHICH IS THE NORMAL EXIT FROM AVERAGE G.

R0127           SERVEXIT - DOES A PHASE CHANGE FOR RESTART PROTECTION AND GOES TO ENDOFJOB.
R0129                      THE 2CADR OF SERVEXIT IS SET INTO AVGEXIT BY THE USER IF NO OTHER ROUTINE (SEE ABOVE).

R0131           AVGEND - LAST PASS OF AVERAGE G EXITS HERE, BYPASSING SPECIAL ROUTINE (SEE ABOVE UNDER READACCS).
R0133                    FINAL EXIT IS TO CANV37.                                    F AVERAGE G).

R0135   OUTPUT

R0136       DVTOTAL(2)  PIPTIME(2)  XPIPBUF(2)  YPIPBUF(2)  ZPIPBUF(2)
R0137       RN(6)        REFERENCE COORD.   SCALED AT 2(+29)M/CS
R0138       VN(6)        REFERENCE COORD.   SCALED AT 2(+7)M/CS
R0139       GDT/2(6)     REFERENCE COORD.   SCALED AT 2(+7)M/CS
R0140       DELV(6)      STABLE MEMB. COORD.SCALED AT 2(+14)*5.85*10(-4)M/CS (KPIP1 USED TO GET DV/2 AT 2(+7))
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R0142      DELVREF(6)   REFERENCE COORD.   SCALED AT 2(+7)M/CS

R0143   INITIALIZATION

R0144           ONMONITOR FLAG SET BY ENTRY TO SHOW PIPBUF VALUES REQUIRED.
R0145           IDLE FLAG ON IF DVMON TO BE BYPASSED.
R0146           DVTHRUSH SET TO APPROPRIATE VALUE FOR DVMON.
R0147           AVGEXIT SET TO 2CADR OF ROUTINE, IF ANY, TO BE PERFORMED AFTER EACH CYCLE OF AVERAGE G.  IF NO ROUTINE
R0149                 TO BE DONE, AVGEXIT SET TO SERVEXIT.
R0150           VALUES NEEDED
R0151                 REFSMMAT
R0152                 UNITW - FULL UNIT VECTOR, IN REFERENCE COORD., OF EARTH'S ROTATIONAL VECTOR
R0154                 RN1, VN1, PIPTIME1 - IN REFERENCE COORD., CONSISTENT WITH TIME OF EXECUTION OF PREREAD


R0156   DEBRIS

R0157      CENTRALS     A, L, Q
R0158      OTHER        INTERNAL - DVCNTR(1)  PIPAGE(1)  PIPCTR(1)  AVGEXIT(2)
R0159                   EXTERNAL - ITEMP1(1)  ITEMP2(1)  RUPTREG1(1)  TEMX(1)  TEMY(1)  TEMZ(1)
R0161                   USEFUL DEBRIS
R0162                      RN1(6)  VN1(6)  GOT1/2  PIPTIME1(2)
R0163                         THESE LOCATIONS USED AS BUFFER STORAGE FOR NEWLY CALCULATED VALUES OF RN, VN, GOT/2,
R0165                         AND PIPTIME DURING PERFORMANCE OF SERVICER ROUTINES.
R0167                      UNITR - HALF UNIT VECTOR OF RN, REFERENCE COORD.
R0168                      RMAG SCALED AT 2(+58) IN 36D.
R0169                      RMAGSQ SCALED AT 2(+58) IN 34D.
R0170                      (RE/RMAG)SQ IN 32D.


 0171                        27,2671                    BANK   27
 0172   REF   1              37,2000                    SETLOC SERVICES
 0173                        37,2701                    BANK

 0174   REF  12  LAST  805   E7,1431                    EBANK= DVCNTR
R0175   ****************************************  PREREAD  ********************************************************
R0177

 0178   REF   1                                         COUNT  37/SERV

 0185   REF   2  LAST  301   37,2701  3 5073 0  PREREAD  CAF    PRIO21          CALLER MUST PROTECT PREREAD
 0186   REF  26  LAST  798   37,2702  0 5134 1           TC     NOVAC
 0187   REF   6  LAST  304   E3,1460                     EBANK= NBDX
 0188   REF   1              37,2703   03636 1          2CADR  LASTBIAS        DO LAST GYRO COMPENSATION IN FREE FALL
 0189   REF   1              37,2704   14063 1

A01882                                                 CALL-TO AND LASTBIAS ITSELF ARE NOT
A01883                                                      PROTECTED. REREADAC SETS I/PIPADT
A01884                                                      TO 2.0 SECS IN CASE LASTBIAS LOST.
A01885                                                      (REDUNDANT IF LASTBIAS IS AOK)
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0189   REF   2  LAST  536   37,2705  0 2722 1  REDO5.31 TC     PREREAD1

0190   REF   4  LAST  231   37,2706  3 7667 1           CAF    PRIO32
0191   REF  27  LAST  804   37,2707  0 5147 0           TC     FINDVAC        SET UP NORMLIZE JOB REQUIRED PRIOR TO
0192   REF  13  LAST  822   E7,1431                     EBANK= DVCNTR         FIRST AVERAGE G PASS
0193   REF   3  LAST  539   37,2710   03236 0           2CADR  NORMLIZE
0193                        37,2711   76067 1
0194   REF   3  LAST  686   37,2712  3 5042 1           CAF    2SECS
0195   REF  37  LAST  804   37,2713  0 5245 1           TC     WAITLIST
0196   REF  19  LAST  804   E6,1661                     EBANK= AOG
0197   REF   2  LAST  539   37,2714   02744 1           2CADR  READACCS
0197                        37,2715   76066 0
0198   REF  35  LAST  593   37,2716  4 5016 1           CS     TWO
0199   REF   7  LAST  698   37,2717  0 4114 1           TC     NEWPHASE
0200                        37,2720   00005 1           OCT    5

0201   REF  42  LAST  794   37,2721  1 5324 0           TCF    TASKOVER


0202                        37,2722  0 0006 1  PREREAD1 EXTEND
0203   REF  17  LAST  223   37,2723  22 070 0           QXCH   RUPTREG1

0204   REF   1              37,2724  0 3254 1           TC     PIPASR         CLEAR + READ PIPS LAST TIME IN FREE FALL
02042  REF  96  LAST  795   37,2725  3 5017 1           CAF    ONE            SET UP PIPAGE FOR REREADAC IN CASE A
02043  REF   2  LAST   79   37,2726  55'230 0           TS     PIPAGE               RESTART OCCURS BEFORE READACCS

0205   REF  23  LAST  733   37,2727  4 0075 1           CS     FLAGWRD1       SET AVEG FLAG
0206   REF  57  LAST  769   37,2730  7 5017 0           MASK   BIT1
0207   REF  24  LAST  823   37,2731  26 075 1           ADS    FLAGWRD1

0208   REF  16  LAST  721   37,2732  3 4777 1           CA     POSMAX
0209   REF  14  LAST  701   37,2733  7 0076 1           MASK   FLAGWRD2
0210   REF  15  LAST  823   37,2734  54 076 1           TS     FLAGWRD2       KNOCK DOWN DRIFT FLAG

0211   REF  17  LAST  732   37,2735  4 0103 1           CS     FLAGWRD7       SET V37 FLAG
0212   REF  33  LAST  746   37,2736  7 5012 0           MASK   BIT6
0213   REF  18  LAST  823   37,2737  26 103 1           ADS    FLAGWRD7

0218   REF 152  LAST  781   37,2740  3 5021 1           CAF    ZERO
0224   REF   5  LAST  685   37,2741  55'425 1           TS     DVTOTAL        CLEAR DVTOTAL
0225   REF   6  LAST  823   37,2742  55'426 1           TS     DVTOTAL +1

0226   REF  18  LAST  823   37,2743  0 0070 0           TC     RUPTREG1
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P0227   ************************************  READACCS  ************************************************************
 0229   REF  20  LAST  823   E6,1661                          EBANK= ADG
 0242   REF   2  LAST  823   37,2744  0 3254 1  READACCS TC     PIPASR

 0243   REF  17  LAST  769   37,2745  3 5022 1  PIPSDONE CAF    FIVE
 0244   REF  72  LAST  783   37,2746  54 001 1           TS     L
 0245                        37,2747  4 0000 0           COM
 0246   REF   3  LAST  535   37,2750  52 763 1           DXCH   -PHASE5

 0247   REF  97  LAST  823   37,2751  3 5017 1  RED05.5  CAF    ONE             SHOW PIPS HAVE BEEN READ
 0248   REF   3  LAST  823   37,2752  55'230 0           TS     PIPAGE

 0249   REF  36  LAST  823   37,2753  3 5016 0           CA     TWO             SET PIPCTR FOR ONMINTOR
 0250   REF   2  LAST   79   37,2754  55'227 0           TS     PIPCTR          AFTER ABOVE PHASCHNG

 0251   REF   3  LAST  800   37,2755  4 0102 0           CS     CM/FLAGS
 0252   REF  34  LAST  739   37,2756  7 5016 1           MASK   BIT2            CM/DSTBY
 0253   REF 185  LAST  783   37,2757  10 000 0           CCS    A
 0254   REF   2  LAST  218   37,2760  0 3033 1           TC     CHEKAVEG

 0255   REF   6  LAST  686   37,2761  4 1246 1           CS     PIPTIME1 +1
 0256   REF   2  LAST  703   37,2762  55'065 1           TS     TBASE6          FOR RESTARTS
 0260                        37,2763  0 0006 1           EXTEND                 CONTINUE FOR ENTRY DAP
 0261   REF  21  LAST  824   37,2764  3 1662 1           DCA    ADG
 0262   REF   2  LAST  111   37,2765  53'670 0           DXCH   ADG/PIP
 0263   REF   2  LAST  111   37,2766  3 1663 0           CA     AMG
 0264   REF   2  LAST  111   37,2767  57'671 0           XCH    AMG/PIP
 0265                        37,2770  0 0006 1           EXTEND
 0266   REF   2  LAST  111   37,2771  3 1665 0           DCA    ROLL/180
 0267   REF   2  LAST  111   37,2772  53'673 0           DXCH   ROLL/PIP
 0268   REF   2  LAST  111   37,2773  3 1666 0           CA     BETA/180
 0269   REF   2  LAST  111   37,2774  57'674 0           XCH    BETA/PIP
 0270   REF   4  LAST  824   37,2775  3 0102 1           CA     CM/FLAGS
 0271   REF  28  LAST  705   37,2776  7 5004 1           MASK   BIT12           CM/DAPARM  93D  BIT12
 0272                        37,2777  0 0006 1           EXTEND                 DURING ENTRY, WHEN RCS DAP IS INACTIVE,
 0273   REF   1              37,3000  1 3016 1           BZF    NOSAVPIP        SAVE PIPAS EACH 0.5 SEC FOR TM.

 0274   REF   1              37,3001  3 3066 1           CA     0.5SEC
 0275   REF  38  LAST  823   37,3002  0 5245 1           TC     WAITLIST
 0276   REF   2  LAST  116   E6,1533                    EBANK= XPIPBUF
 0277   REF   1              37,3003   03067 0          2CADR  QUIKREAD
 0277   REF   1              37,3004   76066 0
A0278                                                                   NO NEED TO RESTART PROTECT THIS.
 0279   REF   9  LAST  438   37,3005  3 1162 0           CA     DELVX           SAVE PIPAS AS READ (BUT NOT COMPENSATED)
 0280   REF   3  LAST  824   37,3006  57'533 0           XCH    XPIPBUF
 0281   REF   2  LAST  116   37,3007  55'536 1           TS     XOLOBUF

 0282   REF   5  LAST  437   37,3010  3 1164 0           CA     DELVY
 0283   REF   2  LAST  116   37,3011  57'534 1           XCH    YPIPBUF
 0284   REF   2  LAST  116   37,3012  55'537 0           TS     YOLOBUF
```

```
0285  REF   4  LAST  437   37,3013  3 1166 1          CA     DELVZ
0286  REF   2  LAST  116   37,3014  57'535 0          XCH    ZPIPBUF
0287  REF   1              37,3015  55'540 0          TS     ZOLDBUF

0288  REF  18  LAST  824   37,3016  3 5022 1  NOSAVPIP CA     FIVE
0289  REF   4  LAST  219   37,3017  55'725 1          TS     CM/GYMDT

0290  REF   1              37,3020  3 3233 0          CA     JTAGTIME      ACTIVATE CM/RCS AFTER PIPUP TO GO
A0291                                                                     IN JTAGTIME +5 CS.
0292  REF  39  LAST  824   37,3021  0 5245 1          TC     WAITLIST
0293  REF  22  LAST  824   E6,1661                    EBANK= AOG
0294  REF   2  LAST  212   37,3022   03207 1          2CADR  SETJTAG
0294                       37,3023   32066 0

0295  REF  28  LAST  800   37,3024  4 6214 1          CS     THREE         1.3SPOT FOR SETJTAG
0296  REF   8  LAST  823   37,3025  0 4114 1          TC     NEWPHASE
0297                       37,3026   00001 0          OCT    1

0298  REF   4  LAST  690   37,3027  3 4362 1          CAF    OCT37
0299  REF  73  LAST  824   37,3030  54 001 1          TS     L
0300                       37,3031  4 0000 0          COM
0301  REF   4  LAST  824   37,3032  52 763 1          DXCH   -PHASE5

0302  REF  25  LAST  823   37,3033  4 0075 1  CHEKAVEG CS     FLAGWRD1
0303  REF  58  LAST  823   37,3034  7 5017 0          MASK   BIT1
0304  REF 186  LAST  824   37,3035  10 000 0          CCS    A             IF AVEG FLAG DOWN SET FINAL EXIT AVEG
0305  REF   1              37,3036  0 3056 1          TC     AVEGOUT

0306  REF   4  LAST  823   37,3037  3 5042 1          CAF    2SECS
0307  REF  40  LAST  825   37,3040  0 5245 1          TC     WAITLIST
0308  REF  23  LAST  825   E6,1661                    EBANK= AOG
0309  REF   3  LAST  823   37,3041   02744 1          2CADR  READACCS
0309                       37,3042   76066 0

0310  REF   6  LAST  709   37,3043  3 5002 0  MAKESERV CAF    PRIO20        ESTABLISH SERVICER ROUTINE
0311  REF  28  LAST  823   37,3044  0 5147 0          TC     FINDVAC
0312  REF  14  LAST  823   E7,1431                    EBANK= OVCNTR
0313  REF   2  LAST  217   37,3045   03104 1          2CADR  SERVICER
0313                       37,3046   76067 1

0314  REF   8  LAST  436   37,3047  4 5015 1          CS     FOUR          RESTART SERVICER AND READACCS
0315  REF   9  LAST  825   37,3050  0 4114 1          TC     NEWPHASE
0316                       37,3051   00005 1          OCT    5

0317  REF  27  LAST  766   37,3052  3 5007 0          CAF    BIT9
0318                       37,3053  0 0006 1          EXTEND
0319  REF  25  LAST  701   37,3054  05 011 1          WOR    DSALMOUT      TURN TEST CONNECTOR OUTBIT ON

0320  REF  43  LAST  823   37,3055  1 5324 0          TCF    TASKOVER      END PREVIOUS READACCS WAITLIST TASK
```

```
0321                          37,3056  0 0006 1  AVEGOUT  EXTEND
0322   REF   1                37,3057  3 3063 1           DCA     AVOUTCAD
0323   REF   2  LAST  538      37,3060  53'223 1           DXCH    AVGEXIT
0324   REF   1                37,3061  1 3043 1           TCF     MAKESERV

0325   REF  15  LAST  825      E7,1431                     EBANK=  DVCNTR
0326   REF   1                37,3062   03165 0  AVOUTCAD 2CADR   AVGEND
0326   REF   1                37,3063   76067 1
```

```
P0327   ROUTINE NAME: ONMNITOR
R0328   MOD 04 BY BAIRNSFATHER  30 APR 1968                    REDO ONMNITOR TO SAVE PIPS EACH 0.5 SEC FOR TM.ENTRY.
R0330   MOD 03 BY FISHER DECEMBER 1967
R0331   MOD 02 BY RYE SEPT 1967
R0332   MOD 01 BY KOSMALA 23 MAR 1967
R0333   MOD 00 BY KOSMALA 27 FEB 1967

R0334   FUNCTIONAL DESCRIPTION

R0335           THE PURPOSE OF ONMONITOR IS TO PROVIDE 1/2 SEC.READING OF PIPAS FOR DOWNLIST DURING ENTRY.
R0337           X,Y,ZPIPBUF CONTAIN PRESENT VALUES X,Y,ZOLDBUF CONTAIN VALUES FROM PREVIOUS READING.

R0339   CALLING SEQUENCE

R0340           CALL AS WAITLIST TASK. TERMINATES ITSELF IN TASKOVER

R0341   INITIALISATION

R0342           PIPCTR = 2 (FOR DT = 0.5 SEC)
R0343           X,Y,ZPIPBUF SET TO PREVIOUS PIPAX,Y,Z

R0344   OUTPUT

R0345           X,Y,ZPIPBUF, X,Y,ZOLDBUF

R0346   DEBRIS

R0347           X,Y,ZPIPBUF CONTAIN LAST PIPAX,Y,Z VALUES
R0348                   X,Y,ZOLDBUF CONTAIN LAST-BUT-ONE PIPAX,Y,Z VALUES
R0349           RUPTREG1
R0350           PIPCTR

 0351   REF   3  LAST  824   37,3064  55'227 0  ONMNITOR TS     PIPCTR

 0352   REF  12  LAST  731   37,3065  0 5267 1           TC     FIXDELAY        WAIT
 0353                        37,3066   00062 0  0.5SEC   DEC    50

 0354   REF  37  LAST  824   37,3067  3 5016 0  QUIKREAD CAF    TWO
 0355   REF  19  LAST  823   37,3070  54 070 1           TS     RUPTREG1
 0356   REF 187  LAST  825   37,3071  50 000 1           INDEX  A
 0357   REF   8  LAST  437   37,3072  3 0037 0           CA     PIPAX           SAVE ACTUAL PIPAS FOR TM.
 0358   REF  20  LAST  827   37,3073  50 070 0           INDEX  RUPTREG1
 0359   REF   4  LAST  824   37,3074  57'533 0           XCH    XPIPBUF         UPDATE X,Y,ZPIPBUF
 0360   REF  21  LAST  827   37,3075  50 070 0           INDEX  RUPTREG1
 0361   REF   3  LAST  824   37,3076  55'536 1           TS     XOLDBUF         AND X,Y,ZOLDBUF
 0362   REF  22  LAST  827   37,3077  10 070 1  CHKCTR   CCS    RUPTREG1
 0363   REF   2  LAST  824   37,3100  1 3070 1           TCF    QUIKREAD +1     LOOP AGAIN
 0364   REF   4  LAST  827   37,3101  11'227 0           CCS    PIPCTR
 0365   REF   1              37,3102  1 3064 1           TCF    ONMNITOR
 0366   REF  44  LAST  825   37,3103  0 5324 1           TC     TASKOVER
```

```
P0367  ************************************  SERVICER  ************************************************************
R0369

 0370   REF  16  LAST  826   E7,1431                          EBANK= DVCNTR

 0371   REF  38  LAST  827   37,3104  3 5016 0  SERVICER CAF    TWO
 0372                        37,3105  0 0004 0           INHINT
 0373   REF  23  LAST  827   37,3106  54 070 1  PIPCHECK TS     RUPTREG1

 0374                        37,3107  6 0000 1           DOUBLE
 0375   REF 188  LAST  827   37,3110  50 000 1           INDEX  A
 0376   REF  10  LAST  824   37,3111  11'162 1           CCS    DELVX
 0377                        37,3112  0 3114 0           TC     +2
 0378   REF   1              37,3113  0 3122 0           TC     PIPLOOP

 0379   REF   1              37,3114  6 3232 1           AD     -MAXDELV      DO PIPA-SATURATION TEST BEFORE
 0380                        37,3115  0 0006 1           EXTEND
 0381   REF   2  LAST  828   37,3116  6 3122 0           BZMF   PIPLOOP       COMPENSATION.

 0382   REF  33  LAST  805   37,3117  0 5650 1           TC     ALARM
 0383                        37,3120   00205 0           OCT    00205         SATURATED-PIPA ALARM  ***CHANGE LATER
 0384   REF   1              37,3121  0 3143 1           TC     AVERAGEG

 0385   REF  24  LAST  828   37,3122  10 070 1  PIPLOOP  CCS    RUPTREG1
 0386   REF   1              37,3123  1 3106 1           TCF    PIPCHECK

 0387   REF  82  LAST  804   37,3124  0 5412 0           TC     PHASCHNG      RESTART REREADAC + SERVICER
 0388                        37,3125   16035 0           OCT    16035
 0389                        37,3126   20000 0           OCT    20000
 0390   REF  17  LAST  828   E7,1431                          EBANK= DVCNTR
 0391   REF   1              37,3127   03133 0           2CADR  DVTOTUP
 0391   REF   1              37,3130   76067 1

 0392   REF 234  LAST  805   37,3131  0 4662 1           TC     BANKCALL      PIPA COMPENSATION CALL
 0393   REF   2  LAST  438   37,3132   15262 0           CADR   1/PIPA

 0394   REF 205  LAST  804   37,3133  0 6006 1  DVTOTUP  TC     INTPRET
 0395                        37,3134   51575 1           VLOAD  ABVAL         GET ABS VALUE OF DELV
 0396   REF   8  LAST  178   37,3135   01163 1                  DELV
 0397                        37,3136   77405 0           DMP    EXIT
 0398   REF   1              37,3137   37451 0                  KPIP1         SCALE AT 2(+7)

 0399                        37,3140  0 0006 1           EXTEND
 0400   REF 279  LAST  810   37,3141  3 0155 0           DCA    MPAC
 0401   REF   7  LAST  823   37,3142  21'426 1           DAS    DVTOTAL       ACCUMULATE DVTOTAL
 0402   REF  83  LAST  828   37,3143  0 5412 0  AVERAGEG TC     PHASCHNG
 0403                        37,3144   10035 0           OCT    10035

 0404   REF 208  LAST  828   37,3145  0 6006 1           TC     INTPRET
 0405                        37,3145   77624 1           CALL
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0406   REF   1                 37,3147   77420 1                 CALCRVG
0407                           37,3150   77776 1           EXIT

0408   REF  84  LAST  828      37,3151   0 5412 0          TC      PHASCHNG
0409                           37,3152    10035 0          OCT     10035

0410   REF   4  LAST  545      37,3153   3 4113 0          CAF     OCT31         COPY RN1,VN1,GOT102,GOBL1/2,PIPTIME1
0411   REF  12  LAST  692      37,3154   0 5606 1          TC      GENTRAN       INTO RN ,VN ,GDT/12 ,GOBL/2 ,PIPTIME
0412   REF   6  LAST  537      37,3155    01231 0         ADRES   RN1
0413   REF  13  LAST  804      37,3156    01170 0         ADRES   RN
04131                          37,3157   0 0003 1          RELINT                GENTRAN DOES AN INHINT
0414   REF  85  LAST  829      37,3160   0 5412 0          TC      PHASCHNG
0415                           37,3161    10035 0          OCT     10035

0416                           37,3162   0 0006 1          EXTEND
0417   REF   3  LAST  826      37,3163   3 1223 0          DCA     AVGEXIT
0418   REF  15  LAST  482      37,3164   52 006 0          DXCH    Z             AVERAGEG EXIT

0419   REF  12  LAST  802      37,3165   3 1205 1  AVGEND  CA      PIPTIME +1    FINAL AVERAGE G EXIT
0420   REF   1                 37,3166   55'074 1          TS      OLDBT1        SET UP FREE FALL GYRO COMPENSATION

0421   REF  50  LAST  800      37,3167   0 5546 0          TC      UPFLAG        SET DRIFTFLG
0422   REF   5  LAST  768      37,3170    00036 1         ADRES   DRIFTFLG       BIT 15  FLAG 2
0425   REF  26  LAST  804      37,3171   0 5372 1          TC      2PHSCHNG
0426                           37,3172    00005 1         OCT     5             GROUP 5 OFF
0427                           37,3173    05022 1         OCT     05022         GROUP 2 ON FOR AVETOMID
0428                           37,3174    20000 0         OCT     20000

0429   REF 207  LAST  828      37,3175   0 6006 1          TC      INTPRET
0430                           37,3176    77624 1         CALL
0431   REF   1                 37,3177    73675 1                 AVETOMID      CONVERT STATE VECTOR TO REFERENCE SCALE.
0432                           37,3200    77776 1         EXIT

043201 REF 153  LAST  823      37,3201   3 5021 1          CAF     ZERO          ZERO MARK COUNTERS.
043202 REF   9  LAST  584      37,3202   55'125 1          TS      VHFCNT
043203 REF   6  LAST  584      37,3203   55'126 1          TS      TRKMKCNT

04321  REF 235  LAST  828      37,3204   0 4662 1          TC      BANKCALL
04322  REF   1                 37,3205    17173 1         CADR    PIPFREE

04323  REF  28  LAST  825      37,3206   4 5007 1          CS      BIT9
043235 REF  16  LAST  585      37,3207   55'734 1          TS      MRKBUF2       INVALIDATE MARK BUFFER
04324                          37,3210   0 0006 1          EXTEND
04325  REF  26  LAST  825      37,3211   03 011 1          WAND    DSALMOUT

043255 REF  55  LAST  798      37,3212   0 5560 1          TC      DOWNFLAG
043256 REF   1                 37,3213    00147 0         ADRES   CM/DSTBY

04326  REF  56  LAST  829      37,3214   0 5560 1          TC      DOWNFLAG
04327  REF   5  LAST  644      37,3215    00162 1         ADRES   V37FLAG
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 0433   REF  34  LAST  745   37,3216  3 5011 1          CAF     BIT7          RESTORE GROUP 1 + 2 IF P20 IS RUNNING.
 0434   REF  10  LAST  259   37,3217  7 0074 0          MASK    FLAGWRD0
 0435                        37,3220  0 0006 1          EXTEND
 0436                        37,3221  1 3225 0          BZF     +4

 0437   REF  27  LAST  829   37,3222  0 5372 1          TC      2PHSCHNG
 0438                        37,3223   00111 0          OCT     111           1.11SPOT
 0439                        37,3224   00132 1          OCT     132           2.13SPOT

 0445   REF  50  LAST  804   37,3225  0 4701 0          TC      POSTJUMP
 0446   REF   2  LAST  199   37,3226   10124 1          CADR    CANV37

 0447   REF  86  LAST  829   37,3227  0 5412 0 SERVEXIT TC      PHASCHNG
 0448                        37,3230   00035 1          OCT     00035         A, 5.3 = REREADAC  (ONLY)

 0449   REF  94  LAST  804   37,3231  1 5217 1          TCF     ENDOFJOB

 0450   REF   5  LAST  385      5024          DVTHRUSH EQUALS ELEVEN          15 PERCENT OF 2SEC PIPA ACCUMULATION,
A0451                                                                             FOR 503-FULL CSM/LEM....DELV SC.AT
A0452                                                                             5.85 CM/SEC.

 0453                        37,3232   63401 1 -MAXDELV DEC     -6398        3200 PPS FOR 2 SEC  CCS TAKES 1

 0454                        37,3233   00170 1 JTAGTIME DEC     120          = 1 SEC + T CDU, T CDU = .1 SEC

 0455                        37,3234   00372 1 2.5SEC   DEC     250
 0456                        37,3235   00044 1 MDOTFAIL DEC     144.0 B-16   5 SEC MASS LOSS AT 28.8 KG/SEC
A0457                                                                        SHOULD BE 2-4 SECS FOR NO START
A0458                                                                                  6-8 SECS FOR FAILURE
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P0459      NORMLIZE PERFORMS THE INITIALIZATION REQUIRED PRIOR TO THE FIRST ENTRY TO AVERAGEG, AND SCALES RN SO THAT IT
P0461   HAS 1 LEADING BINARY ZERO. IN MOST MISSIONS, RN WILL BE SCALED AT 2(+29), BUT IN THE 206 MISSION, RN WILL BE
P0463   SCALED AT 2(+24)M.


 0464   REF   1                  37,3236  3 5025 0  NORMLIZE CAF     THIRTEEN        SET UP TO COPY 14 REGS- RN1,VN1,PIPTIME1
 0465   REF  13  LAST  829       37,3237  0 5606 1            TC      GENTRAN         INTO RN,VN, PIPTIME
 0466   REF   7  LAST  829       37,3240   01231 0           ADRES   RN1             FROM HERE
 0467   REF  14  LAST  829       37,3241   01170 0           ADRES   RN              TO HERE

 0468                             37,3242  0 0003 1           RELINT
 0469   REF 208  LAST  829       37,3243  0 6006 1           TC      INTPRET
 0470                             37,3244   45175 0           VLOAD   CALL            LOAD RN FOR CALCGRAV
 0471   REF  15  LAST  831       37,3245   01171 1                   RN
 0472   REF   2  LAST  713       37,3246   77353 1                   CALCGRAV        INITIALISE UNITR RMAG GDT1

 0473   REF   3  LAST  724       37,3247   25207 0           STOVL   GDT/2
 0474   REF   2  LAST   80       37,3250   01256 1                   GOBL1/2
 0475   REF   3  LAST  724       37,3251   01215 0           STORE   GOBL/2
 0476                             37,3252   77776 1           EXIT
 0477   REF  95  LAST  830       37,3253  1 5217 1           TCF     ENDOFJOB
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P0478   *****  PIPA READER *****

R0479                   MOD NO. 00  BY D. LICKLY  DEC.9 1966

R0480   FUNCTIONAL DESCRIPTION

R0481       SUBROUTINE TO READ PIPA COUNTERS, TRYING TO BE VERY CAREFUL SO THAT IT WILL BE RESTARTABLE.
R0483       PIPA READINGS ARE STORED IN THE VECTOR DELV. THE HIGH ORDER PART OF EACH COMPONENT CONTAINS THE PIPA READING.
R0485       RESTARTS BEGIN AT REREADAC.

R0486       AT THE END OF THE PIPA READER THE CDUS ARE READ AND STORED AS A
R0487   VECTOR IN CDUTEMP.  THE HIGH ORDER PART OF EACH COMPONENT CONTAINS
R0488   THE CDU READING IN 2S COMP IN THE ORDER CDUX,Y,Z.  THE THRUST
R0489   VECTOR ESTIMATOR IN FINDCDUD REQUIRES THE CDUS BE READ AT PIPTIME.

R0490   CALLING SEQUENCE AND EXIT

R0491       CALL VIA TC, ISWCALL, ETC.

R0492       EXIT IS VIA Q.

R0493   INPUT

R0494       INPUT IS THROUGH THE COUNTERS PIPAX, PIPAY, PIPAZ, AND TIME2.

R0495   OUTPUT

R0496       HIGH ORDER COMPONENTS OF THE VECTOR DELV CONTAIN THE PIPA READINGS.
R0497       PIPTIME CONTAINS TIME OF PIPA READING.

R0498   DEBRIS (ERASABLE LOCATIONS DESTROYED BY PROGRAM)

R0499           LOW ORDER DELV'S ARE ZEROED FOR TM INDICATION.
R0500           TEMX   TEMY   TEMZ   PIPAGE

 0501                                37,3254  0 0006 1  PIPASR   EXTEND
 0502   REF  26  LAST  782           37,3255  3 0025 0           DCA     TIME2
 0503   REF   7  LAST  824           37,3256  53'246 1           DXCH    PIPTIME1       CURRENT TIME  POSITIVE VALUE
 0504   REF 154  LAST  829           37,3257  4 5021 0           CS      ZERO           INITIALIZE THESE AT NEG ZERO.
 0505   REF   2  LAST   79           37,3260  55'224 0           TS      TEMX
 0506   REF   2  LAST   79           37,3261  55'225 1           TS      TEMY
 0507   REF   2  LAST   79           37,3262  55'226 1           TS      TEMZ
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 0508   REF 155  LAST  832   37,3263  3 5021 1           CA     ZERO
 0509   REF   5  LAST  825   37,3264  55'166 0           TS     DELVZ          OTHER DELVS OK INCLUDING LOW ORDER
 0510   REF   6  LAST  824   37,3265  55'164 1           TS     DELVY

 0511   REF  11  LAST  828   37,3266  55'163 0           TS     DELVX +1       LOW ORDER DELV'S ARE ZEROED FOR TM: THUS
 0512   REF   7  LAST  833   37,3267  55'165 0           TS     DELVY +1       IF DNLNK'D LOW ORDER DELVS ARE NZ, THEY
 0513   REF   6  LAST  833   37,3270  55'167 1           TS     DELVZ +1       CONTAIN PROPER COMPENSATION. IF=0, THEN
A0514                                                                         THE TM VALUES ARE BEFORE COMPENSATION.

 0515   REF   4  LAST  824   37,3271  55'230 0           TS     PIPAGE         SHOW PIPA READING IN PROGRESS

 0516                        37,3272  0 0006 1  REPIP1   EXTEND
 0517   REF   9  LAST  827   37,3273  4 0040 1           DCS    PIPAX          X AND Y PIPS READ
 0518   REF   3  LAST  832   37,3274  53'225 1           DXCH   TEMX
 0519   REF  10  LAST  833   37,3275  52 040 1           DXCH   PIPAX          PIPAS SET TO NEG ZERO AS READ.
 0520   REF  12  LAST  833   37,3276  55'162 1           TS     DELVX
 0521   REF   8  LAST  833   37,3277  23'164 0           LXCH   DELVY

 0522   REF   3  LAST  437   37,3300  4 0041 0  REPIP3   CS     PIPAZ          REPEAT PROCESS FOR Z PIP
 0523   REF   3  LAST  832   37,3301  57'226 0           XCH    TEMZ
 0524   REF   4  LAST  833   37,3302  56 041 1           XCH    PIPAZ
 0525   REF   7  LAST  833   37,3303  55'166 0  DODELVZ  TS     DELVZ

 0526   REF 173  LAST  773   37,3304  0 0002 0           TC     Q

 0527   REF  24  LAST  825   E6,1661                     EBANK= A0G

 0528   REF   3  LAST  693   37,3305  10 763 1  REREADAC CCS    PHASE5         LAST PASS CHECK
 0529                        37,3306  1 3310 1           TCF    +2
 0530   REF  45  LAST  827   37,3307  1 5324 0           TCF    TASKOVER

 05302  REF   3  LAST  538   37,3310  3 7665 0           CAF    PRIO31         RESTART MAY HAVE WIPED OUT LASTBIAS. AN
 05303  REF  11  LAST  770   37,3311  55'074 1           TS     1/PIPADT             UNPROTECTED NOVAC FROM PREREAD,
A05304                                                                            WHICH SET(S) UP 1/PIPADT (THUSLY)
A05305                                                                            FOR NON-COASTING COMPENSATION....BE
A05306                                                                            SURE 1/PIPADT IS A0K. (PRIO31 IS
A05307                                                                            2.0SEC SC.AT B+8CS)

 0531   REF   5  LAST  833   37,3312  11'230 0           CCS    PIPAGE
 0532   REF   4  LAST  825   37,3313  1 2744 0           TCF    READACCS       PIP READING NOT STARTED. GO TO BEGINNING

 0533   REF   1              37,3314  3 3352 0           CAF    DONEADR        SET UP RETURN FROM PIPASR
 0534   REF 174  LAST  833   37,3315  54 002 1           TS     Q

 0535   REF   8  LAST  833   37,3316  11'166 0           CCS    DELVZ
 0536   REF 175  LAST  833   37,3317  0 0002 0           TC     Q              Z DONE, GO DO CDUS
 0537                        37,3320  1 3323 1           TCF    +3             Z NOT DONE, CHECK Y.
 0538   REF 176  LAST  833   37,3321  0 0002 0           TC     Q
 0539   REF 177  LAST  833   37,3322  0 0002 0           TC     Q
```

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0540                                37,3323  22 007 0           ZL
0541   REF   9  LAST  833           37,3324  11'164 1           CCS    DELVY
0542                                37,3325  1 3330 0           TCF    +3
0543   REF   1                     37,3326  1 3337 1           TCF    CHKTEMX      Y NOT DONE, CHECK X.
0544                                37,3327  1 3330 0           TCF    +1
0545   REF   5  LAST  833           37,3330  22 041 1           LXCH   PIPAZ       Y DONE, ZERO Z PIP.

0546   REF   4  LAST  833           37,3331  11'226 1           CCS    TEMZ
0547   REF   5  LAST  834           37,3332  4 1226 1           CS     TEMZ        TEMZ NOT = -0, CONTAINS -PIPAZ VALUE.
0548   REF   1                     37,3333  1 3303 0           TCF    DODELVZ
0549                                37,3334  1 3332 1           TCF    -2
0550   REF   9  LAST  833           37,3335  23'166 1           LXCH   DELVZ       TEMZ = -0, L HAS ZPIP VALUE.
0551   REF 178  LAST  833           37,3336  0 0002 0           TC     Q

0552   REF   4  LAST  833           37,3337  11'224 0  CHKTEMX   CCS    TEMX        HAS THIS CHANGED
0553   REF   5  LAST  834           37,3340  4 1224 0           CS     TEMX        YES
0554                                37,3341  1 3344 0           TCF    +3          YES
0555                                37,3342  1 3340 1           TCF    -2          YES
0556   REF   1                     37,3343  1 3272 1           TCF    REPIP1      NO
0557   REF  13  LAST  833           37,3344  55'162 1           TS     DELVX

0558   REF   3  LAST  832           37,3345  4 1225 1           CS     TEMY
0559   REF  10  LAST  834           37,3346  55'164 1           TS     DELVY

0560   REF 156  LAST  833           37,3347  4 5021 0           CS     ZERO        ZERO X AND Y PIPS
0561   REF  11  LAST  833           37,3350  52 040 1           DXCH   PIPAX       L STILL ZERO FROM ABOVE

0562   REF   1                     37,3351  1 3300 0           TCF    REPIP3

0563   REF   1                     37,3352   02745 0  DONEADR   GENADR PIPSDONE
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R0564   ************************************************************************************************

R0566           ROUTINE CALCRVG INTEGRATES THE EQUATIONS OF MOTION BY AVERAGING THE THRUST AND GRAVITATIONAL
R0568   ACCELERATIONS OVER A TIME INTERVAL OF 2 SECONDS.

R0569           FOR THE EARTH-CENTERED GRAVITATIONAL FIELD, THE PERTURBATION DUE TO OBLATENESS IS COMPUTED TO THE FIRST
R0571   HARMONIC COEFFICIENT J.

R0572           ROUTINE CALCRVG REQUIRES...
R0573                   1) THRUST ACCELERATION INCREMENTS IN DELV SCALED SAME AS PIPAX,Y,Z IN STABLE MEMBER COORDS.
R0575                   2) VN SCALED 2(+7)M/CS IN REFERENCE COORDS.
R0576                   3) RN SCALED AT 2(+29) METERS IN REFERENCE COORDS.
R0577                   4) UNITW THE EARTH S UNIT ROTATIONAL VECTOR (SCALED AS A FULL UNIT VECTOR) IN REFERENCE COORDS.

R0579   IT LEAVES RNI UPDATED (SCALED AT 2(+29)M, VNI (SCALED AT 2(+7)M/CS), AND GDT1/2 (SCALED AT 2(+7)M/CS). ALSO HALF
R0581   UNIT VECTOR UNITR, RMAG IN 36D SCALED AT 2(+29)M, R MAG SQ. IN 34D SCALED AT 2(+58) M SQ.
R0583

 0584                           37,3353   41456 0  CALCGRAV UNIT   PUSH            ENTER WITH RN IN MPAC
 0585   REF   1                 37,3354   01760 1           STORE  UNITR
 0586                           37,3355   67340 1           LXC,1  SLOAD
 0587   REF  15  LAST  724      37,3356   03746 1                  RTX2
 05871  REF  41  LAST  787      37,3357   00047 1                  X1
 0588                           37,3360   77240 1           BMN    VLOAD
 05881  REF   1                 37,3361   77407 1                  ITISMOON
 0589                           37,3362   41441 0           DOT    PUSH
 0590   REF   8  LAST  812      37,3363   01714 1                  UNITW
 0591                           37,3364   44316 0           DSQ    BDSU
 0592   REF   1                 37,3365   37461 0                  DP1/20
 0593                           37,3366   56325 0           PDDL   DDV
 0594   REF   1                 37,3367   37463 1                  RESQ
 0595                           37,3370   00043 0                  34D             (RN)SQ
 0596                           37,3371   00041 1           STORE  32D             TEMP FOR (RE/RN)SQ
 0597                           37,3372   41205 0           DMP    DMP
 0598   REF   1                 37,3373   37465 1                  20J
 0599                           37,3374   65361 0           VXSC   PDDL
 0600   REF   2  LAST  835      37,3375   01760 1                  UNITR
 0601                           37,3376   41205 0           DMP    DMP
 0602   REF   1                 37,3377   37467 0                  2J
 0603                           37,3400   00041 1                  32D
 0604                           37,3401   53361 0           VXSC   VAD
 0605   REF   9  LAST  835      37,3402   01714 1                  UNITW
 0606                           37,3403   77626 0           STADR
 0607   REF   3  LAST  831      37,3404   76521 0           STORE  GOBL1/2
 0608                           37,3405   41455 0           VAD    PUSH
 0609   REF   3  LAST  835      37,3406   01760 1                  UNITR
 0610                           37,3407   60345 0  ITISMOON DLOAD  NORM
 0611                           37,3410   00043 0                  34D
 0612   REF  21  LAST  787      37,3411   00050 1                  X2
 06121                          37,3412   53663 1           BDDV*  SLR*
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06122  REF   1                    37,3413   37453 1                    -MUDT(E),1
0613                              37,3414   56623 0                    0 -21D,2
0614                              37,3415   45561 1           VXSC     STADR
0615   REF   2  LAST   79         37,3416   76527 0           STORE    GDT1/2          SCALED AT 2(+7) M/CS
0616                              37,3417   77616 0           RVQ

0622                              37,3420   74375 0  CALCRVG  VLOAD    VXSC
0623   REF   9  LAST  828         37,3421   01163 1                    DELV
0624   REF   2  LAST  828         37,3422   37451 0                    KPIP1
0625                              37,3423   76505 0           VXM      VSL1
0626   REF  36  LAST  818         37,3424   01736 1                    REFSMMAT
0627   REF   7  LAST  721         37,3425   03433 0           STORE    DELVREF         DELV IN REF COORDS AT 2(+7)
0628                              37,3426   41562 0           VSR1     PUSH
0629                              37,3427   41455 0           VAD      PUSH            (DV-OLDGDT)/2 TO PD SCALED AT 2(+7)M/CS
0630   REF   4  LAST  831         37,3430   01207 0                    GDT/2
0631                              37,3431   74255 0           VAD      VXSC
0632   REF  12  LAST  804         37,3432   01177 1                    VN
0633   REF   1                    37,3433   37457 0                    2SEC(22)
0634                              37,3434   44055 1           VAD      STQ
0635   REF  16  LAST  831         37,3435   01171 1                    RN
0636                              37,3436   00037 0                    31D
0637   REF   8  LAST  831         37,3437   35232 1           STCALL   RN1             TEMP STORAGE OF RN SCALED 2(+29)M
0638   REF   3  LAST  831         37,3440   77353 1                    CALCGRAV

0639                              37,3441   53255 0           VAD      VAD
0640                              37,3442   77655 1           VAD
0641   REF  13  LAST  836         37,3443   01177 1                    VN
0642   REF   3  LAST  538         37,3444   35240 1           STCALL   VN1             TEMP STORAGE OF VN SCALED 2(+7)M/CS
0643                              37,3445   00037 0                    31D

0644                              37,3446   03215 1  KPIP     2DEC     .1024           SCALES DELV TO 2(+4)
0644                              37,3447   27057 0
0645                              37,3450   02312 0  KPIP1    2DEC     0.074880        207 DELV SCALING. 1 PULSE = 5.85 CM/SEC.
0645                              37,3451   32537 1
0646                              37,3452   61377 0  -MUDT(E) 2DEC*    -7.9720645 E+12 B-44*
0646                              37,3453   55754 1
0647                              37,3454   77644 1  -MUDT(M) 2DEC*    -9.805556 E+10 B-44*
0647                              37,3455   65556 1
0648                              37,3456   00000 1  2SEC(22) 2DEC     200 B-22
0648                              37,3457   31000 0

0649                              37,3460   01463 1  DP1/20   2DEC     0.05
0649                              37,3461   06315 0
0650                              37,3462   00001 0  RESO     2DEC*    40.6809913 E12 B-59*
0650                              37,3463   05000 1
0651                              37,3464   02047 0  20J      2DEC*    3.24692010 E-2 B1*
0651                              37,3465   36332 0
0652                              37,3466   00152 1  2J       2DEC*    3.24692010 E-3 B1*
0652                              37,3467   14511 1
```

R0001 R0003	VARIABLE	DESCRIPTION	MAXIMUM VALUE *	COMPUTER NAME
R0005	-			
R0006	URTO	INITIAL TARGET VECTOR	2 (UNIT VECTOR)	= RTINIT
R0008	-			
R0009	UZ	UNIT VECTOR NORTH	1	= UNITW
R0011	-			
R0012	V	VELOCITY VECTOR	2 VSAT	= VEL
R0014	-			
R0015	R	POSITION VECTOR	2 EXP 29 METERS	= RN
R0017	-			
R0018	VI	INERTIAL VELOCITY	128 M/CENTISEC	= VN
R0020	-			
R0021	RTE	VECTOR EAST AT INITIAL TARGET	2	= RTEAST
R0023	-			
R0024	UTR	NORMAL TO RTE AND UZ	2	= RTNORM
R0026	-			
R0027	URT	TARGET VECTOR	2	= RT
R0029	-			
R0030	UNI	UNIT NORMAL TO TRAJECTORY PLANE	2	
R0031	-			
R0032	DELV	INTEGRATED ACCEL. FROM PIPAS	5.85 16384 CM/S	
R0033	-			
R0034	G	GRAVITY VECTOR	128 M/CENTISEC	= GOT/2
R0036	A0	INITIAL DRAG FOR UPCONTRL	805 FPSS	FPSS=FT/SEC/SEC
R0038	AHOOKDV	TERM IN GAMMAL CALC. = AHOOK DVL	16	
R0039	A1	DRAG VALUE IN FACTOR CALCULATION	805 FPSS	
R0040	ALP	CONST FOR UPCONTRL	1	
R0041	ASKEP	KEPLER RANGE	21600 NM	NM = NAUTICAL MILE
R0043	ASP1	FINAL PHASE RANGE	21600 NM	
R0044	ASPUP	UP-RANGE	21600 NM	
R0045	ASP3	GAMMA CORRECTION	21600 NM	
R0046	ASPDWN	RANGE DOWN TO PULL-UP	21600 NM	
R0047	ASP	PREDICTED RANGE	21600 NM	NOT STORED
R0049	COSG	COSINE(GAMMAL)	2	= COSG/2
R0051	C/DO	RECIPROCAL DRAG, -4/DO 8-8	64/FPSS	
R0052	D	TOTAL ACCELERATION	805 FPSS	
R0053	DO	CONTROLLED CONSTANT D	805 FPSS	
R0054	DHOOK	TERM IN GAMMAL COMPUTATION	805 FPSS	
R0055	DIFF	THETNM-ASP (RANGE DIFFERENCE)	21600 NM	
R0056	DIFFOLD	PREVIOUS VALUE OF DIFF	21600 NM	
R0057	DLEWD	CHANGE IN LEWD	1	
R0058	DR	REFERENCE DRAG FOR DOWNCONTROL	805 FPSS	NOT STORED
R0060	DREFR	REFERENCE DRAG	805 FPSS	NOT STORED
R0062	DVL	VS1-VL	2 VSAT	
R0063	E	ECCENTRICITY	4	NOT STORED
R0065	F1	DRANGE/D DRAG (FINAL PHASE)	2700/805	= FX +5
R0067	F2	DRANGE/D RDOT (FINAL PHASE)	2700/2VS NM/FPS	= FX +4

R0069	F3	DRANGE/D (L/D)	2700 NM	= FX
R0071	FACT1	CONST FOR UPCONTRL	805 FPSS	
R0072	FACT2	CONST FOR UPCONTRL	1/805 FPSS	
R0073	FACTOR	USED IN UPCONTRL	1	* MAXIMUM VALUE DENOTES UNSCALED
R0075	GAMMAL	FLIGHT PATH ANGLE AT VL	1 RADIAN	VARIABLE VALUE WHEN SCALED
R0077	GAMMAL1	SIMPLE FORM OF GAMMAL	1 RADIAN	VARIABLE HAS MAXIMUM VALUE OF ONE.

P0079 R0081	VARIABLE	DESCRIPTION	MAXIMUM VALUE	COMPUTER NAME
R0083	HEADSUP	INDICATOR FOR INITIAL ROLL	1	
R0084	KA	DRAG TO LIFT UP IF DOWN	805 FPSS	= KAT
R0086	KLAT	LATERAL SWITCH GAIN	1	(NOM = .0125)
R0088	K2ROLL	INDICATOR FOR ROLL SWITCH		
R0089	LAD	MAX L/D (MIN ACTUAL VEHICLE L/D)	1	
R0090	LADPAD	NOMINAL VEHICLE L/D, SP PAD LOAD	1	(NOM = 0.3)
R0092	LATANG	LATERAL RANGE	4 RADIANS	
R0093	LFQ	EXCESS C.F. OVER GRAV=(VSQ-1)GS	128.8 FPSS	
R0094	LEWD	UPCONTROL REFERENCE L/D	1	
R0095	LOD	FINAL PHASE L/D	1	(NOM = 0.18)
R0097	LODPAD	FINAL PHASE L/D, SP PAD LOAD	1	
R0098	L/D	DESIRED LIFT TO DRAG RATIO	1	
R0099		(VERTICAL PLANE)		
R0100	L/D1	TEMP STORAGE FOR L/D IN LATERAL	1	
R0101	L/DCMINR	LAD COS(15DEG)	1	(NOM = 0.2895)
R0103	PREDANGL	PREDICTED RANGE (FINAL PHASE)	2700 NM	= PREDANG
R0105	Q2	FINAL PHASE RANGE -23500 Q3	21600 NM	
R0106		Q2 = FCN(LAD)		
R0107	Q7	MINIMUM DRAG FOR UPCONTROL	805 FPSS	
R0108	RDOT	ALTITUDE RATE	2 VSAT	
R0109	RDOTREF	REFERENCE RDOT FOR UPCONTROL	2 VSAT	
R0110	RDTR	REFERENCE RDOT FOR DOWNCONT	2 VSAT	NOT SAVED
R0112	ROLLC	ROLL COMMAND	1 REVOLUTION	
R0113	RTOGO	RANGE TO GO (FINAL PHASE)	2700 NM	= FX +2
R0115	SL	SINE OF LATITUDE	1	NOT SAVED
R0117	T	TIME	8 28 CENTISEC	= TIME2,TIME1
R0119	THETA	DESIRED RANGE (RADIANS)	2 PI RADIANS	= THETAH
R0121	THETNM	DESIRED RANGE (NM)	21600 NM	NON EXISTENT
R0123	V	VELOCITY MAGNITUDE	2 VSAT	
R0124	VI	INITIAL VELOCITY FOR UPCONTROL	2 VSAT	
R0125	VL	EXIT VELOCITY FOR UPCONTROL	2 VSAT	
R0126	VREF	REFERENCE VELOCITY FOR UPCONTROL	2 VSAT	
R0127	VSI	VSAT OR V1, WHICHEVER IS SMALLER	2 VSAT	
R0128		$2 \quad 2$		
R0129	V8ARS	VL /VSAT	4	
R0130		$2 \quad 2$		
R0131	VSQ	NORMALISED VEL. SQUARED = V /VSAT	4	= VSQUARE
R0133	WT	EARTH RATE TIMES TIME	1 REVOLUTION	NOT SAVED
R0135				= WIE (DTEAROT)
R0137	X	INTERMEDIATE VARIABLE IN G-LIMITER	2 VSAT	NOT SAVED
R0139	Y	LATERAL MISS LIMIT	4 RADIANS	NOT SAVED

P0141 EXTRA COMPUTER ERASABLE LOCATIONS NOT SHOWN ON FLOW CHARTS
R0142 ----------

R0143 R0144	VARIABLE	DESCRIPTION	MAXIMUM VALUE
R0145	GOTOADDR	ADDRESS SELECTED BY SEQUENCER	
R0146	XPIPBUF	BUFFER TO STORE X PIPA COUNTS	
R0147	YPIPBUF	BUFFER TO STORE Y PIPA COUNTS	
R0148	ZPIPBUF	BUFFER TO STORE Z PIPA COUNTS	
R0149	PIPCTR	COUNTS PASSES THRU PIPA READ ROUTINE	
R0150	JJ	INDEX IN FINAL PHASE TABLE LOOK-UP	
R0151	MM	INDEX IN FINAL PHASE TABLE LOOK-UP	
R0152	GRAD	INTERPOLATION FACTOR IN FINAL PHASE	
R0153	FX	DRANGE/D L/D = F3	2700 NM
R0154	FX + 1	AREF	805 FPSS
R0155	FX + 2	RTOGO	2700 NM
R0156	FX + 3	RDOTREF	VSAT/4
R0157	FX + 4	DRANGE/D RDOT = F2	21600/2VS NM/FPS
R0158	FX + 5	DRANGE/D DRAG = F1	2700/805 NM/FPSS
R0159	TEMIB	TEMPORARY LOCATION	
R0160	TIME/RTO	TIME OF INITIAL TARGET RTINIT	B 28 CENTISEC
R0161	DTEAROT	EST TIME BETWEEN RTINIT AND RT	B 28 CENTISEC
R0162	-		
R0163	UNITV	UNIT V VECTOR	2
R0164	-		
R0165	UNITR	UNIT R VECTOR	2
R0166	-		
R0167	-VREL	NEGATIVE VELOCITY REL TO ATMOSP	2 VSAT

R0168 R0170	COMPUTER SWITCHES		INITIAL STATE	CM/FLAGS = STATE +6
R0172	ENTRYDSP	DO ENTRY DISPLAY, IF SET	NON-BRANCH (1)	92D, BIT13
R0174	GONEPAST	INDICATES OVERSHOOT OF TARGET	NON-BRANCH (0)	95D, BIT10
R0176	RELVELSW	RELATIVE VELOCITY SWITCH	NON-BRANCH (0)	96D, BIT 9
R0178	EGSW	FINAL PHASE SWITCH	NON-BRANCH (0)	97D, BIT 8
R0180	FIRSTPAS	INITIAL PASS THRU HUNTEST	NON-BRANCH (0)	98D, BIT 7
R0182	HIND	INDICATES ITERATION IN HUNTEST	NON-BRANCH (0)	99D, BIT 6
R0184	INRLSW	INDICATES INIT ROLL ATTITUDE SET	NON-BRANCH (0)	100D, BIT 5
R0186	LATSW	INHIBIT DOWNLIFT SWITCH IF NOT SET	BRANCH (1)	101D, BIT 4
R0188	.05GSW	INDICATES DRAG EXCEEDS .05 GS	BRANCH (0)	102D, BIT 3
R0190	GONEBY	INDICATES GONE PAST TARGET (SET)	SELF-INITIALZNG	112D, BIT 8

P0192	CONSTANTS AND GAINS		VALUE		
R0194	----------		-----		
R0196	C1	FACTOR IN ALP COMPUTATION	1.25		
R0198	C16	CONSTD GAIN ON DRAG	.01		
R0200	C17	CONSTD GAIN ON ROOT	.001		
R0202	C18	BIAS VEL. FOR FINAL PHASE START	500	FPS	
R0204	C20	MAX DRAG FOR DOWN-LIFT	175	FPSS	
R0206	CHOOK	FACTOR IN AHOOK COMPUTATION	.25		
R0208	CH1	FACTOR IN GAMMAL COMPUTATION	1.0		
R0210	COS15	COS(15 DEG)	.965		
R0212	DLEWDO	INITIAL VARIATION IN LEWD	-.05		
R0214	D2	DRAG TO CHANGE LEWD	175	FPSS	
R0216	DT	COMPUTATION CYCLE TIME INTERVAL	2	SEC.	
R0218	GMAX	MAXIMUM ACCELERATION	257.6	FPSS	(8 G-S)
R0220	KA1	FACTOR IN KA CALC	1.3 GS		
R0222	KA2	FACTOR IN KA CALC	.2 GS		
R0224	KA3	FACTOR IN DO CALC	90	FPSS	
R0226	KA4	FACTOR IN DO CALC	40	FPSS	
R0228	KB1	OPTIMIZED UPCONTROL GAIN	3.4		
R0230	KB2	OPTIMIZED UPCONTROL GAIN	.0034		
R0232	KDMIN	INCREMENT ON Q7 TO DETECT END OF KEPLER PHASE	.5	FPSS	
R0234	KTETA	TIME OF FLIGHT CONSTANT	1000		
R0236	KLAT1	FACTOR IN KLAT CALC	1/24		
R0238	K44	GAIN USED IN INITIAL ROLL SECTION	19749550	FPS	
R0240	LATBIAS	LATERAL SWITCH BIAS TERM	.41252961	NM	
R0242	LEWD1	NOMINAL UPCONTROL L/D	.15		
R0244	POINT1	FACTOR TO REDUCE UPCONTROL GAIN	.1		
R0246	Q2	FINAL PHASE RANGE - 23500 Q3	-1002	NM	
R0248	Q3	FINAL PHASE DRANGE/D V	.07	NM/FPS	
R0250	Q5	FINAL PHASE DRANGE/ D GAMMA	7050	NM/RAD	
R0252	Q6	FINAL PHASE INITIAL FLIGHT PATH ANGLE	.0349	RAD	
R0254	Q7F	MIN DRAG FOR UPCONTROL	6	FPSS	
R0256	Q7MIN	MIN VALUE FOR Q7 IN FACTOR CALCULATION	40	FPSS	
R0258	Q19	FACTOR IN GAMMAL1 CALCULATION	.5		
R0260	Q21	FACTOR IN Q2 CALCULATION.	1000	NM	
R0262	Q22	FACTOR IN Q2 CALCULATION.	-1302	NM	
R0264	VFINAL1	VELOCITY TO START FINAL PHASE ON INITIAL ENTRY	27000	FPS	
R0266	VFINAL	FACTOR IN INITIAL UP-DOWN CALC	26600	FPS	
R0268	VLMIN	MINIMUM VL	18000	FPS	
R0270	VMIN	VELOCITY TO SWITCH TO RELATIVE VEL	VSAT/2		
R0272	VRCONTRL	ROOT TO START INTO HUNTEST	700	FPS	
R0274		VRCONT = COMPUTER NAME			
R0275	25NM	TOLERANCE TO STOP RANGE ITERATION	25	NM	
R0277	VQUIT	VELOCITY TO STOP STEERING	1000	FPS	

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P0279           CONVERSION FACTORS AND SCALING CONSTANTS
R0280           ---------- ------- --- ------- ---------

R0281           ATK         ANGLE IN RAD TO NM                      3437.7468   NM/RAD
R0283           GS          NOMINAL G VALUE FOR SCALING             32.2        FPSS
R0285           HS          ATMOSPHERE SCALE HEIGHT                 28500       FT
R0287           J           GRAVITY HARMONIC COEFFICIENT            .00162346
R0289           KWE         EQUATORIAL EARTH RATE                   1546.70168  FPS
R0291           MUE         EARTH GRAVITATIONAL CONSTANT            3.986032233 E 14 CUBIC M/ SEC SEC
R0293           RE          EARTH RADIUS                            21202900    FT
R0295           REQ         EARTH EQUATORIAL RADIUS                 20925738.2  FT
R0297           VSAT        SATELLITE VELOCITY AT RE                25766.1973  FPS
R0299           WIE         EARTH RATE                              .0000729211505 RAD/SEC

A0301                                   (END GSOP AS-278, VOL 1, FIG. 5.6-3  CONSTANTS,GAINS, ETC.)


R0302           DISPLAY QUANTITIES
R0303           ------------------

R0304           (SEE SECTION 4 OF THE GSOP FOR SIGN CONVENTIONS. )

R0305           VARIABLE    DESCRIPTION                             MAXIMUM VALUE
R0306           --------    -----------                             ------- -----
R0307           GMAX        PREDICTED MAXIMUM ENTRY ACCEL           163.84 GS       N 60
R0309           VPRED       PREDICTED VELOCITY AT ALTITUDE          128 M/CENTISEC  N 60
R0311                       400K FT ABOVE FISCHER RADIUS.
R0312           GAMMAEI     PREDICTED GAMMA AT ALTITUDE             1 REVOLUTION    N 60
R0314                       400K FT ABOVE FISCHER RADIUS.
R0315           D           DRAG ACCELERATION                       805 FPSS        N 64
R0317           VMAGI       INERTIAL VELOCITY MAGNITUDE             128 M/CENTISEC  N 64, N 68
R0319           THETAH      DESIRED RANGE ANGLE NM                  1 REVOLUTION    N 64, N 67
R0321           LAT         PRESENT LATITUDE                        1 REVOLUTION    N 67
R0323           LONG        PRESENT LONGITUDE                       1 REVOLUTION    N 67
R0325           RTOGO       RANGE ANGLE TO SPLASH FROM              1 REVOLUTION    N 63
R0327                       EMSALT FT ABOVE FISCHER RADIUS. (IN NM)
R0329           VIO         PREDICTED VELOCITY AT ALTITUDE          128 M/CENTISEC  N 63
R0330                       EMSALT FT ABOVE FISCHER RADIUS.
R0331           TTE         TIME OF FREE FALL TO ALT                8 28 CENTISEC   N 63
R0333                       EMSALT FT ABOVE FISCHER RADIUS.
R0334           ROLLC       ROLL COMMAND                            1 REVOLUTION    N 66, N 68, N 69
R0336           LATANG      CROSS-RANGE ERROR (XRNGERR)             4 RADIANS       N 66
R0338           DNRNGERR    DOWN RANGE ERROR                        1 REVOLUTION    N 66
R0340                       (PREDANG - THETAH  IN NM)
R0341           HDOT        ALTITUDE RATE                           128 M/CENTISEC      N 68
R0343           Q7          MINIMUM DRAG FOR UPCONTROL              805 FPSS        N 69
R0345           VL          EXIT VELOCITY FOR UP-CONTROL            2 VSAT          N 69
```

P0347 BODY ATTITUDE QUANTITIES (CM/POSE)
R0348 ----------

	VARIABLE	DESCRIPTION	MAXIMUM VALUE
R0349			------- -----
R0350			
R0351	-		
R0352	-VREL	NEGATIVE VELOCITY REL TO ATMOS.	2 VSAT
R0353	-		
R0354	OLDUYA	USED FOR UYA BELOW 1000 FPS	2
R0355	-		
R0356	UXA/2	UNIT VECTOR TRIAD	2
R0357	-		
R0358	UYA/2	BASED ON	2
R0359	-		
R0360	UZA/2	THE TRAJECTORY.	2
R0361	-		
R0362	UBX/2	UNIT VECTOR	2
R0363	-		
R0364	UBY/2	BODY TRIAD	2
R0365	-		
R0366	UBZ/2	FOR CM.	2

```
R0001   ENTRY INITIALIZATION ROUTINE
R0002    ----------------------------

 0003                       25,2000                    BANK   25
 0004   REF   1             25,2000                    SETLOC REENTRY
 0005                       25,2000                    BANK

 0006   REF   1                                        COUNT* $$/ENTRY
 0007   REF   7  LAST  796  E7,1451                    EBANK= RTINIT

 0008   REF   6  LAST  705      5060          EBENTRY  =      EBANK7
 0009   REF  11  LAST  705      5057          EBAOG    EQUALS EBANK6
 0010   REF   7  LAST  825      5002          NTRYPRIO EQUALS PRIO20        (SERVICER)
 0011   REF  50  LAST  746      0102          CM/FLAGS EQUALS STATE +6

 0012                       25,2000  77776 1  STARTENT EXIT                  MM = 63
A0013                                                    COME HERE FROM  CM/POSE . RESTARTED IN CM/POSE.

 0014   REF   1             25,2001  4 2113 1          CS     ENTMASK        INITIALIZE ALL SWITCHES TO ZERO
A0015                                                                       EXCEPT LATSW, ENTRYDSP AND GONEPAST.
A0016                                                                       GONEBY 1120 BIT8 FLAG7,SELF INITIALIZING
 0017                       25,2002  0 0004 0          INHINT
 0018   REF   5  LAST  824  25,2003  7 0102 0          MASK   CM/FLAGS
A0019                                                                       ENTRYDSP = 920  B13
A0020                                                                       GONEPAST=95D B10,  RELVELSW=96D B9
A0021                                                                       EGSW = 97D  B8      NOSWITCH = 98D  B7
A0022                                                                       HIND=99D B6         INRLSW=100D B5
A0023                                                                       LATSW=101D B4       .05GSW=102D B3

 0024   REF   1             25,2004  6 2114 1          AD     ENTRYSW        SET ENTRYDSP, LATSW, GONEPAST.
 0025   REF   6  LAST  844  25,2005  54 102 0          TS     CM/FLAGS

 0026                       25,2006  0 0003 1          RELINT

 0027   REF 209  LAST  831  25,2007  0 6006 1          TC     INTPRET

 0028                       25,2010   77735 0          SLOAD
 0029   REF   1             25,2011   03011 1                 LODPAD
 0030   REF   2  LAST  118  25,2012   03626 0          STORE  LOD

 0031                       25,2013   77735 0          SLOAD
 0032   REF   1             25,2014   03010 0                 LADPAD
 0033   REF   2  LAST  118  25,2015   03624 1          STORE  LAD

 0034                       25,2016   77605 1          DMP                    L/DCMINR = LAD COS(15)
 0035   REF   1             25,2017   15323 1                 COS15
 0036   REF   2  LAST  118  25,2020   17630 1          STODL  L/DCMINR
 0037   REF   1             25,2021   15146 0                 LATSLOPE
 0038                       25,2022   70405 1          DMP    SR1            KLAT = LAD/24
 0039   REF   3  LAST  844  25,2023   03624 1                 LAD
```

```
0040   REF   2  LAST  118   25,2024   17632 0          STODL  KLAT
0041   REF   1              25,2025   15177 1                 Q7F
0042   REF   2  LAST  281   25,2026   17175 1          STODL  Q7          Q7 = Q7F
0043   REF   1              25,2027   17372 1                 NEARONE     1.0 -1BIT
0044   REF   2  LAST  118   25,2030   17614 1          STODL  FACTOR
0045   REF   4  LAST  844   25,2031   03624 1                 LAD
0046                        25,2032   57565 0          SIGN   DCOMP
0047   REF   6  LAST  793   25,2033   03327 1                 HEADSUP     MAY BE NOISE FOR DISPLAY P61
0048   REF   2  LAST  118   25,2034   37634 1          STCALL L/D         L/D = - LAD SGN(HEADSUP)

0049   REF   2  LAST  790   25,2035   52063 0                 STARTEN1    RETURN VIA GOTOADDR
0050                        25,2036   47375 0          VLOAD  VXV
0051   REF  14  LAST  836   25,2037   01177 1                 VN          (-7) M/CS
0052   REF   4  LAST  835   25,2040   01760 1                 UNITR       .5 UNIT          REF COORDS
0053                        25,2041   50256 0          UNIT   DOT
0054   REF   4  LAST  816   25,2042   03474 0                 RT          RT/2  TARGET VECTOR      REF COORDS
0055   REF   4  LAST  177   25,2043   03676 0          STORE  LATANG      LATANG = UNI.RT /4
0056                        25,2044   47076 0          DCOMP  RTB
0057   REF  13  LAST  410   25,2045   45712 1                 SIGNMPAC
0058   REF   2  LAST  118   25,2046   17644 1          STODL  K2ROLL      K2ROLL = -SGN(LATANG)

0059   REF   5  LAST  845   25,2047   03624 1                 LAD
0060                        25,2050   43205 1          DMP    DAD
0061   REF   1              25,2051   15201 0                 Q21
0062   REF   1              25,2052   15203 1                 Q22
0063   REF   2  LAST  119   25,2053   03712 0          STORE  Q2          Q2 = -1152 + 500 LAD

0064                        25,2054   66331 0          SSP    SSP
0065   REF   3  LAST  798   25,2055   03646 0                 GOTOADDR    SET SELECTOR FOR INITIAL PASS
0066   REF   1              25,2056   52260 1                 INITROLL
0067   REF   4  LAST  795   25,2057   03325 0                 POSEXIT
0068   REF   1              25,2060   52115 0                 SCALEPOP    SET CM/POSE TO CONTINUE AT SCALEPOP

0069                        25,2061   77634 0          RTB
0070   REF   2  LAST  802   25,2062   53611 1                 SERVNOUT    OMIT INITIAL DISPLAY, SINCE 1ST GUESSBAD

R0071  CALCULATE THE INITIAL TARGET VECTOR:  RTINIT,  ALSO RTEAST, RTNORM  AND  RT.    ALL ARE .5 UNIT AND IN
R0073   REFERENCE COORDINATES.

0074                        25,2063   77220 1  STARTEN1 STQ    VLOAD
0075   REF   4  LAST  845   25,2064   03645 0                 GOTOADDR
0076   REF   8  LAST  643   25,2065   03401 1                 LAT(SPL)    TARGET COORDINATES
0077                        25,2066   43014 0          CLEAR  CLEAR       DO CALL USING PAD RADIUS. WILL UNIT IT.
0078   REF  10  LAST  802   25,2067   00662 0                 ERADFLAG    ANYWAY.
0079   REF  10  LAST  802   25,2070   01663 0                 LUNAFLAG
0080   REF   8  LAST  643   25,2071   15104 0          STODL  LAT
0081   REF   1              25,2072   15335 0                 3ZEROS

0082   REF   9  LAST  845   25,2073   15110 0          STODL  LAT +4      SET ALT=0.
0083   REF  13  LAST  829   25,2074   01205 1                 PIPTIME     ESTABLISH RTINIT AT TIME OF PRESENT
```

```
A0084                                                                   RN AND VN.
 0085   REF  2 LAST 118  25,2075  37524 0          STCALL TIME/RTO      SAVE TIME BASE OF RTINIT.
 0086   REF  8 LAST 776  25,2076  26441 1                 LALOTORV      C(MPAC) =TIME   (PIPTIME)
 0087                    25,2077  77656 1          UNIT                 ANSWER IN ALPHAV ALSO
 0088   REF  8 LAST 844  25,2100  17452 1          STODL  RTINIT        .5 UNIT TARGET          REF COORDS
 0089   REF  1           25,2101  12112 0                 500SEC        NOMINAL ENTRY TIME FOR P63
A0090                                                                   TIME/RTO = PIPTIME, STILL.
 0091   REF  7 LAST 816  25,2102  37606 0          STCALL DTEAROT       INITIALIZE EARROT
 0092   REF  1           25,2103  46215 0                 EARROT1       GET RT
 0093                    25,2104  72441 0          DOT    SL1
 0094   REF  5 LAST 845  25,2105  01760 1                 UNITR         RT/2 IN MPAC
 0095                    25,2106  77725 1          ACOS
 0096   REF  2 LAST 119  25,2107  37702 0          STCALL THETAH        RANGE ANGLE /360
 0097   REF  5 LAST 845  25,2110  03645 0                 GOTOADDR      RETURN TO CALLER

 0098                    25,2111  00003 1  500SEC  2DEC   50000 B-28     CS
 0098                    25,2112  01520 1
 0099                    25,2113  11774 0  ENTMASK OCT    11774
 0100                    25,2114  11010 0  ENTRYSW OCT    11010         ENTRYDSP B13, GONEPAST B10, LATSW B4
```

```
P0101
 0102                          25,2115   77624 1  SCALEPOP CALL
 0103  REF   1                 25,2116   52125 0                   TARGETNG

 0104                          25,2117   77776 1           EXIT

 0105  REF  87  LAST  830      25,2120   0 5412 0  REFAZE10 TC      PHASCHNG
 0106                          25,2121   10035 0           OCT     10035          SERVICER 5.3 RESTART AT REFAZE10

 0107  REF 210  LAST  844      25,2122   0 6006 1          TC      INTPRET

R0108          JUMP TO PARTICULAR RE-ENTRY PHASE:

A0109                                    SEQUENCE
 0110                          25,2123   77650 1           GOTO
 0111  REF   6  LAST  846      25,2124   03645 0                   GOTOADDR

R0112

R0113          GOTOADDR  CONTAINS THE ADDRESS OF THE ROLL COMMAND EQUATIONS APPROPRIATE TO THE CURRENT PHASE OF
R0115  RE-ENTRY.  SEQUENCING IS AS FOLLOWS:

R0116  INITROLL ADDRESS IS SET HERE INITIALLY. HOLDS INITIAL ROLL ATTITUDE UNTIL KAT  IS EXCEEDED. THEN HOLDS NEW ROLL
R0118          ATTITUDE UNTIL  VRTHRESH  IS EXCEEDED.  THEN BRANCHES TO

R0119  HUNTEST  THIS SECTION CHECKS TO SEE IF THE PREDICTED RANGE AT NOMINAL  L/D FROM PRESENT CONDITIONS IS LESS
R0121          THAN THE DESIRED RANGE.
R0122            IF NOT - A ROLL COMMAND IS GENERATED BY THE CONSTANT DRAG CONTROLLER.
R0124            IF SO -  CONTROL AND GOTOADDR ARE SET TO  UPCONTRL.
R0125          USUALLY NO ITERATION IS INVOLVED EXCEPT IF THE RANGE DESIRED IS TOO LONG ON THE FIRST PASS THROUGH
R0127          HUNTEST.

R0128  UPCONTRL CONTROLS ROLL DURING THE SUPER-CIRCULAR PHASE.  UPCONTRL IS TERMINATED EITHER
R0130            (A)  WHEN THE DRAG (AS MEASURED BY THE PIPAS) FALLS BELOW Q7 ,  OR
R0132            (B)  IF ROOT IS NEGATIVE AND REFERENCE VL EXCEEDS V.
R0133          IN CASE (A),  GOTOADDR  IS SET TO  KEP2  AND IN CASE (B), TO PREDICT3  SKIPPING THE KEPLER PHASE OF
R0135          ENTRY.

R0136  KEP2     GOTOADDR IS SET HERE DURING THE KEPLER PHASE TO MONITOR DRAG. THE SPACECRAFT IS INSTANTANEOUSLY
R0138          TRIMMED IN PITCH AND YAW TO THE COMPUTED RELATIVE VELOCITY. THE LAST COMPUTED ROLL ANGLE IS MAINTAINED.
R0140          WHEN THE MEASURED DRAG EXCEEDS Q7 +0.5,  GOTOADDR  IS SET TO

R0141  PREDICT3 THIS CONTROLS THE FINAL SUB-ORBITAL PHASE. ROLL COMMANDS CEASE
R0142          WHEN  V  IS LESS THAN VQUIT. AN EXIT IS MADE TO

R0143  P67.1    THE LAST COMPUTED ROLL ANGLE IS MAINTAINED. RATE DAMPING IS DONE IN PITCH AND YAW. PRESENT LATITUDE
R0145          AND LONGITUDE ARE COMPUTED FOR DISPLAY.
R0146          ENTRY IS TERMINATED WHEN DISKY RESPONSE IS MADE TO TO THIS FINAL FLASHING DISPLAY.
```

```
P0148    PROCESS AVERAGE G OUTPUT...SCALE IT AND GET INPUT DATA
R0149
R0150    * START  TARGETING ...

 0151    REF   9 LAST  846   E7,1451                    EBANK= RTINIT

A0152                                                        TARGETNG IS CALLED BY P61, FROM GROUP 4.
A0153                                                        TARGETNG IS CALLED BY ENTRY, FROM GROUP 5.

A0154                                                                ALL MM COME HERE.
 0155                        25,2125   77214 0  TARGETNG BOFF   VLOAD      ENTER WITH PROPER EB FROM CM/POSE(TEST)
 0156    REF   1             25,2126   03346 0                  RELVELSW   RELVELSW = 96D  BIT9
 0157    REF   1             25,2127   52133 1                  GETVEL     WANT INERTIAL VEL. GO GET IT.
 0158    REF   2 LAST  118   25,2130   03526 0                  -VREL      NEW V  IS RELATIVE, CONTINUE

 0159                        25,2131   52076 1           VCOMP  GOTO       (VREL) = (V) + KWE UNITR*UNITW
 0160    REF   1             25,2132   52136 1                  GETUNITV -1  - VREL WAS LEFT BY CM/POSE

 0161                        25,2133   74375 0  GETVEL   VLOAD  VXSC       INERTIAL V WANTED
 0162    REF  15 LAST  845   25,2134   01177 1                  VN         KVSCALE = (12800 / .3048) / 2VS
 0163    REF   1             25,2135   15231 0                  KVSCALE    KVSCALE = .81491944
 0164    REF   2 LAST  118   25,2136   03516 0           STORE  VEL        V/2 VS
 0165                        25,2137   44056 1  GETUNITV UNIT   STQ
 0166    REF   6 LAST  816   25,2140   03373 0                  60GENRET
 0167    REF   2 LAST  118   25,2141   17510 0           STODL  UNITV
 0168                        25,2142   00043 0                  34D
 0169    REF   2 LAST  118   25,2143   03622 1           STORE  VSQUARE    VSQ/4

 0170                        25,2144   77625 0           DSU
 0171    REF   1             25,2145   15325 1                  FOURTH     4 G-S FULL SCALE
 0172    REF   2 LAST  118   25,2146   17654 0           STODL  LEQ        LEQ/4

 0173                        25,2147   00045 0                  36D
 0174    REF   2 LAST  119   25,2150   27674 1           STOVL  V          V/2 VS = VEL/2 VS

 0175    REF   3 LAST  848   25,2151   03516 0                  VEL
 0176                        25,2152   72441 0           DOT    SL1        RDOT= V.UNITR
 0177    REF   6 LAST  846   25,2153   01760 1                  UNITR
 0178    REF   3 LAST  281   25,2154   27700 0           STOVL  RDOT       RDOT / 2 VS

 0179    REF  10 LAST  836   25,2155   01163 1                  DELV       PIPA COUNTS IN PLATFORM COORDS.
 0180                        25,2156   41246 1           ABVAL  DMP
 0181    REF   1             25,2157   15233 1                  KASCALE
 0182                        25,2160   53152 1           SL1    BZE
 0183    REF   1             25,2161   55133 0                  SETMIND
 0184    REF   4 LAST  281   25,2162   27640 0  DSTORE   STOVL  D          ACCELERATION USED TO APPROX DRAG
 0185    REF   4 LAST  848   25,2163   03516 0                  VEL
 0186                        25,2164   53435 0           VXV    UNIT       UNI = UNIT(V*R)
```

```
 0187   REF   7  LAST  848   25,2165   01760 1                    UNITR
 0188   REF   4  LAST  812   25,2166   03502 0          STORE     UNI          .5 UNI                  REF COORDS.

 0189                       25,2167   71214 0          BOFF      DLOAD
 0190   REF   2  LAST  848   25,2170   03346 0                    RELVELSW
 0191   REF   1              25,2171   55074 1                    GETETA
 0192   REF   2  LAST  845   25,2172   15335 0                    3ZEROS
 0193                       25,2173   43225 0  UPDATERT DSU      DAD          PIPTIME=TIME/RTO =ELAPSED TIME SINCE
A0194                                                              RTINIT  WAS ESTABLISHED.
 0195   REF   3  LAST  846   25,2174   03524 1                    TIME/RTO
 0196   REF  14  LAST  845   25,2175   01205 1                    PIPTIME
 0197   REF   8  LAST  846   25,2176   37606 0          STCALL    DTEAROT      GET PREDICTED TARGET VECTOR  RT

 0198   REF   3  LAST  816   25,2177   46225 0                    EARROT2
 0199                       25,2200   40241 1          DOT       SETPD        SINCE (RT) UNIT VECT, THIS IS 1/4 MAX
 0200   REF   5  LAST  849   25,2201   03502 0                    UNI          LATANG = RT.UNI
 0201                       25,2202   00001 0                    0
 0202   REF   5  LAST  845   25,2203   27676 0          STODL     LATANG       LATANG = MAC LATANG / 4

 0203   REF   5  LAST  845   25,2204   03474 0                    RT
 0204                       25,2205   77614 1          CLEAR
 0205   REF   1              25,2206   03667 0                    GONEBY       SHOW HAVE NOT GONE PAST TARGET.
 0206                       25,2207   50235 0          VXV       DOT          IF RT*UNITR.UNI NEG, GONEBY=1
 0207   REF   8  LAST  849   25,2210   01760 1                    UNITR        GONEPAST IS CONDITIONAL SW SET IN
 0208   REF   6  LAST  849   25,2211   03502 0                    UNI          FINAL PHASE.
 0209                       25,2212   43044 0          BPL       SET
 0210                       25,2213   52215 0                    +2
 0211   REF   2  LAST  849   25,2214   03467 1                    GONEBY       SHOW HAVE     GONE PAST TARGET.

 0212                       25,2215   77775 1          VLOAD
 0213   REF   6  LAST  849   25,2216   03474 0                    RT
 0214                       25,2217   45241 1  GETANGLE DOT      DSU          THETA = ARCCOS(RT.UNITR)
 0215   REF   9  LAST  849   25,2220   01760 1                    UNITR
 0216   REF   1              25,2221   15163 1                    NEAR1/4      TO IMPROVE ACCURACY, CALC RANGE BY
 0217                       25,2222   43244 1          BPL       DAD          TINYTHET IF HIGH ORDER PART OF
 0218   REF   1              25,2223   55136 0                    TINYTHET     ARCCOS ARGUMENT IS ZERO
 0219   REF   2  LAST  849   25,2224   15163 1                    NEAR1/4
 0220                       25,2225   65552 0          SL1       ACOS
 0221   REF   3  LAST  846   25,2226   03702 1  THETDONE STORE    THETAH       THETAH/360
A0222                                                              HI WORD, LO BIT =1.32 NM=360 60/16384

 0223                       25,2227   57414 1          BON       DCOMP
 0224   REF   3  LAST  849   25,2230   03707 1                    GONEBY       =1 IF HAVE GONE PAST TARGET.
A0225                                                              (SIGN MAY BECOME ERRATIC VERY NEAR
A0226                                                              TARGET DUE TO LOSS OF PRECISION.)
 0227                       25,2231   52232 0                    +1
 0228   REF   2  LAST  281   25,2232   17714 0          STODL     RTGON67      RANGE ERROR: NEG IF WILL FALL SHORT.

 0229   REF   5  LAST  848   25,2233   03640 0                    D
 0230                       25,2234   50025 0          DSU       BMN
```

```
0231   REF  1                25,2235   15241 1                    .05G
0232   REF  1                25,2236   52255 1                    NO.05G
0233                         25,2237   77214 0          SET       VLOAD
0234   REF  1                25,2240   03074 1                    .05GSW
0235   REF  8  LAST  836     25,2241   03433 0                    DELVREF
0236                         25,2242   50206 0          PUSH      DOT
0237   REF  5  LAST  818     25,2243   03542 1                    UXA/2
0238                         25,2244   63552 0          SL1       DSQ
0239                         25,2245   47515 0          PDVL      VSQ          EXCHANGE WITH PDL.
0240                         25,2246   56225 1          DSU       DDV
0241                         25,2247   00001 0                    0
0242                         25,2250   75400 1          BOV       SQRT
0243   REF  1                25,2251   52253 1                    NOLDCALC     OVFL LAST CLEARED IN EARROT2 ABOVE.
0244   REF  1                25,2252   03727 0          STORE     L/DCALC

0245                         25,2253   77650 1  NOLDCALC GOTO
0246   REF  7  LAST  848     25,2254   03373 0                    GOGENRET

0247                         25,2255   52014 0  NO.05G   CLEAR    GOTO         THIS WAY FOR DAP.(MAY INTERRUPT)
0248   REF  2  LAST  850     25,2256   03274 0                    .05GSW        .05GSW = 1020  83
0249   REF  2  LAST  850     25,2257   52253 1                    NOLDCALC     KEEP SINGLE EXIT FOR TARGETNG
```

```
P0250       SUBROUTINES CALLED BY SCALEPOP (TARGETING):

 0251                          26,3074                    BANK   26
 0252   REF   1                26,2000                    SETLOC REENTRY1
 0253                          26,3074                    BANK

 0254   REF   1                                           COUNT* $$/ENTRY

 0255                          26,3074   56345 0  GETETA   DLOAD  DDV          D = D +DT-RDOT/HS -2D/V)  DT/2
A0256                                                                         DT/2  =  2/2  = 1
 0257   REF   4  LAST  848    26,3075   03700 0            RDOT
 0258   REF   1                26,3076   15317 0            -HSCALED
 0259                          26,3077   41325 0  PDDL     DMP
 0260   REF   6  LAST  849    26,3100   03640 0            D
 0261   REF   1                26,3101   15321 0            -KSCALE
 0262                          26,3102   43271 1  DDV      DAD
 0263   REF   3  LAST  848    26,3103   03674 1            V
A0264                                                                         -RDOT/HS FROM PDL.
 0265                          26,3104   43205 1  DMP      DAD
 0266   REF   7  LAST  851    26,3105   03640 0            D
 0267   REF   8  LAST  851    26,3106   03640 0            D
 0268   REF   9  LAST  851    26,3107   03640 0  STORE    D

 0269                          26,3110   71214 0  BON      DLOAD        EGSW INDICATES FINAL PHASE.
 0270   REF   2  LAST   58     26,3111   03307 0            EGSW
 0271   REF   1                26,3112   55117 0            SUBETA
 0272   REF   4  LAST  849    26,3113   03702 1            THETAH
 0273                          26,3114   52005 0       DMP  GOTO
 0274   REF   1                26,3115   15235 1            KTETA        = 1000X2PI/(2)E14 163.84
 0275   REF   1                26,3116   52173 0            UPDATERT

 0276                          26,3117   45345 1  SUBETA   DLOAD  DSU          SWITCH FROM  INERTIAL TO RELATIVE VEL.
 0277   REF   4  LAST  851    26,3120   03674 1            V
 0278   REF   1                26,3121   15325 1            VMIN
 0279                          26,3122   43044 0       BPL  SET
 0280   REF   1                26,3123   55125 1            SUBETA2
 0281   REF   3  LAST  849    26,3124   03066 1            RELVELSW

 0282                          26,3125   41345 0  SUBETA2  DLOAD  DMP

 0283   REF   5  LAST  851    26,3126   03702 1            THETAH
 0284   REF   1                26,3127   15237 0            KT1          KT1 = KT
 0285                          26,3130   52071 0       DDV  GOTO
 0286   REF   5  LAST  851    26,3131   03674 1            V            KT = RE(2 PI)/2 VS 16384 163.84/ 2 VSAT
 0287   REF   2  LAST  851    26,3132   52173 0            UPDATERT

 0288                          26,3133   52145 0  SETMIND  DLOAD  GOTO
 0289   REF   2  LAST  643    26,3134   16326 1            1BITDP
 0290   REF   1                26,3135   52162 0            DSTORE
```

```
0291                          26,3136   51425 0  TINYTHET DSU    ABS             ENTER WITH X-.249
0292  REF   3  LAST  851       26,3137   16327 0                  1BITOP + 1      GET 1/4 - MPAC
0293                          26,3140   75461 0           SL     SQRT            SCALE UP BEFORE SQRT
0294                          26,3141   20216 0                  13D             HAS FACTOR FOR UP SCALING
0295                          26,3142   52005 0           DMP    GOTO
0296  REF   1                 26,3143   15247 1                  KACOS
0297  REF   1                 26,3144   52226 0                  THETDONE
```

```
P0298   * START   INITIAL ROLL  ...

 0299                          25,2260                    BANK   25
 0300   REF   2  LAST  844     25,2000                    SETLOC REENTRY
 0301                          25,2260                    BANK

 0302   REF   2 LAST  844 TO  851:   176   176*          COUNT* $$/ENTRY

A0303                                                                    MM = 63 , 64 ..
 0304                          25,2250   43014 0  INITROLL BON    BOFF   IF D- .05G NEG, GO TO LIMITL/D
 0305   REF   1                25,2261   03312 1                 INRLSW
 0306   REF   1                25,2262   52362 1                 INITRL1
 0307   REF   3  LAST  850     25,2263   03354 0                 .05GSW
 0308   REF   1                25,2264   53526 0                 LIMITL/D

A0309                                                                    MM = 64. NOW

A0310                                                                                3
A0311                                                                    KA = KA1 LEQ  + KA2
 0312                          25,2265   63545 0           DLOAD  DSQ
 0313   REF   3  LAST  848     25,2266   03654 0                  LEQ
 0314                          25,2267   56205 0           DMP    DDV
 0315   REF   4  LAST  853     25,2270   03654 0                  LEQ
 0316   REF   1                25,2271   15305 0                  1/KA1          = 25 /(64  1.81
 0317                          25,2272   47015 0           DAD    RTB
 0318   REF   1                25,2273   15307 1                  KA2            = .2
 0319   REF   1                25,2274   54433 1                  P64            ROLLC          V1             ROOT
A0320                                                                            XXX.XX DEG     XXXXX. FPS     XXXXX. FPS
 0321   REF   2  LAST  119     25,2275   03720 1           STORE  KAT

 03211                         25,2276   50025 0           DSU    BMN
 03212  REF   1                25,2277   15315 1                  KALIM
 03213                         25,2300   52304 1                  +4
 03214                         25,2301   77745 1           DLOAD
 03215  REF   2  LAST  853     25,2302   15315 1                  KALIM
 03216  REF   3  LAST  853     25,2303   03720 1           STORE  KAT
 0322                          25,2304   45345 1           DLOAD  DSU             IF V-VFINAL1 NEG, GO TO FINAL PHASE.
 0323   REF   6  LAST  851     25,2305   03674 1                  V
 0324   REF   1                25,2306   15303 0                  VFINAL1
 0325                          25,2307   51014 0           CLEAR  BPL             (CAN'T CLEAR INRLSW AFTER HERE:RESTARTS)
 0326   REF   1                25,2310   03265 0                  GONEPAST       GONEPAST WAS INITIALLY SET=1 TO FORCE
A0327                                                                            ROLLC TO REMAIN AS DEFINED BY HEADSUP
A0328                                                                            UNTIL START OF P64. (UNTIL D > .05G)
 0329   REF   1                25,2311   52316 1                  DOEQ
 0330                          25,2312   52131 0           SSP    GOTO
 0331   REF   7  LAST  847     25,2313   03646 0                  GOTOADDR
 0332   REF   1                25,2314   53317 1                  KEP2           AND IDLE UNTIL D>0.2 G.  (NO P66 HERE)
 0333   REF   1                25,2315   52351 1                  INROLOUT       GO TO LIMITL/D AFTER SETTING INRLSW.

 0334                          25,2316   41345 0  DOEQ     DLOAD  DMP             DO = KA3 LEQ + KA4
```

```
 0335   REF   5  LAST  853   25,2317   03654 0                LEQ
 0336   REF   1              25,2320   15311 0                KA3
 0337                        25,2321   77615 0          DAD
 0338   REF   1              25,2322   15313 1                KA4
 0339   REF   2  LAST  119   25,2323   03710 1          STORE DO          DO/805
 0340                        25,2324   40065 0          BDDV  BDV
 0341   REF   1              25,2325   15267 0                C001       (-4/25 G)  B-8
 0342                        25,2326   52327 0                +1         CLEAR DVFIND, IF ON.
 0343   REF   2  LAST  119   25,2327   17706 0          STODL C/DO       (-4/DO)  B-8
 0344   REF   6  LAST  845   25,2330   03624 1                LAD        IF V-VFINAL +K(RDOT/V)CUBED POS,L/D=-LAD
 0345   REF   3  LAST  845   25,2331   17634 0          STODL L/D
 0346   REF   5  LAST  851   25,2332   03700 0                RDOT
 0347                        25,2333   41471 0          DDV   PUSH
 0348   REF   7  LAST  853   25,2334   03674 1                V
 0349                        25,2335   41316 0          DSQ   DMP
 0350                        25,2336   45271 1          DDV   DSU
 0351   REF   1              25,2337   15277 1                1/K44
 0352   REF   1              25,2340   15301 1                VFINAL
A0353
A0354                                                                3
                                                          V-VFINAL +(RDOT/V)  / K44   OVFL $

 0355                        25,2341   40015 1          DAD   BDV
 0356   REF   8  LAST  854   25,2342   03674 1                V
 0357   REF   2  LAST  853   25,2343   52351 1                INROLOUT   GO TO LIMITL/D AFTER SETTING INRLSW.
 0358                        25,2344   71240 1          BMN   DLOAD
 0359   REF   3  LAST  854   25,2345   52351 1                INROLOUT   GO TO LIMITL/D AFTER SETTING INRLSW.
 0360   REF   7  LAST  854   25,2346   03624 1                LAD
 0361                        25,2347   77676 0          DCOMP
 0362   REF   4  LAST  854   25,2350   03634 0          STORE L/D

A0363                                                                SET INRLSW AT END FOR RESTART PROTECTION
 0364                        25,2351   77614 1 INROLOUT BOFSET       END OF PRE .05G PATH OF INITROLL.
 0365   REF   2  LAST  853   25,2352   03052 0                INRLSW     SWITCH IS ZERO INITIALLY.
 0366   REF   2  LAST  853   25,2353   53526 0                LIMITL/D   (GO TO)

 0367                        25,2354   45345 1 KATEST   DLOAD DSU        IF KAT - D POS, GO TO CONSTD
 0368   REF   4  LAST  853   25,2355   03720 1                KAT
 0369   REF  10  LAST  851   25,2356   03640 0                D          IF POS, OUT WITH COMMAND VIA LIMITL/D
 0370                        25,2357   52044 0          BPL   GOTO
 0371   REF   3  LAST  854   25,2360   53526 0                LIMITL/D
 0372   REF   1              25,2361   53232 1                CONSTD

 0373                        25,2362   43345 1 INITRL1  DLOAD DAD        IF RDOT + VRCONT POS, GO TO HUNTEST
 0374   REF   6  LAST  854   25,2363   03700 0                RDOT
 0375   REF   1              25,2364   15261 0                VRCONT
 0376                        25,2365   45040 1          BMN   CALL       IF POSITIVE, FALL INTO HUNTEST.
 0377   REF   1              25,2366   52354 1                KATEST

 03771  REF   1              25,2367   53022 1                FOREHUNT   INITIALIZE HUNTEST.
```

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P0378   * START   HUNT TEST   ..

A0379                                                                   MM = 64
 0380                          25,2370   77731 1          SSP            INITIALIZE HUNTEST ON FIRST PASS
 0381   REF   8  LAST  853     25,2371   03646 0                  GOTOADDR
 0382   REF   1                25,2372   52373 1                  HUNTEST       MUST GO AFTER FOREHUNT FOR RESTARTS.

 0389                          25,2373   77745 1  HUNTEST DLOAD
 0390   REF  11  LAST  854     25,2374   03640 0                  D
 0391   REF   2  LAST  119     25,2375   17664 0          STODL   A1            A1/805  = A1/ 25G

 0392   REF   8  LAST  854     25,2376   03624 1                  LAD
 0393   REF   2  LAST  118     25,2377   17647 1          STODL   TEM1B
 0394   REF   7  LAST  854     25,2400   03700 0                  RDOT
 0395                          25,2401   71240 1          BMN     DLOAD         IF RDOT NEG,TEM1B=LAD, OTHERWISE = LEWD
 0396   REF   1                25,2402   52406 1                  AOCALC
 0397   REF   1                25,2403   03725 1                  LEWD
 0398   REF   3  LAST  855     25,2404   17647 1          STODL   TEM1B

 0399   REF   8  LAST  855     25,2405   03700 0                  RDOT
 0400                          25,2406   43271 1  AOCALC  DDV     DAD           V1 = V + RDOT/TEM1B
 0401   REF   4  LAST  855     25,2407   03647 1                  TEM1B
 0402   REF   9  LAST  854     25,2410   03674 1                  V
 0403   REF   2  LAST   72     25,2411   14326 0          STODL   V1            V1/2 VS

 0404   REF   9  LAST  855     25,2412   03700 0                  RDOT
 0405                          25,2413   56316 0          DSQ     DDV           AO=(V1/V)SQ(D+RDOT SQ/(TEM1B 2 C1 HS)
 0406   REF   5  LAST  855     25,2414   03647 1                  TEM1B
 0407                          25,2415   43271 1          DDV     DAD
 0408   REF   1                25,2416   15273 0                  2C1HS
 0409   REF  12  LAST  855     25,2417   03640 0                  D
 0410                          25,2420   41205 0          DMP     DMP
 0411   REF   3  LAST  855     25,2421   00326 0                  V1
 0412   REF   4  LAST  855     25,2422   00326 0                  V1
 0413                          25,2423   77671 1          DDV
 0414   REF   3  LAST  848     25,2424   03622 1                  VSQUARE
 0415   REF   1                25,2425   14330 1          STODL   AO            AO/805  = AO/ 25G

 0416   REF  10  LAST  855     25,2426   03700 0                  RDOT
 0417                          25,2427   71244 0          BPL     DLOAD
 0418   REF   1                25,2430   52433 1                  V1LEAD
 0419   REF   2  LAST  855     25,2431   00330 1                  AO
 0420   REF   3  LAST  855     25,2432   03664 0          STORE   A1            A1/25G

12
11
10
 9
 8
 7
 6
 5
 4
 3
 2
 04202                        25,2433   51145 0  V1LEAD  DLOAD   BPL           IF L/D NEG, V1=V1 - 1000
 04203  REF   5  LAST  854     25,2434   03634 0                  L/D
 04204  REF   1                25,2435   52442 1                  HUNTEST1

 04205                        25,2436   45345 1          DLOAD   DSU
 04206  REF   5  LAST  855     25,2437   00326 0                  V1
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04207  REF  1                  25,2440  15215 0                VQUIT
04208  REF  6  LAST  855       25,2441  00326 0          STORE V1

0421                           25,2442  41345 0 HUNTEST1 DLOAD DMP          ALP = 2 C1 HS AO/LEWD V1 V1
0422   REF  3  LAST  855       25,2443  00330 1                AO
0423   REF  2  LAST  855       25,2444  15273 0                2C1HS
0424                           25,2445  40271 1          DDV   SETPD
0425   REF  7  LAST  856       25,2446  00326 0                V1
0426                           25,2447  00001 0                0
0427                           25,2450  56271 0          DDV   DDV
0428   REF  8  LAST  856       25,2451  00326 0                V1
0429   REF  2  LAST  855       25,2452  03725 1                LEWD
0430   REF  2  LAST  119       25,2453  03704 1          STORE ALP

0431                           25,2454  55221 0          BDSU  BDDV         FACT1 = V1 / (1 - ALP)
0432   REF  1                  25,2455  17372 1                BARELY1
0433   REF  9  LAST  856       25,2456  00326 0                V1
0434   REF  2  LAST  118       25,2457  17616 0          STODL FACT1        FACT1 / 2VS

0435   REF  3  LAST  856       25,2460  03704 1                ALP
0436                           25,2461  41225 1          DSU   DMP          FACT2 = ALP(ALP - 1) / AO
0437   REF  2  LAST  856       25,2462  17372 1                BARELY1
0438   REF  4  LAST  856       25,2463  03704 1                ALP
0439                           25,2464  77671 1          DDV
0440   REF  4  LAST  856       25,2465  00330 1                AO
0441   REF  2  LAST  118       25,2466  03620 0          STORE FACT2        FACT2  (25G)

0442                           25,2467  43205 1          DMP   DAD
0443   REF  3  LAST  345       25,2470  03175 1                Q7           Q7 /805 = Q7 / 25G
0444   REF  5  LAST  856       25,2471  03704 1                ALP          VL=FACT1 (1-SQRT(Q7 FACT2 +ALP)  )
0445                           25,2472  44366 1          SQRT  BOSU
0446   REF  3  LAST  856       25,2473  17372 1                BARELY1
0447                           25,2474  77605 1          DMP
0448   REF  3  LAST  856       25,2475  03616 0                FACT1
0449   REF  2  LAST  281       25,2476  03767 1          STORE VL           VL / 2 VS

0450                           25,2477  41221 0          BDSU  DMP          GAMMAL1 = LEWD (V1-VL)/VL
0451   REF 10  LAST  856       25,2500  00326 0                V1
0452   REF  3  LAST  856       25,2501  03725 1                LEWD
0453                           25,2502  77671 1          DDV
0454   REF  3  LAST  856       25,2503  03767 1                VL
0455   REF  1                  25,2504  14027 1          STODL GAMMAL1      GAMMAL1 USED IN UPCONTROL

A0456                                                           GAMMAL1 = PDL 22D.
0457   REF  4  LAST  856       25,2505  03767 1                VL
0458                           25,2506  50025 0          DSU   BMN          IF VL-VLMIN NEG, GO TO PREFINAL
0459   REF  1                  25,2507  15205 1                VLMIN
0460   REF  1                  25,2510  53333 1                PREFINAL

0461                           25,2511  63545 0          DLOAD DSQ
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0462   REF  5  LAST  856   25,2512   03767 1                    VL
0463   REF  2  LAST  119   25,2513   17666 1          STODL     VBARS          VBARS / 4 VS VS

0464   REF  1             25,2514   15333 0                    HALVE          IF VSAT-VL  NEG,  GO TO CONSTD
0465                      25,2515   50025 0          DSU       BMN
0466   REF  6  LAST  857   25,2516   03767 1                    VL
0467   REF  1             25,2517   53226 1                    BECONSTD       SET MODE=HUNTEST, CONTINUE IN CONSTD
0468   REF  2  LAST  119   25,2520   17662 0          STODL     DVL            DVL / 2VS

0469   REF  2  LAST  857   25,2521   15333 0                    HALVE
0470   REF  2  LAST  119   25,2522   03672 1          STORE     VS1            VS1 = VSAT

0471                      25,2523   50025 0          DSU       BMN            IF V1 GREATER THAN VSAT , GO ON
0472   REF 11  LAST  856   25,2524   00326 0                    V1
0473   REF  1             25,2525   52533 0                    GETDHOOK
0474                      25,2526   77621 1          BDSU
0475   REF  3  LAST  857   25,2527   03662 0                    DVL
0476   REF  4  LAST  857   25,2530   17662 0          STODL     DVL            DVL = DVL - (VSAT-V1) = V1 - VL
0477   REF 12  LAST  857   25,2531   00326 0                    V1
0478   REF  3  LAST  857   25,2532   03672 1          STORE     VS1            VS1 = V1,  IN THIS CASE

0479                      25,2533   45145 0 GETDHOOK DLOAD     CALL           DHOOK=((1-VS1/FACT1) SQ -ALP)/FACT2
0480   REF  4  LAST  857   25,2534   03672 1                    VS1            VS1 /2 VS
0481   REF  1             25,2535   53004 0                    DHOOKYQ7       GO CALC DHOOK
0482   REF  2  LAST  118   25,2536   03656 1          STORE     DHOOK          DHOOK /256

0483                      25,2537   56261 1          SR        DDV
0484                      25,2540   20607 1                    6              CHOOK
0485   REF  4  LAST  856   25,2541   03175 1                    Q7
0486                      25,2542   77625 0          DSU
0487   REF  1             25,2543   15251 0                    CHOOK          = .25/16 = (-6)
0488   REF  2  LAST  119   25,2544   03660 1          STORE     AHOOKDV

0489                      25,2545   41215 1          DAD       DMP            GAMMAL= GAMMAL1-CH1 DVL SQ(1+AHOOK DVL)
0490   REF  1             25,2546   17366 1                    1/16TH
0491   REF  1             25,2547   15255 1                    CH1
0492                      25,2550   41205 0          DMP       DMP
0493   REF  5  LAST  857   25,2551   03662 0                    DVL
0494   REF  6  LAST  857   25,2552   03662 0                    DVL
0495                      25,2553   56271 0          DDV       DDV
0496   REF  3  LAST  857   25,2554   03656 1                    DHOOK
0497   REF  3  LAST  857   25,2555   03666 1                    VBARS
0498                      25,2556   50021 1          BDSU      BMN
0499   REF  2  LAST  856   25,2557   00027 1                    GAMMAL1
0500   REF  1             25,2560   52751 0                    NEGAMA
0501   REF  1             25,2561   03771 0 HUNTEST3 STORE     GAMMAL

0502                      25,2562   77625 0          DSU                      GAMMAL1=GAMMAL1 +.019 (GAMMAL-GAMMAL1)
0503   REF  3  LAST  857   25,2563   00027 1                    GAMMAL1
0504                      25,2564   43205 1          DMP       DAD
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0505    REF   1                25,2565   15333 0                 Q19
0506    REF   4  LAST  857      25,2566   00027 1                 GAMMAL1
0507    REF   5  LAST  858      25,2567   14027 1          STODL  GAMMAL1
0508    REF   2  LAST  857      25,2570   03771 0                 GAMMAL
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P0509    *START    RANGE PREDICTION  ...

A0510                                                                  C(MPAC) = GAMMAL
 0511                          25,2571   60516 0  RANGER   DSQ    SR2   COSG = 1-GAMMAL SQ/2, TRUNCATED SERIES
 0512                          25,2572   77621 1           BDSU
 0513   REF   3  LAST  857     25,2573   15333 0                 HALVE
 0514   REF   2  LAST  119     25,2574   17670 0           STODL COSG/2
 0515   REF   4  LAST  857     25,2575   03666 1                 VBARS  E=SQRT(1+VBARS........

 0516                          25,2576   41225 1           DSU    DMP
 0517   REF   4  LAST  859     25,2577   15333 0                 HALVE
 0518   REF   5  LAST  859     25,2600   03666 1                 VBARS
 0519                          25,2601   41205 0           DMP    DMP
 0520   REF   3  LAST  859     25,2602   03670 0                 COSG/2
 0521   REF   4  LAST  859     25,2603   03670 0                 COSG/2
 0522                          25,2604   43312 0           SL2    DAD
 0523   REF   1                25,2605   17366 1                 C1/16  C1/16 = 1/16
 0524                          25,2606   65366 1           SQRT   PDDL   E/4 INTO PDL

 0525   REF   6  LAST  859     25,2607   03666 1                 VBARS
 0526                          25,2610   41205 0           DMP    DMP    ASKEP/2 = ARCSIN(VBARS COSG SING/E)
 0527   REF   5  LAST  859     25,2611   03670 0                 COSG/2
 0528   REF   3  LAST  858     25,2612   03771 0                 GAMMAL
 0529                          25,2613   67471 1           DDV    ASIN
 0530                          25,2614   41552 0           SL1    PUSH   ASKEP TO PDL 0.
 0531   REF   1                25,2615   17731 1           STODL  ASKEP  BALLISTIC RANGE      ASKEP/2PI

A0532                                                                  FOR TM, STORE RANGE COMPONENTS OVERLAPPING (SP)
 0533   REF   7  LAST  857     25,2616   03767 1                 VL
 0534                          25,2617   43205 1           DMP    DAD    ASP1 = Q2 + Q3 VL
 0535   REF   1                25,2620   15171 1                 Q3
 0536   REF   3  LAST  845     25,2621   03712 0                 Q2
 0537   REF   1                25,2622   03732 1           STORE  ASP1   FINAL PHASE RANGE   ASP1/2 PI

 0538                          25,2623   63525 0           PDDL   DSQ    ASP1 TO PDL 2.
 0539   REF  13  LAST  857     25,2624   00326 0                 V1
A0540                                                                                    2
A0541                                                                  ASPUP= -C12 LOG(V1 07/VBARS A0)/GAMMAL1
 0542                          25,2625   56205 0           DMP    DDV
 0543   REF   5  LAST  857     25,2626   03175 1                 Q7
 0544   REF   7  LAST  859     25,2627   03666 1                 VBARS
 0545                          25,2630   45071 0           DDV    CALL
 0546   REF   5  LAST  856     25,2631   00330 1                 A0
 0547   REF   1                25,2632   46155 1                 LOG    RETURN WITH -LOG IN MPAC

 0548                          25,2633   56205 0           DMP    DDV
 0549   REF   1                25,2634   15207 0                 C12
 0550   REF   6  LAST  858     25,2635   00027 1                 GAMMAL1
 0551   REF   1                25,2636   03733 0           STORE  ASPUP  UP PHASE RANGE      ASPUP / 2 PI
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 0552                          25,2637   41325 0          PDDL   DMP          ASPUP TO PDL 4.
 0553   REF   1                25,2640   15257 0                 KC3          KC3 =-4 VS VS/ 2 PI 805 RE
A0554                                                                         ASPDWN = KC3 RDOT V / A0
 0555   REF  11 LAST  855      25,2641   03700 0                 RDOT
 0556                          25,2642   56205 0          DMP    DDV
 0557   REF  10 LAST  855      25,2643   03674 1                 V
 0558   REF   6 LAST  859      25,2644   00330 1                 A0
 0559                          25,2645   41471 0          DDV    PUSH         ASPDWN TO PDL 6.
 0560   REF   9 LAST  855      25,2646   03624 1                 LAD
 0561   REF   1                25,2647   17734 1          STODL  ASPDWN       RANGE TO PULL OUT        ASPDWN /2 PI

 0562   REF   1                25,2650   15175 0                 Q6
 0563                          25,2651   41225 1          DSU    DMP          ASP3 = Q5(Q6-GAMMAL)
 0564   REF   4 LAST  859      25,2652   03771 0                 GAMMAL
 0565   REF   1                25,2653   15173 0                 Q5
 0566   REF   1                25,2654   27735 0          STOVL  ASP3         GAMMA CORRECTION         ASP3/2PI

 0567   REF   2 LAST  859      25,2655   03731 1                 ASKEP        GET HI-WD AND
 0568   REF   1                25,2656   17126 1          STODL  ASPS(TM)     SAVE HI-WORD OF ASP'S FOR TM.

 0569   REF   2 LAST  860      25,2657   03735 0                 ASP3
 0570                          25,2660   43215 0          DAD    DAD
A0571                                                                         ASPDWN FROM PDL 6.
A0572                                                                         ASPUP FROM PDL 4.
 0573                          25,2661   43215 0          DAD    DAD
A0574                                                                         ASP1 FROM PDL 2.
A0575                                                                         ASKEP FROM PDL 0.
 0576                          25,2662   41025 0          DSU    BDV8         CLEAR OVFIND.
 0577   REF   6 LAST  851      25,2663   03702 1                 THETAH
 0578   REF   3 LAST  804      25,2664   57352 1                 TCDANZIG
 0579   REF   2 LAST  118      25,2665   03610 0          STORE  DIFF         DIFF = (ASP-THETAH) /2 PI
A0580                                                                         ASP=ASKEP+ASP1+ASPUP+ASP3+ASPDWN = TOTAL RANGE

 0581                          25,2666   45246 0          ABS    DSU          IF ABS(THETAH-ASP) -25NM NEG, GO TO UPSY
 0582   REF   1                25,2667   15223 0                 25NM
 0583                          25,2670   43040 1          BMN    BON
 0584   REF   1                25,2671   53033 1                 GOTOUPSY
 0585   REF   1                25,2672   03311 1                 HIND
 0586   REF   1                25,2673   52677 0                 GETDLEWD

 0587                          25,2674   51145 0          DLOAD  BPL
 0588   REF   3 LAST  860      25,2675   03610 0                 DIFF
 0589   REF   1                25,2676   53221 0                 DCONSTD      EVENTUALLY SETS MODE = HUNTEST.
 0590                          25,2677   41345 0 GETDLEWD DLOAD  DMP
A0591                                                                         DLEWD = DLEWD (DIFF/(DIFFOLD-DIFF))
 0592   REF   2 LAST  118      25,2700   03642 1                 DLEWD
 0593   REF   4 LAST  860      25,2701   03610 0                 DIFF
 0594                          25,2702   45325 1          PDDL   DSU
 0595   REF   2 LAST  118      25,2703   03612 1                 DIFFOLD
 0596   REF   5 LAST  860      25,2704   03610 0                 DIFF
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 0597                                25,2705   77665 1           BDDV
 05971                               25,2706   77626 0 LWDSTORE  STADR
 0598   REF   3  LAST  860           25,2707   74135 0           STORE  DLEWD
 0599                                25,2710   50015 0           DAD    BMN        IF LEWD+DLEWD NEG,DLEWD=-LEWD/2
 0600   REF   4  LAST  856           25,2711   03725 1                  LEWD
 06002  REF   1                     25,2712   52745 0                  LEWDPTR
 06004                               25,2713   77600 1           BDV
 0601   REF   1                     25,2714   52741 1                  LEWDOVFL
 0602   REF   5  LAST  861           25,2715   03725 1           STORE  LEWD

 0603                                25,2716   77776 1 SIDETRAK  EXIT

 0604   REF   2  LAST  804           25,2717  3 5060 1           CA     EBENTRY
 0605   REF  35  LAST  804           25,2720  54 003 0           TS     EBANK

 06051  REF  10  LAST  388           25,2721  3 5070 0           CA     PRIO16     DROP GRP 5 RESTART PRIO TO 1 LESS THAN
 06052  REF   1                     25,2722  55'064 0           TS     PHSPRDT5   GRP 4.

 0606   REF  88  LAST  847           25,2723  0 5412 0           TC     PHASCHNG
 0607                                25,2724   00474 0           OCT    00474      RESTART GRP 4 AT PRE-HUNT.
A06071                                                                           FORCE RESTART TO PICK UP IN GRP 4:
A06072                                                                           USE PRIO 17 FOR GRP 4( < SERVICER PRIO)
 0608   REF  11  LAST  861           25,2725  3 5070 0           CA     PRIO16     CONTINUE GRP 5 AT LOWER PRIO THAN EITHER
A06081                                                                           GRP 4 OR SERVICER.
 0609   REF   9  LAST  692           25,2726  0 5210 1           TC     PRIOCHNG

 0610   REF   1                     25,2727  3 3032 0           CAF    ADENDEXT   SIDETRACK NEXT PASS UNTIL THIS ONE DONE.
 0611   REF   9  LAST  855           25,2730  55'645 0           TS     GOTOADDR   ONLY AFTER RESTART IS LEFT AFTER DETOUR.

 0612   REF 211  LAST  847           25,2731  0 6006 1           TC     INTPRET

 0613                                25,2732   43145 0           DLOAD  SET
 0614   REF   6  LAST  860           25,2733   03610 0                  DIFF
 0615   REF   2  LAST  860           25,2734   03071 1                  HIND
 0616   REF   3  LAST  860           25,2735   17612 1           STODL  DIFFOLD    DIFFOLD / 2 PI

 0617   REF   2  LAST  845           25,2736   15177 1                  Q7F
 0621   REF   6  LAST  859           25,2737   37175 0           STCALL Q7         Q7 / 805 FPSS
 0622   REF   2  LAST  855           25,2740   52373 1                  HUNTEST    (GO TO )

 0623                                25,2741   77745 1 LEWDOVFL  DLOAD
 0624   REF   2  LAST  845           25,2742   17372 1                  NEARONE
 0625   REF   6  LAST  861           25,2743   37725 0           STCALL LEWD
 0626   REF   2  LAST  860           25,2744   53221 0                  DCONSTD    (GO TO)  ALSO WILL SET MODE = HUNTEST

 06262                               25,2745   70545 1 LEWDPTR   DLOAD  SR1
 06264  REF   7  LAST  861           25,2746   03725 1                  LEWD
 06266                               25,2747   52076 1           DCOMP  GOTO
 06268  REF   1                     25,2750   52706 1                  LWDSTORE
```

R0627 NEGAMA IS PART OF HUNTEST ...

```
 0628                                25,2751   41205 0  NEGAMA   DMP     DMP          ENTER WITH GAMMAL IN MPAC
 0629   REF   8  LAST  859           25,2752   03767 1           VL
 0630   REF   1                     25,2753   15147 1           1/3RD
 0631                                25,2754   41325 0           PDDL    DMP          PUSH GAMMAL VL/3
 0632   REF   8  LAST  861           25,2755   03725 1           LEWD
 0633   REF   2  LAST  862           25,2756   15147 1           1/3RD
 0634                                25,2757   43325 1           PDDL    DAD          PUSH LEWD/3
 0635   REF   3  LAST  857           25,2760   03660 1           AHOOKDV
 0636   REF   1                     25,2761   15253 1           1/24TH
 0637                                25,2762   41205 0           DMP     DMP          DEL VL =(GAMMAL VL/3)/(LEWD/3-DVL
 0638   REF   7  LAST  857           25,2763   03662 0           DVL                  (2/3 + AHOOKDV)(CH1 GS/DHOOK VL))
 0639   REF   2  LAST  857           25,2764   15255 1           CH1
 0640                                25,2765   56271 0           DDV     DDV
 0641   REF   4  LAST  857           25,2766   03656 1           DHOOK
 0642   REF   9  LAST  862           25,2767   03767 1           VL
 0643                                25,2770   55221 0           BDSU    BDDV
A0644                                                                               LEWD/3
A0645                                                                               GAMMAL VL /3
 0646                                25,2771   77615 0           DAD
 0647   REF  10  LAST  862           25,2772   03767 1           VL
 0648   REF  11  LAST  862           25,2773   37767 0           STCALL  VL           VL/2 VS
 0649   REF   2  LAST  857           25,2774   53004 0           DHOOKYQ7             GO CALC Q7
A0650                                                                               Q7=((1-VL/FACT1)SQ - ALP)/FACT2
 0651   REF   7  LAST  861           25,2775   17175 1           STODL   Q7           Q7 / 256

 0652   REF  12  LAST  862           25,2776   03767 1           VL
 0653                                25,2777   77716 1           DSQ
 0654   REF   8  LAST  859           25,3000   17666 1           STODL   VBARS       VBARS / 4 VS VS

 0655   REF   3  LAST  849           25,3001   15335 0           3ZEROS
 0656                                25,3002   77650 1           GOTO                 SET GAMMAL = 0
 0657   REF   1                     25,3003   52561 1           HUNTEST3

 0658                                25,3004   56342 1  DHOOKYQ7 SR1     DDV        SUBROUTINE TO CALC DHOOK OR Q7)
 0659   REF   4  LAST  856           25,3005   03616 0           FACT1
 0660                                25,3006   72421 0           BDSU    SL1
 0661   REF   5  LAST  859           25,3007   15333 0           HALVE
 0662                                25,3010   45316 1           DSQ     DSU
 0663   REF   6  LAST  856           25,3011   03704 1           ALP
 0664                                25,3012   43471 1           DDV     RVQ
 0665   REF   3  LAST  856           25,3013   03620 0           FACT2
```

P06651

```
A0666                                                   COME TO PRE-HUNT WHEN RESTART OCCURS AFTER
A0667                                                   HUNTEST IS SIDE-TRACKED AT SIDETRAK.
A0668                                                   PICK UP IN GROUP 4.

 0669   REF 212  LAST  861   25,3014  0 6006 1  PRE-HUNT TC      INTPRET
 0670                        25,3015   45014 0           CLEAR   CALL
 0671   REF   3  LAST  861   25,3016   03271 0                   HIND            HIND      99D  BIT 6  FLAG 6
 0672   REF   2  LAST  854   25,3017   53022 1                   FOREHUNT        RE-INITIALIZE HUNTEST AFTER RE-START.
 0673                        25,3020   77650 1           GOTO
 0675   REF   3  LAST  861   25,3021   52373 1                   HUNTEST


 0675                        25,3022   77745 1  FOREHUNT DLOAD                   INITIALIZE HUNTEST.
 0677   REF   4  LAST  862   25,3023   15335 0                   3ZEROS
 0678   REF   4  LAST  861   25,3024   17612 1           STODL   DIFFOLD
 0679   REF   1               25,3025   15157 0                   OLEWDO
 0680   REF   4  LAST  861   25,3026   17642 1           STODL   OLEWD
 0681   REF   1               25,3027   15151 0                   LEWDI
 0682   REF   9  LAST  862   25,3030   03725 1           STORE   LEWD
 0683                        25,3031   77616 0           RVQ

A0684
 0685   REF   2  LAST  794   25,3032   53576 0  ADENDEXT CADR    ENDEXIT
```

```
P0686   * START  UP CONTROL  ...

A0687                                                                   MM = 65
 0688                          25,3033   77634 0  GOTOUPSY RTB          END OF HUNTEST
 0689   REF   1                25,3034   54441 1                 P65    HUNTEST USE OF GRP4 IS DISABLED BY P65
A0690                                                                   USE FOR DISPLAY.
A0691                                                                   SET MODE = UPCONTRL.
A0692                                                                   RETURN FROM P65 DIRECTLY TO UPCONTRL
A0693                                                                   VIA THE GOTOADDR AT REFAZE10.

 0694                          25,3035   45345 1  UPCONTRL DLOAD  DSU    IF D-140 POS. NOSWITCH =1
 06941  REF  13  LAST  855     25,3036   03640 0                  D      (SUPPRESS LATERAL SWITCH)
 06942  REF   1                25,3037   15221 1                  C21
 06943                         25,3040   43040 1           BMN    SET
 06944                         25,3041   53043 0                  +2
 06945  REF   1                25,3042   03070 0                  NOSWITCH

 06946                         25,3043   45345 1           DLOAD  DSU    IF  V-V1  POS, GO TO DOWN CONTROL.
 0695   REF  11  LAST  860     25,3044   03674 1                  V
 0696   REF  14  LAST  859     25,3045   00326 0                  V1
 0697                          25,3046   71244 0           BPL    DLOAD
 0698   REF   1                25,3047   53260 0                  DOWNCNTL
 0699   REF  14  LAST  864     25,3050   03640 0                  D
 0700                          25,3051   30025 0           DSU    BMN    IF D- Q7 NEG, GO TO KEP
 0701   REF   8  LAST  862     25,3052   03175 1                  Q7
 0702   REF   1                25,3053   53313 0                  KEP
 0703                          25,3054   51145 0           DLOAD  BPL    IF ROOT NEG, DO VLTEST
 0704   REF  12  LAST  860     25,3055   03700 0                  ROOT
 0705   REF   1                25,3056   53065 1                  CONT1

 0706                          25,3057   45345 1  VLTEST   DLOAD  DSU    IF V-VL-C18 NEG,EGSW=1,MODE=PREDICT3
 0707   REF  12  LAST  864     25,3060   03674 1                  V
 0708   REF  13  LAST  862     25,3061   03767 1                  VL
 0709                          25,3062   50025 0           DSU    BMN
 0710   REF   1                25,3063   15165 1                  C18
 0711   REF   2  LAST  856     25,3064   53333 1                  PREFINAL

 0712                          25,3065   77745 1  CONT1    DLOAD         IF D-A0 POS, L/D = LAD, GO TO LIMITL/D
 0713   REF  15  LAST  864     25,3066   03640 0                  D
 0714                          25,3067   50025 0           DSU    BMN
 0715   REF   7  LAST  860     25,3070   00330 1                  A0
 0716   REF   1                25,3071   53075 0                  CONT3
 0717                          25,3072   52145 0           DLOAD  GOTO
 0718   REF  10  LAST  860     25,3073   03624 1                  LAD
 0719   REF   1                25,3074   53525 0                  STOREL/D
A0720

 0721                          25,3075   41345 0  CONT3    DLOAD  DMP    VREF=FACT1(1-SQRT(FACT2 D + ALP))
 0722   REF  16  LAST  864     25,3076   03640 0                  D
 0723   REF   4  LAST  862     25,3077   03620 0                  FACT2
```

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0724                            25,3100  75415 0          DAD     SQRT
0725   REF   7  LAST  862       25,3101  03704 1                  ALP
0726                            25,3102  41221 0          BDSU    DMP
0727   REF   4  LAST  856       25,3103  17372 1                  BARELY1
0728   REF   5  LAST  862       25,3104  03616 0                  FACT1
0729   REF   1                  25,3105  01160 1          STORE   VREF          VREF / 2VS

0730                            25,3106  41221 0          BDSU    DMP           RDOTREF = LEWD(V1-VREF)
0731   REF  15  LAST  864       25,3107  00326 0                  V1
0732   REF  10  LAST  863       25,3110  03725 1                  LEWD
0733   REF   2  LAST   79       25,3111  15156 1          STODL   RDOTREF       RDOTREF / 2VS

0734   REF   5  LAST  857       25,3112  03672 1                  VS1
0735                            25,3113  50025 0          DSU     BMN           IF VSAT-VREF NEG, GO TO CONTINU2
0736   REF   2  LAST  865       25,3114  01160 1                  VREF
0737   REF   1                  25,3115  53134 1                  CONTINU2

0738                            25,3116  41406 0          PUSH    PUSH          VS1-VREF  TO PDL TWICE
0739                            25,3117  56205 0          DMP     DDV           RDHOOK=CH1(1+DV AHOOKDV/DVL) DV DV
0740   REF   4  LAST  862       25,3120  03660 1                  AHOOKDV           /DHOOK VREF
0741   REF   8  LAST  862       25,3121  03662 0                  DVL           WHERE  DV = (VS1-VREF)
0742                            25,3122  41215 1          DAD     DMP
0743   REF   2  LAST  857       25,3123  17366 1                  1/16TH
0744   REF   3  LAST  862       25,3124  15255 1                  CH1
0745                            25,3125  41205 0          DMP     DMP
A0746                                                             VS1-VREF  FROM PDL TWICE.
0747                            25,3126  77671 1          DDV
0748   REF   5  LAST  862       25,3127  03656 1                  DHOOK
0749                            25,3130  44271 0          DDV     BDSU
0750   REF   3  LAST  865       25,3131  01160 1                  VREF
0751   REF   3  LAST  865       25,3132  01156 1                  RDOTREF       C(RDOTREF)= LEWD (V1-VREF)
0752   REF   4  LAST  865       25,3133  01156 1          STORE   RDOTREF       RDOTREF = RDOTREF - RDHOOK

0753                            25,3134  45345 1 CONTINU2 DLOAD   DSU
0754   REF  17  LAST  864       25,3135  03640 0                  D
0755   REF   1                  25,3136  15313 1                  Q7MIN
0756                            25,3137  50004 0          BOVB    BMN
0757   REF   4  LAST  860       25,3140  57352 1                  TCDANZIG      CLEAR OVFL IND, IF ON.
0758   REF   1                  25,3141  53152 1                  UPCNTRL3
0759                            25,3142  45345 1          DLOAD   DSU
0760   REF   4  LAST  855       25,3143  03664 0                  A1
0761   REF   9  LAST  864       25,3144  03175 1                  Q7
0762                            25,3145  45325 1          PDDL    DSU
0763   REF  18  LAST  865       25,3146  03640 0                  D
0764   REF  10  LAST  865       25,3147  03175 1                  Q7
0765                            25,3150  45471 1          DDV     STADR
0766   REF   3  LAST  845       25,3151  74163 0          STORE   FACTOR        FACTOR / 256
```

P0767 SKIPPER

A0768 DELTA L/D=-((RDOT-RDOTREF)F1 KB1+V-VREF)F1 KB2
A0769 WHERE F1 = FACTOR

```
 0770                          25,3152  77745 1  UPCNTRL3 DLOAD
 0771  REF  13  LAST  864     25,3153  03700 0                   RDOT
 0772                          25,3154  41225 1           DSU     DMP          L/D = LEWD
 0773  REF   5  LAST  865     25,3155  01156 1                   RDOTREF      -((RDOT-RDOTREF)F1/KB1+V-VREF)F1/KB2
 0774  REF   4  LAST  865     25,3156  03614 1                   FACTOR
 0775                          25,3157  43271 1           DDV     DAD
 0776  REF   1                25,3160  15211 1                   1/KB1
 0777  REF  13  LAST  864     25,3161  03674 1                   V
 0778                          25,3162  41225 1           DSU     DMP
 0779  REF   4  LAST  865     25,3163  01160 1                   VREF
 0780  REF   5  LAST  866     25,3164  03614 1                   FACTOR
 0781                          25,3165  41471 0           DDV     PUSH

 0782  REF   1                25,3166  15213 0                   -1/KB2       DELTA L/D INTO PDL
 0783                          25,3167  51400 1           BOV     ABS          NONLINEAR CIRCUIT FOR REDUCING HIGH GAIN
 0784  REF   1                25,3170  53472 0                   GOMAXL/D
 0785                          25,3171  50025 0           DSU     BMN
 0786  REF   1                25,3172  15275 0                   PT1/16
 0787  REF   1                25,3173  53200 0                   NEXT1
 0788                          25,3174  43205 1           DMP     DAD
 0789  REF   1                25,3175  15153 1                   POINT1
 0790  REF   2  LAST  866     25,3176  15275 0                   PT1/16
 0791                          25,3177  41565 1           SIGN    PUSH         ATTACH SIGN OF PUSH TO MPAC THEN PUSH

 0792                          25,3200  42545 0  NEXT1    DLOAD   SL4
A0793                                                             DELTA L/D FROM PDL.
 0794                          25,3201  77615 0           DAD
 0795  REF  11  LAST  865     25,3202  03725 1                   LEWD
 0796                          25,3203  41400 0  NEGTESTS BOV     PUSH         L/D TO PDL FOR USE IN NEGTESTS.
 0797  REF   2  LAST  866     25,3204  53472 0                   GOMAXL/D
 0798  REF   6  LAST  855     25,3205  17634 0           STODL   L/D
A0799                                                             IF D-C20 POS, LATSW =0
A0800                                                             AND IF L/D NEG, L/D = 0.
 0801  REF  19  LAST  865     25,3206  03640 0                   D
 0802                          25,3207  50025 0           DSU     BMN
 0803  REF   1                25,3210  15217 1                   C20
 0804  REF   4  LAST  854     25,3211  53526 0                   LIMITL/D
 0805                          25,3212  71214 0           CLEAR   DLOAD
 0806  REF   1                25,3213  03273 1                   LATSW        =210.  ROLL OVER TOP, REGARDLESS.
A0807                                                             L/D FROM PDL.
 0809                          25,3214  71244 0           BPL     DLOAD
 0809  REF   5  LAST  866     25,3215  53526 0                   LIMITL/D
 0810  REF   5  LAST  863     25,3216  15335 0                   3ZEROS
 0811  REF   7  LAST  866     25,3217  37634 1           STCALL  L/D
 0812  REF   6  LAST  866     25,3220  53526 0                   LIMITL/D     (GO TO)
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 0813                          25,3221   77745 1  DCONSTD  DLOAD                TWO RANGER ENTRIES TO CONSTD HERE
 0814   REF   7  LAST  861     25,3222   03610 0                   DIFF
A0815                                                              SAVE OLD VALUE OF DIFF FOR NEXT PASS.
 0817   REF   5  LAST  863     25,3223   17612 1           STODL   DIFFOLD          DIFFOLD / 2 PI

 0818   REF   3  LAST  861     25,3224   15177 1                   Q7F
 0819   REF  11  LAST  865     25,3225   03175 1           STORE   Q7

 0820                          25,3226   47131 1  BECONSTD SSP     RTB              A HUNTEST ENTRY INTO CONSTD.
 0821   REF  10  LAST  861     25,3227   03646 0                   GOTOADDR         RESET MODE TO HUNTEST
 0822   REF   4  LAST  863     25,3230   52373 1                   HUNTEST
 0823   REF   1                25,3231   54506 0                   KILLGRP4         DEACTIVATE GRP4 FROM HUNTEST.

 0824                          25,3232   77604 0  CONSTD   BOVB
 0825   REF   5  LAST  865     25,3233   57352 1                   TCDANZIG         CLEAR OVF IND IF ON.

 0826                          25,3234   41345 0           DLOAD   DMP
 0827   REF   6  LAST  854     25,3235   03654 0                   LEQ
 0828   REF   3  LAST  854     25,3236   03706 0                   C/DO             C/DO = -4/DO  B-8
 0829                          25,3237   41325 0           PDDL    DMP              LEQ C/DO  INTO PDL
 0830   REF   1                25,3240   15263 1                   2HS              2HS / 4 VS VS
 0831   REF   3  LAST  854     25,3241   03710 1                   DO
 0832                          25,3242   43271 1           DDV     DAD              RDOTREF = - 2 HS DO/V
 0833   REF  14  LAST  866     25,3243   03674 1                   V
 0834   REF  14  LAST  866     25,3244   03700 0                   RDOT
 0835                          25,3245   43205 1           DMP     DAD
 0836   REF   1                25,3246   15227 1                   K2D              C/DO LEQ + K2D(RDOT-RDOTREF) INTO PD
 0837                          25,3247   77725 1           PDDL
 0838   REF   4  LAST  867     25,3250   03710 1                   DO               DO /805

 0839                          25,3251   77621 1  CONSTD1  BDSU                     ENTER WITH  DREF  IN MPAC
 0840   REF  20  LAST  866     25,3252   03640 0                   D
 0841                          25,3253   43205 1           DMP     DAD
 0842   REF   1                25,3254   15225 0                   K1D              K2D TERM FROM PUSH
 0843                          25,3255   52061 1           SL      GOTO
 0844                          25,3256   20211 1                   8D
 0845   REF   1                25,3257   53203 0                   NEGTESTS         (GO TO)

 0846                          25,3260   77604 0  DOWNCNTL BOVB                     INITIAL PART OF UPCONTROL.
 0847   REF   6  LAST  867     25,3261   57352 1                   TCDANZIG         CLEAR OVFIND , IF ON.

 0848                          25,3262   54345 1           DLOAD   SR
 0849   REF  11  LAST  864     25,3263   03624 1                   LAD
 0850                          25,3264   20611 0                   8D
 0851                          25,3265   45325 1           PDDL    DSU              RDTR = LAD(V1-V)
 0852   REF  15  LAST  867     25,3266   03674 1                   V
 0853   REF  16  LAST  865     25,3267   00326 0                   V1
 0854                          25,3270   43205 1           DMP     DAD
 0855   REF  12  LAST  867     25,3271   03624 1                   LAD
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```
 0856   REF  15  LAST  867   25,3272   03700 0                RDOT
 0857                        25,3273   43205 1        DMP     DAD
 0858   REF   2  LAST  867   25,3274   15227 1                K2D
A0859                                                        PUSH UP LAD.
 0860                        25,3275   45325 1        PDDL    DSU        LAD + K2D(RDOT-RDTR) INTO PD
 0861   REF  17  LAST  867   25,3276   00326 0                V1
 0862   REF  16  LAST  867   25,3277   03674 1                V
 0863                        25,3300   41316 0        DSQ     DMP
 0864   REF  13  LAST  867   25,3301   03624 1                LAD
 0865                        25,3302   65271 0        DDV     PDDL       (V1-V)SQ LAD/(2 C1 HS) INTO PD
 0866   REF   3  LAST  856   25,3303   15273 0                2C1HS
 0867   REF  18  LAST  868   25,3304   00326 0                V1
 0868                        25,3305   56316 0        DSQ     DDV
 0869   REF   4  LAST  855   25,3306   03622 1                VSQUARE
 0870                        25,3307   45265 1        BDDV    DSU        DREF = (V/V1)SQ A0 - PD
 0871   REF   8  LAST  864   25,3310   00330 1                A0
A0872                                                        PUSH UP HERE
 0873                        25,3311   77650 1        GOTO                C(MPAC) = DREF
 0874   REF   1               25,3312   53251 1                CONSTO1
```

$$DREF = (V/V1)^2 A0 - (V-V1)^2 LAD/2 C1 HS$$

A0875
A0876

```
P0877   * START  BALLISTIC PHASE  ...

A0878                                                                   MM = 66     UPCONTRL ENTRY INTO KEP2.
 0879                          25,3313   66234 1  KEP      RTB    SSP
 0880   REF   1                25,3314   54474 1                  P66             DISPLAY TRIM GIMBAL ANGLE VALUES.
 0881   REF  11  LAST  867     25,3315   03646 0                  GOTOADDR        SET GOTOADDR TO KEPLER PHASE.
 0882   REF   2  LAST  853     25,3316   53317 1                  KEP2

A0883                                                                   KEP2 CAN ALSO BE STARTED UP DIRECTLY FROM INITROLL
A0884                                                                   IN P64. PROGRAM WILL IDLE IN P64 UNTIL D EXCEEDS
A0885                                                                   .2 G BEFORE GOING ON TO P67.

 0886                          25,3317   45345 1  KEP2     DLOAD  DSU             IF Q7F+KDMIN -D NEG,GO TO FINAL PHASE.
 0887   REF   1                25,3320   15167 0                  Q7FKDMIN        (Q7F + KDMIN)/805
 0888   REF  21  LAST  867     25,3321   03640 0                  D
 0889                          25,3322   72240 1           BMN    TLOAD
 0891   REF   3  LAST  864     25,3323   53333 1                  PREFINAL

A0892                                                                   SET ROLLHOLD = ROLLC, IN CASE CMDAPMOD
 0893   REF  10  LAST  818     25,3324   03316 0                  ROLLC           = +1 EVER ENTERED.
 0895                          25,3325   72214 0           BDN    TLOAD           IF D > .05G, KEEP PRESENT ROLL COMMAND.
 0896   REF   4  LAST  853     25,3326   03314 1                  .05GSW          IF D < .05G, SET ROLL COMMAND = 0.
 0897                          25,3327   53331 0                  +2
 0899   REF   6  LAST  866     25,3330   15335 0                  3ZEROS          SET ROLLC & ROLLHOLD =0.
 0899   REF  11  LAST  869     25,3331   37316 1  +2      STCALL ROLLC           (SP ROLLHOLD FOLLOWS DP ROLLC)
 0900   REF   2  LAST  792     25,3332   54401 0                  P62.3           CALC DESIRED GIMBAL ANGLES AT PRESENT
A0901                                                                   RN, VN  TO YIELD TRIM ATTITUDE.
A0902                                                                   AVAILABLE IN CPHI'S FOR N22.
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```
P0903   START  FINAL  PHASE  ..

A0904                                                                  MM = 67
 0905                          25,3333   47131 1  PREFINAL SSP    RTB
 0906   REF  12  LAST  869    25,3334   03646 0                   GOTOADDR     RESTART PROTECT: RESET GOTOADDR IF CAME
 0907   REF   4  LAST  869    25,3335   53333 1                   PREFINAL     FROM HUNTEST.
 0908   REF   1               25,3336   54500 0                   P67          DISABLES GRP4. FINE IF FROM HUNTEST.BUT
A0909                                                                  MAY ALSO REMOVE RESTART PROTECTION OF
A0910                                                                  N69 (P65).
A0911                                                                  ROLLC          XRNGERR        DNRNGERR
A0912                                                                  XXX.XX DEG     XXXX.X NM      XXXX.X NM

 0913                          25,3337   66214 0             SET    SSP
 0914   REF   3  LAST  851    25,3340   03067 0                    EGSW
 0915   REF  13  LAST  870    25,3341   03646 0                    GOTOADDR
 0916   REF   1               25,3342   53343 0                    PREDICT3

 0917                          25,3343   45345 1  PREDICT3 DLOAD   DSU          IF V-VQUIT NEG, STOP STEERING
 0918   REF  17  LAST  868    25,3344   03674 1                    V
 0919   REF   2  LAST  856    25,3345   15215 0                    VQUIT
 0920                          25,3346   77440 1             BMN    EXIT
 0921   REF   1               25,3347   53613 0                    STEEROFF

 0922   REF   3  LAST  861    25,3350   3 5060 1            CA     EBENTRY      PRECAUTIONARY.
 0923   REF  36  LAST  861    25,3351   54 003 0            TS     EBANK

 0924   REF   2  LAST  204    25,3352   3 5771 0            CA     TWELVE
 0925   REF   1               25,3353   55'771 0  BACK      TS     JJ

 0926   REF  18  LAST  870    25,3354   4 1673 0            CS     V
 0927   REF   2  LAST  870    25,3355   51'771 1            INDEX  JJ
 0928   REF   1               25,3356   6 3637 0            AD     VREFER       VREF - V, HIGHEST VREF AT END OF TABLE.
 0929   REF 189  LAST  828    25,3357   10 000 0            CCS    A            IF VREF-V POS LOOP BACK
 0930   REF   3  LAST  870    25,3360   11'771 0            CCS    JJ           DECREMENT JJ , JJ CANNOT BE ZERO
 0931   REF   1               25,3361   1 3353 0            TCF    BACK
 0932   REF  98  LAST  824    25,3362   6 5017 1            AD     ONE
 0933   REF   6  LAST  855    25,3363   55'646 0            TS     TEM1B        V-VREF IN TEM1B (MUST BE POSITIVE NUM)

 0934   REF   4  LAST  870    25,3364   51'771 1            INDEX  JJ
 0935   REF   2  LAST  870    25,3365   4 3637 1            CS     VREFER
 0936   REF   5  LAST  870    25,3366   51'771 1            INDEX  JJ
 0937   REF   3  LAST  870    25,3367   6 3640 0            AD     VREFER + 1   V(K+1) - V(K)     (POS NUM)
 0938   REF   7  LAST  870    25,3370   57'646 1            XCH    TEM1B
 0939                          25,3371   22 007 0            ZL
 0940                          25,3372   0 0006 1            EXTEND
 0941   REF   8  LAST  870    25,3373   11'646 0            DV     TEM1B
 0942   REF   2  LAST  118    25,3374   55'651 0            TS     GRAD         GRAD = (V-VREF)/(VK+1 - VK)   (POS NUM

 0943   REF  19  LAST  825    25,3375   3 5022 1            CAF    FIVE
```

```
0944   REF   5  LAST  791   25,3376  55'650 1  BACK2   TS      MM
0945   REF   2  LAST  831   25,3377  3 5025 0          CAF     THIRTEEN
0946   REF   6  LAST  870   25,3400  27'771 0          ADS     JJ
0947   REF 190  LAST  870   25,3401  50 000 1          INDEX   A
0948   REF   4  LAST  870   25,3402  4 3637 1          CS      VREFER
0949   REF   7  LAST  871   25,3403  51'771 1          INDEX   JJ
0950   REF   5  LAST  871   25,3404  6 3640 0          AD      VREFER + 1      X(K+1) - X(K)
0951                        25,3405  0 0006 1          EXTEND
0952   REF   3  LAST  870   25,3406  7 1651 0          MP      GRAD
0953   REF   8  LAST  871   25,3407  51'771 1          INDEX   JJ
0954   REF   6  LAST  871   25,3410  6 3637 0          AD      VREFER
0955   REF   6  LAST  871   25,3411  51'650 0          INDEX   MM
0956   REF   2  LAST  118   25,3412  55'652 0          TS      FX              FX = AK + GRAD (AK+1 - AK)
0957   REF   7  LAST  871   25,3413  11'650 1          CCS     MM
0958   REF   1              25,3414  1 3376 1          TCF     BACK2
0959   REF   3  LAST  871   25,3415  57'653 0          XCH     FX +1           ZERO FX +1  AND GET DREFR
0960   REF  22  LAST  869   25,3416  6 1637 1          AD      D
0961                        25,3417  0 0006 1          EXTEND
0962   REF   4  LAST  871   25,3420  7 1557 0          MP      FX + 5           F1
0963   REF 280  LAST  828   25,3421  52 155 1          DXCH    MPAC            MPAC = F1(D-DREF)

0964                        25,3422  0 0006 1          EXTEND
0965   REF  16  LAST  868   25,3423  4 1700 0          DCS     RDOT            FORM RDOTREF - RDOT
0966                        25,3424  20 001 1          DDOUBL
0967                        25,3425  20 001 1          DDOUBL
0968                        25,3426  20 001 1          DDOUBL                  SCALE UP BY 8 FOR THIS PHASE.
0969   REF   5  LAST  871   25,3427  6 1655 0          AD      FX + 3           RDOTREF
0970                        25,3430  0 0006 1          EXTEND
0971   REF   6  LAST  871   25,3431  7 1656 1          MP      FX + 4           F2
0972   REF   7  LAST  871   25,3432  6 1654 1          AD      FX +2           RTOGO
0973   REF 281  LAST  871   25,3433  20 155 1          DAS     MPAC            ADD F2(DADV1-DADVR)
0974   REF 282  LAST  871   25,3434  3 0154 1          CA      MPAC
0975   REF   2  LAST  119   25,3435  55'770 1          TS      PREDANG
A0976                                                                        L/D = LOD +(THETA- PREDANG)/ Y
0977   REF 213  LAST  863   25,3436  0 6006 1          TC      INTPRET

0978                        25,3437   45242 1          SR3     DSU
0979   REF   7  LAST  860   25,3440   03702 1                  THETAH
0980                        25,3441   43014 0          BON     BOFF
0981   REF   2  LAST  853   25,3442   03305 1                  GONEPAST
0982   REF   1              25,3443   53470 1                  GONEGLAD
0983   REF   4  LAST  849   25,3444   03747 0                  GONEBY
0984   REF   1              25,3445   53453 0                  HAVONRNG
0985                        25,3446   43145 0          DLOAD   SET             SET GONEPAST IF GONEBY SET & LATCH IN -
0986   REF   1              25,3447   13773 0                  MAXRNG          DISPLAY = 9999.9 IF GONEBY          PLACE
0987   REF   3  LAST  871   25,3450   03065 1                  GONEPAST
0988   REF   3  LAST  281   25,3451   37716 0          STCALL  DNRNGERR
0989   REF   2  LAST  871   25,3452   53470 1                  GONEGLAD

0990   REF   4  LAST  871   25,3453   03716 1  HAVONRNG STORE   DNRNGERR        = (PREDANG - THETA) /360
```

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0991                        25,3454  77676 0          DCOMP                    FALL SHORT IF NEG, OVERSHOOT IF POS
0993                        25,3455  56204 1          BOVB    DDV
0994   REF   7 LAST  867    25,3456  57352 1                  TCDANZIG         CLEAR OVFIND IF ON.
0995   REF   8 LAST  871    25,3457  03653 1                  FX               FX= DRANGE/D L/D = Y
0996                        25,3460  40061 1          SL      BDV
0997                        25,3461  20206 1                  5
0998   REF   3 LAST  866    25,3462  53472 0                  GOMAXL/D
0999                        25,3463  40015 1          DAD     BDV
1000   REF   3 LAST  844    25,3464  03626 0                  LOD
1001   REF   4 LAST  872    25,3465  53472 0                  GOMAXL/D
1002   REF   8 LAST  866    25,3466  37634 1          STCALL  L/D
1003   REF   1              25,3467  53476 1                  GLIMITER         (GO TO)

R1004  GONEGLAD AND GOPOSMAX ENTRY POINTS FOR GLIMITER ...

1005                        25,3470  77745 1  GONEGLAD DLOAD                   SET L/D = -LAD
1006   REF   3 LAST  871    25,3471  13471 1                  GONEGLAD         (ANY NEGATIVE NUMBER WILL DO)

1007                        25,3472  41234 1  GOMAXL/D RTB    DMP              L/D = LAD SIGN(MPAC)
1008   REF  14 LAST  845    25,3473  45712 1                  SIGNMPAC
1009   REF  14 LAST  868    25,3474  03624 1                  LAD
1010   REF   9 LAST  872    25,3475  03634 0          STORE   L/D              AND FALL INTO GLIMITER SECTION

1011                        25,3476  45345 1  GLIMITER DLOAD  DSU              IF GMAX/2-D POS, GO TO LIMITL/D
1012   REF   1              25,3477  15161 0                  GMAX/2
1013   REF  23 LAST  871    25,3500  03640 0                  D
1014                        25,3501  43244 1          BPL     DAD              IF GMAX  -D NEG, GO TO GOPOSLAD
1015   REF   7 LAST  866    25,3502  53526 0                  LIMITL/D
1016   REF   2 LAST  872    25,3503  15161 0                  GMAX/2
1017                        25,3504  41240 1          BMN     DMP
1018   REF   1              25,3505  53523 0                  GOPOSLAD
1019   REF   2 LAST  867    25,3506  15263 1                  2HS
1020                        25,3507  41325 0          PDDL    DMP              2HS(GMAX-D) INTO PD
1021   REF   7 LAST  867    25,3510  03654 0                  LEQ
1022   REF   1              25,3511  15333 0                  1/GMAX
1023                        25,3512  41215 1          DAD     DMP
1024   REF  15 LAST  872    25,3513  03624 1                  LAD
1025                        25,3514  56325 0          PDDL    DDV              2HS(GMAX-D) (LEQ/GMAX+LAD) INTO PD
1026   REF   1              25,3515  15265 1                  2HSGMXSQ
1027   REF   5 LAST  868    25,3516  03622 1                  VSQUARE
1028                        25,3517  75415 0          DAD     SQRT             XLIM = SQRT(PD+(2HSGMAX/V)SQ)
1029                        25,3520  51015 1          DAD     BPL              IF RDOT+XLIM POS, GO TO LIMITL/D
1030   REF  17 LAST  871    25,3521  03700 0                  RDOT
1031   REF   8 LAST  872    25,3522  53526 0                  LIMITL/D

1032                        25,3523  77745 1  GOPOSLAD DLOAD
1033   REF  16 LAST  872    25,3524  03624 1                  LAD
1034   REF  10 LAST  872    25,3525  03634 0  STOREL/D STORE  L/D
```

```
1035                                25,3526  77745 1  LIMITL/D DLOAD
1036  REF  11  LAST  872           25,3527  03634 0                L/D
1037  REF   3  LAST  177           25,3530  17636 1           STODL L/D1
1038  REF   6  LAST  872           25,3531  03622 1                VSQUARE

1039                                25,3532  77614 1           BON                  NO LATERAL CONTROL IF PAST TARGET
1040  REF   4  LAST  871           25,3533  03305 1                GONEPAST
1041  REF   1                     25,3534  53566 1                L355
1042                                25,3535  43205 1           DMP  DAD             Y= KLAT VSQUARE + LATBIAS
1043  REF   3  LAST  845           25,3536  03632 0                KLAT
1044  REF   1                     25,3537  15243 0                LATBIAS           Y INTO PD
1045                                25,3540  51525 1  L350     PDDL ABS             IF ABS(L/D)-L/DCMINR NEG, GO TO L353
1046  REF  12  LAST  873           25,3541  03634 0                L/D
1047                                25,3542  50025 0           DSU  BMN
1048  REF   3  LAST  844           25,3543  03630 1                L/DCMINR
1049  REF   1                     25,3544  53553 1                L353
1050                                25,3545  75345 1           DLOAD SIGN           IF K2ROLL LATANG NEG, GO TO L357
1051  REF   6  LAST  849           25,3546  03676 0                LATANG
1052  REF   3  LAST  845           25,3547  03644 1                K2ROLL
1053                                25,3550  71240 1           BMN  DLOAD
1054  REF   1                     25,3551  53632 0                L357
1055                                25,3552  41542 1           SR1  PUSH            Y = Y/2
1056                                25,3553  75345 1  L353     DLOAD SIGN           IF LATANG SIGN(K2ROLL)-Y POS, SWITCH
1057  REF   7  LAST  873           25,3554  03676 0                LATANG
1058  REF   4  LAST  873           25,3555  03644 1                K2ROLL
1059                                25,3556  77625 0           DSU
1060                                25,3557  71240 1           BMN  DLOAD
1061  REF   2  LAST  873           25,3560  53566 1                L355
1062  REF   5  LAST  873           25,3561  03644 1                K2ROLL
1063                                25,3562  57414 1           BONCLR DCOMP         IF NOSWITCH =1, K2ROLL= K2ROLL
10631 REF   2  LAST  864           25,3563  03210 1                NOSWITCH
10632 REF   3  LAST  873           25,3564  53566 1                L355
1064  REF   6  LAST  873           25,3565  03644 1           STORE K2ROLL         K2ROLL = - K2ROLL

1065                                25,3566  56345 0  L355     DLOAD DDV            ROLLC = ACOS(  (L/D1) / LAD)
1066  REF   4  LAST  873           25,3567  03636 1                L/D1
1067  REF  17  LAST  872           25,3570  03624 1                LAD               MPAC SET TO +-1 IF OVERFLOW***
1068                                25,3571  65542 1           SR1  ACOS
1069                                25,3572  43165 1           SIGN CLEAR
1070  REF   7  LAST  873           25,3573  03644 1                K2ROLL
10701 REF   3  LAST  873           25,3574  03270 1                NOSWITCH
1071  REF  12  LAST  869           25,3575  03316 0           STORE ROLLC

1072                                25,3576  77776 1  ENDEXIT  EXIT

1073  REF  34  LAST  733           25,3577  3 5003 1  OVERNOUT CA   BIT13           ENTRYDSP  =92D  B13
1074  REF   7  LAST  844           25,3600  7 0102 0           MASK  CM/FLAGS
1075                                25,3601  0 0006 1           EXTEND
1076  REF   1                     25,3602  1 3606 0           BZF   NODISKY        OMIT DISPLAY.
```

```
1077   REF   7  LAST  800   25,3603  3 1263 1            CA     ENTRYVN        ALL ENTRY DISPLAYS ARE DONE HERE.
1078   REF 236  LAST  829   25,3604  0 4662 1            TC     BANKCALL
1079   REF   1               25,3605   20712 1           CADR   REGODSPR       NO ABORT IF DISKY IN USE

1080                         25,3606  0 0004 0  NODISKY  INHINT
1081   REF   5  LAST  519   25,3607  10 067 1            CCS    NEWJOB         PROTECT READACCS GRP 5, IF SIDETRACKED.
1082   REF   3  LAST  519   25,3610  0 5164 1            TC     CHANG1
1083   REF  51  LAST  830   25,3611  0 4701 0  SERVNOUT  TC     POSTJUMP       ( COME HERE FROM P67.3)
1084   REF   4  LAST  805   25,3612   77227 0           CADR   SERVEXIT       AND END AVERAGEG JOB VIA  ENDOFJOB.
```

```
P1085           DISPLAY WHEN V IS LESS THAN VQUIT.

 1086                          25,3613   77775 1  STEEROFF EXIT
 1087   REF   4  LAST  870    25,3614  3 5060 1            CA     EBENTRY        PRECAUTIONARY.
 1088   REF  37  LAST  870    25,3615  54 003 0            TS     EBANK

 1089   REF  12  LAST  861    25,3616  3 5070 0            CA     PRIO16         2 LESS THAN NTRYPRIO.
 1090   REF  27  LAST  822    25,3617  0 5134 1            TC     NOVAC
 1091   REF  25  LAST  833    E6,1661                      EBANK= AOG            ANY EB HERE
 1092   REF   3  LAST  800    25,3620   02512 0            2CADR  P67.1          START UP REMAINDER OF P67
 1092                          25,3621   54066 0
A1093                                                                RTOGO         LAT           LONG
A1094                                                                XXXX.X NM     XXX.XX DEG    XXX.XX DEG

 1095   REF  28  LAST  830    25,3622  0 5372 1            TC     2PHSCHNG       INHINT/RELINT DONE.
 1096                          25,3623   00414 0            OCT    00414          4.41 RESTART FOR P67.1 DISPLAY JOB.
 1097                          25,3624   10035 0            OCT    10035          SERVICER 5.3 RESTART.

 1098   REF   1                25,3625  3 3631 0            CA     P67.2CAD       HEREAFTER, DO LAT, LONG.
 1099   REF  14  LAST  870    25,3626  55'645 0            TS     GOTOADDR

 1100   REF 214  LAST  871    25,3627  0 6006 1            TC     INTPRET
 1101                          25,3630   77650 1            GOTO
 1102   REF   1                25,3631   54531 1  P67.2CAD          P67.2          CONTINUE FOR LAT, LONG THIS TIME.

 1103                          25,3632   75345 1  L357      DLOAD  SIGN           L/D = L/DCMINR SIGN(L/D)
 1104   REF   4  LAST  873    25,3633   03630 1                   L/DCMINR
 1105   REF  13  LAST  873    25,3634   03634 0                   L/D
 1106   REF   5  LAST  873    25,3635   37636 0            STCALL L/D1
 1107   REF   4  LAST  873    25,3636   53566 1                   L355           (GO TO )
```

P1108 TABLE USED FOR SUB-ORBITAL REFERENCE TRAJECTORY CONTROL.

```
1109                25,3637  00474 0  VREFER   DEC     .019288          REFERENCE VELOCITY SCALED V/51532.3946
1110                25,3640  01235 1           DEC     .040809          13 POINTS ARE STORED AS THE INDEPENDENT
1111                25,3641  02337 1           DEC     .076107          VARIABLE AND THEN SIX 13 POINT FUNCTIONS
1112                25,3642  03721 0           DEC     .122156          OF V ARE STORED CONSECUTIVELY
1113                25,3643  05230 0           DEC     .165546
1114                25,3644  06213 1           DEC     .196012
1115                25,3645  10550 0           DEC     .271945
1116                25,3646  11717 0           DEC     .309533
1117                25,3647  13314 0           DEC     .356222
1118                25,3650  14736 0           DEC     .404192
1119                25,3651  16255 1           DEC     .443067
1120                25,3652  16457 0           DEC     .456023
1121                25,3653  25570 1           DEC     .67918           HIGH VELOCITY FOR SAFETY

1122                25,3654  77526 0           DEC     -.010337         DRANGE/DA   SCALED DRDA/(2700/805)
1123                25,3655  77360 1           DEC     -.016550
1124                25,3656  77106 0           DEC     -.026935
1125                25,3657  76516 1           DEC     -.042039
1126                25,3660  76071 0           DEC     -.058974
1127                25,3661  75570 1           DEC     -.070721
1128                25,3662  74661 0           DEC     -.098538
1129                25,3663  74436 0           DEC     -.107482
1130                25,3664  73212 1           DEC     -.147762
1131                25,3665  71640 0           DEC     -.193289
1132                25,3666  54557 1           DEC     -.602557
1133                25,3667  40000 0           DEC     -.99999
1134                25,3670  40000 0           DEC     -.99999

1135                25,3671  77635 1           DEC     -.0478599  B-3   -DRANGE/DRDOT
1136                25,3672  77563 1           DEC     -.0683663  B-3   SCALED((2VS/8 2700) DR/DRDOT)
1137                25,3673  77354 0           DEC     -.1343468  B-3
1138                25,3674  76712 1           DEC     -.2759846  B-3
1139                25,3675  76066 0           DEC     -.4731437  B-3
1140                25,3676  75322 0           DEC     -.6472087  B-3
1141                25,3677  73237 0           DEC     -1.171693  B-3
1142                25,3700  72104 1           DEC     -1.466382  B-3
1143                25,3701  70301 1           DEC     -1.905171  B-3
1144                25,3702  65635 1           DEC     -2.547990  B-3
1145                25,3703  57311 0           DEC     -4.151220  B-3
1146                25,3704  50575 0           DEC     -5.813617  B-3
1147                25,3705  50575 0           DEC     -5.813617  B-3
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P1148

```
1149                25,3706   74443 1          DEC    -.0134001    B3  RDOTREF    SCALED (8 RDT/2VS)
1150                25,3707   74333 1          DEC    -.013947     B3
1151                25,3710   74433 0          DEC    -.013462     B3
1152                25,3711   74763 0          DEC    -.011813     B3
1153                25,3712   75432 0          DEC    -.0095631    B3
1154                25,3713   75735 1          DEC    -.00806946   B3
1155                25,3714   76200 1          DEC    -.006828     B3
1156                25,3715   75735 1          DEC    -.00806946   B3
1157                25,3716   75140 0          DEC    -.0109791    B3
1158                25,3717   74075 0          DEC    -.0151496    B3
1159                25,3720   73312 0          DEC    -.0179817    B3
1160                25,3721   73732 0          DEC    -.0159061    B3
1161                25,3722   73732 0          DEC    -.0159061    B3

1162                25,3723   00015 0          DEC    .0008067          RANGE TO GO SCALED RTOGO/2700
1163                25,3724   00066 1          DEC    .0032963                    8.9
1164                25,3725   00206 0          DEC    .0081852                    22.1
1165                25,3726   00431 1          DEC    .017148
1166                25,3727   00712 0          DEC    .027926
1167                25,3730   01136 1          DEC    .037
1168                25,3731   02015 1          DEC    .063296
1169                25,3732   02374 0          DEC    .077889
1170                25,3733   03123 1          DEC    .098815
1171                25,3734   04051 1          DEC    .127519
1172                25,3735   05767 1          DEC    .186963
1173                25,3736   07476 0          DEC    .238148
1174                25,3737   11324 1          DEC    .294185185

1175                25,3740   76272 1          DEC    -.051099          -AREF/805
1176                25,3741   75472 1          DEC    -.074534
1177                25,3742   74604 0          DEC    -.101242
1178                25,3743   74210 1          DEC    -.116646
1179                25,3744   74052 0          DEC    -.122360
1180                25,3745   73735 1          DEC    -.127081
1181                25,3746   73217 1          DEC    -.147453
1182                25,3747   73013 1          DEC    -.155528
1183                25,3750   73155 1          DEC    -.149565
1184                25,3751   74151 1          DEC    -.118509
1185                25,3752   76703 1          DEC    -.034907
1186                25,3753   77575 0          DEC    -.007950
1187                25,3754   77575 0          DEC    -.007950
```

P1188

1189	25,3755	00112 0	DEC	.004491	DRANGE/D L/D SCALED Y/2700
1190	25,3756	00204 1	DEC	.008081	
1191	25,3757	00407 1	DEC	.016030	
1192	25,3760	01113 0	DEC	.035815	
1193	25,3761	02161 0	DEC	.069422	
1194	25,3762	03260 0	DEC	.104519	
1195	25,3763	03717 0	DEC	.122	
1196	25,3764	05411 0	DEC	.172407	
1197	25,3765	10057 1	DEC	.252852	
1198	25,3766	13476 0	DEC	.363148	
1199	25,3767	20324 0	DEC	.512963	
1200	25,3770	21677 1	DEC	.558519	
1201	25,3771	21677 1	DEC	.558519	END OF STORED REFERENCE

L REENTRY CONTROL USER'S PAGE NO. 36 E7 S3

P1202 REENTRY CONSTANTS.

R1203 DEFINED BY EQUALS

```
 1204  REF  1                5026          DEC15    =      LOW4
A1205                                      GAMMAL1  =      22D

 12055                     25,3772  16631 1 MAXRNG   2OCT   16631 06755     DNRNGERR = 9999.9 IF GONEPAST=1
 12055                     25,3773  06755 0

 1206                      26,3145                 BANK   26
 1207  REF  2 LAST  851    26,2000                 SETLOC REENTRY1
 1208                      26,3145                 BANK

 1209  REF  2 LAST  851 TO  853:    41    41*      COUNT* $$/ENTRY

 1210  REF  3 LAST  861    27,3371          BARELY1  =      NEARONE         COMMON TO BOTH DISK,DANCE.DEFND IN TFF
A1211                                      LBITDP                 COMMON TO BOTH DISK AND DANCE. DEFND IN VECPOINT.

 1212                      26,3145  02525 1 1/12TH   DEC    .083333         DP 1/12 USES HI WORD IN 1/3 BELOW
 1213                      26,3146  12525 0 1/3RD    2DEC   .3333333333    DP 1/3
 1213                      26,3147  12525 0
 12131 REF  2 LAST  309    27,3365          1/16TH   =      DP2(-4)
```

R1214

R1215 BELOW: VS = VSAT = 25766.1973 FT/SEC

R1216 RE = 21,202,900 FEET

```
 1217                      26,3150  04631 1 LEWD1    2DEC   .15
 1217                      26,3151  23146 0
 1218                      26,3152  03146 1 POINT1   2DEC   .1
 1218                      26,3153  14632 0
 1219                      26,3154  06314 1 POINT2   2DEC   .2              .2
 1219                      26,3155  31463 1
 1220                      26,3156  76314 0 DLEWDO   2DEC   - .05           -.05
 1220                      26,3157  71462 1
 1221                      26,3160  05075 0 GMAX/2   2DEC   .16            8 GS / 2
 1221                      26,3161  16051 1
 1222  REF 24 LAST  809    26,3334          3ZEROS   EQUALS HI6ZEROS
 1223                      26,3162  07777 1 NEAR1/4  2OCT   07777 00000     1/4 LESS 1 BIT IN UPPER PART.
 1223                      26,3163  00000 1
 1224                      26,3164  00236 0 C1B      2DEC   .0097026346     500/2VS
 1224                      26,3165  36763 0
 1225                      26,3166  00204 1 07FKDMIN 2DEC   .0080745342    6.5/805  (Q7F +KDMIN) = 6 + .5)
 1225                      26,3167  11303 1
 1226  REF  3 LAST  879    27,3365          C1/16    =      DP2(-4)

 1227                      26,3170  05260 0 Q3       2DEC   .167003132      .07 2VS/21600
 1227                      26,3171  05572 1
```

```
1228                        26,3172  12343 0  Q5        2DEC   .326388889       .3 23500/21600
1228                        26,3173  21616 0
1229                        26,3174  01073 1  Q6        2DEC   .0349            2 DEG, APPROX 820/23500
1229                        26,3175  31515 1
1230                        26,3176  00172 0  Q7F       2DEC   .0074534161      6/805    (VALUE OF Q7 IN FIXED MEM.)
1230                        26,3177  03571 1
1231  REF  6 LAST 862       26,3332          Q19       =      HALVE            Q19 = .5

1232                        26,3200  00573 0  Q21       2DEC   .0231481481      500/21600
1232                        26,3201  10230 1
1233                        26,3202  76226 0  Q22       2DEC   -.053333333     -1152/21600
1233                        26,3203  45761 0
1234                        26,3204  13132 0  VLMIN     2DEC   .34929485        18000/2 VS
1234                        26,3205  33062 0
1235  REF  2 LAST 848       26,3324          VMIN      =      FOURTH           (VS/2) / 2VS
1236                        26,3206  00160 0  C12       2DEC   .00684572901     32 28500/(21202900 2 PI)
1236                        26,3207  05104 1
1237                        26,3210  11322 1  1/KB1     2DEC   .29411765        1 / 3.4
1237                        26,3211  32265 1
1238                        26,3212  75047 0  -1/KB2    2DEC   -.0057074322 B4 = -1/(  .0034  2  VS)   EXP +4
1238                        26,3213  72454 1
1239                        26,3214  00475 1  VQUIT     2DEC   .019405269     1000 /2VS
1239                        26,3215  35746 1
1240                        26,3216  06751 1  C20       2DEC   .21739130       (175 FPSS) LIFT UP IF ABOVE C20
1240                        26,3217  27515 0
12405                       26,3220  05441 0  C21       2DEC   .17391304      140/805
12405                       26,3221  14412 0
1241                        26,3222  00022 1  25NM      2DEC   .0011574074    25/21600        (25 NAUT MILES)
1241                        26,3223  36641 1
1242                        26,3224  01003 0  K1D       2DEC   .0314453125    =C16 805/256 = .01 805/256
1242                        26,3225  06315 0
1243                        26,3226  71435 0  K2D       2DEC   -.201298418    -C17 2VS/256 = -.001 2VS/256
1243                        26,3227  75516 1
1244                        26,3230  32047 0  KVSCALE   2DEC   .81491944       12800/(2 VS .3048)
1244                        26,3231  24367 0
1245                        26,3232  37200 1  KASCALE   2DEC   .97657358       5.85 16384/(4 .3048 100 805)
1245                        26,3233  05636 1
1246                        26,3234  00046 0  KTETA     2DEC*  .383495203 E2 B-14*        1000 2PI/16384(163.84)
1246                        26,3235  13137 0
1247                        26,3236  00017 1  KT1       2DEC*  .157788327 E 2 B-14*    RE(2PI)/2 VS(16384) 163.84
1247                        26,3237  30730 0
1248                        26,3240  00040 0  .05G      2DEC   .002             .05/25
1248                        26,3241  30447 0
1249                        26,3242  00000 1  LATBIAS   2DEC   .00003           APPRX .5 NM/ 4(21600/2 PI)
1249                        26,3243  17565 1
1250                        26,3244  01727 1  KWE       2DEC   .120056652 B-1
1250                        26,3245  20103 1
1251                        26,3246  00121 0  KACOS     2DEC   .004973592       1/32(2PI)
1251                        26,3247  17460 0
1252                        26,3250  00400 0  CHOOK     2DEC   1 B-6           .25/16
1252                        26,3251  00000 1
```

```
1253                        26,3252  01252 0  1/24TH   2DEC   .0833333333 B-1
1253                        26,3253  25253 1
1254                        26,3254  24365 1  CH1      2DEC   .32 81          16 CH1/25 = 16 (1) /25
1254                        26,3255  30244 0
1255                        26,3256  77152 1  KC3      2DEC   -.0247622232    -(4 VS VS/ 2 PI 805 RE)
1255                        26,3257  51354 1
1256                        26,3260  00336 1  VRCONT   2DEC   .0135836886     700/2 VSAT
1256                        26,3261  21610 0
1257  REF  10  LAST  815    26,3332          HALVE    EQUALS HIDPHALF
1258  REF   2  LAST  816    26,3324          FOURTH   EQUALS HIDP1/4

1259  REF   7  LAST  880    26,3332          1/GMAX   EQUALS HALVE          4/GMAX = 4 / 8
1260                        26,3262  00433 0  2HS      2DEC   .0172786611     2 28500 25 32.2/(4 VS VS)
1260                        26,3263  02775 0
1261                        26,3264  00000 1  2HSGMXSQ 2DEC   .0000305717    (2 28500 8 32.2/ 4 VS VS)SQ
1261                        26,3265  20017 0
1262                        26,3266  77765 0  C001     2DEC   -.000625       -(4/25)/256    LEQ/DO CONST
1262                        26,3267  70243 0
1263                        26,3270  31463 1  POINT8   2DEC   .8
1263                        26,3271  06315 0
1264                        26,3272  00541 1  2C1HS    2DEC   .0215983264     2 1.25 28500 805/(2 VS)SQ
1264                        26,3273  33575 0
1265                        26,3274  00146 1  PT1/16   2DEC   .1 B-4
1265                        26,3275  14632 0
1266                        26,3276  00052 0  1/K44    2DEC   .00260929464    2 VS/19749550
1266                        26,3277  30013 0
1267                        26,3300  20411 1  VFINAL   2DEC   .51618016       26600/2 VS
1267                        26,3301  03041 1
1268                        26,3302  20610 1  VFINAL1  2DEC   .523942273      = 27000 / 2 VS
1268                        26,3303  10513 1
1269                        26,3304  11473 1  1/KA1    2DEC   .30048077       25/(1.3 64)
1269                        26,3305  02355 0
1270                        26,3306  00203 0  KA2      2DEC   .008            .2 / 25
1270                        26,3307  02234 0
1271                        26,3310  16237 0  KA3      2DEC   .44720497       = 90  4/805
1271                        26,3311  00146 1
1272                        26,3312  01456 1  KA4      2DEC   .049689441      40/805
1272                        26,3313  03450 0
12725                       26,3314  01727 1  KALIM    2DEC   .06             1.5/25
12725                       26,3315  01217 1
1273  REF   2  LAST  854    26,3312          07MIN    =      KA4             = 40/805 = .049689441
1274                        26,3316  56232 1  -HSCALED 2DEC   -.55305018      -28500/2 VS
1274                        26,3317  72332 0
1275                        26,3320  77000 1  -KSCALE  2DEC   -.0312424837    -805/VS
1275                        26,3321  43741 1
1276                        26,3322  36702 1  COS15    2DEC   .965
1276                        26,3323  21727 0
1277  REF   1               26,3145          LATSLOPE EQUALS 1/12TH
R1278       ... END OF RE-ENTRY CONSTANTS ...
```

L REENTRY CONTROL

L CM BODY ATTITUDE USER'S PAGE NO. 1 EO S3

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P0001

 0010                          35,3477                    BANK   35

 0011   REF   1                37,2000                    SETLOC BODYATT
 0012                          37,3470                    BANK

 0013   REF   1                                           COUNT  37/CMBAT

A0014                                                    PDL 12D - 15D SAFE.

R0015     VALUES OF GIMBAL AND BODY ANGLES VALID AT PIP TIME ARE SAVED DURING    READACCS.

 0017   REF  10  LAST  848    E7,1451                    EBANK= RTINIT          LET INTERPRETER SET EB

 0018   REF 215  LAST  875    37,3470  0 6006 1  CM/POSE  TC     INTPRET       COME HERE VIA AVEGEXIT.

 0019                         37,3471   77201 1           SETPD  VLOAD
 0020                         37,3472   00001 0                  0
 0021   REF  16  LAST  848    37,3473   01177 1                  VN             KVSCALE = (12800/ .3048) /2VS
 0022                         37,3474   63361 0           VXSC   PDVL
 0023   REF   1               37,3475   37767 0                  -KVSCALE       KVSCALE = .81491944
 0024   REF  10  LAST  835    37,3476   01714 1                  UNITW          FULL UNIT VECTOR
 0025                         37,3477   74235 0           VXV    VXSC           VREL = V - WE*R
 0026   REF  10  LAST  849    37,3500   01760 1                  UNITR
 0027   REF   1               37,3501   15245 0                  KWE
 0028                         37,3502   45455 1           VAD    STADR
 0029   REF   3  LAST  848    37,3503   74251 1           STORE  -VREL          SAVE FOR ENTRY GUIDANCE.  REF COORDS

 0030                         37,3504   72056 1           UNIT   LXA,1
 0031                         37,3505   00044 1                  36D            ABVAL( -VREL) TO X1
 0032   REF   6  LAST  850    37,3506   03542 1           STORE  UXA/2          -UVREL                    REF COORDS

 0033                         37,3507   57435 1           VXV    VCOMP
 0034   REF  11  LAST  883    37,3510   01760 1                  UNITR          .5 UNIT                   REF COORDS
 0035                         37,3511   66256 0           UNIT   SSP            THE FOLLOWING IS TO PROVIDE A STABLE
 0036   REF  32  LAST  787    37,3512   00051 0                  S1             UN FOR THE END OF THE TERMINAL PHASE.
 0037                         37,3513   00476 1 SPVQUIT   DEC    .019405        1000/ 2 VS
 0038                         37,3514   77300 1           TIX,1  VLOAD          IF V=VQUIT POS. BRANCH.
 0039   REF   1               37,3515   77517 1                  CM/POSE2       SAVE UYA IN OLDUYA
 0040   REF   2  LAST  118    37,3516   03534 0                  OLDUYA         OTHERWISE CONTINUE TO USE OLDUYA.
 0041   REF   3  LAST  818    37,3517   03550 1 CM/POSE2 STORE  UYA/2                                   REF COORDS

 0042   REF   3  LAST  883    37,3520   03534 0           STORE  OLDUYA         RESTORE, OR SAVE AS CASE MAY BE.

 0043                         37,3521   57435 1           VXV    VCOMP
 0044   REF   7  LAST  883    37,3522   03542 1                  UXA/2          FINISH OBTAINING TRAJECTORY TRIAD.
 0045                         37,3523   77772 0           VSL1
 0046   REF   3  LAST  818    37,3524   03556 1           STORE  UZA/2                                   REF COORDS
```

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0047                          37,3525  77751 1          TLOAD                PICK UP CDUX, CDUY, CDUZ CORRESPONDING
0048  REF  3 LAST  824        37,3526  03270 1                   AOG/PIP     TO PIPUP TIME IN 2S.C  AND SAVE.
0049                          37,3527  14031 0  CM/TRIO  STODL   24D
0050                          37,3530  00032 0                   25D         AIG/PIP

0051                          37,3531  41434 1          RTB      PUSH        TO PDLO
0052  REF  7 LAST  454        37,3532  45513 1                   CDULOGIC
0053                          37,3533  77746 1          COS
0054  REF  2 LAST  118        37,3534  17564 0          STODL    UBX/2       CI /2
A0055                                                                       AIG/PIP FROM PDL O
0056                          37,3535  57556 0          SIN      DCOMP
0057  REF  3 LAST  884        37,3536  17570 0          STODL    UBX/2 +4    -SI /2
0058                          37,3537  00033 1                   26D         AMG/PIP
0059                          37,3540  41434 1          RTB      PUSH        TO PDL O
0060  REF  8 LAST  884        37,3541  45513 1                   CDULOGIC
0061                          37,3542  65356 1          SIN      PDDL        XCH PDL O. SAVE SM /2
0062                          37,3543  65346 0          COS      PDDL        CM /2 TO PDL 2
0063                          37,3544  00001 0                   0           SM /2
0064                          37,3545  74276 1          DCOMP    VXSC
0065  REF  4 LAST  884        37,3546  03564 0                   UBX/2
0066                          37,3547  77772 0          VSL1                 NOISE WONT OVFL.
0067  REF  2 LAST  118        37,3550  17572 1          STODL    UBY/2       =(-SMCI, NOISE, SMSI) /2
0068                          37,3551  00003 1                   2           CM /2  REPLACES NOISE
0069  REF  3 LAST  884        37,3552  17574 1          STODL    UBY/2 +2    UBY/2=(-SMCI, CM, SMSI)/2
0070                          37,3553  00031 0                   24D         AOG/PIP
0071                          37,3554  41434 1          RTB      PUSH        TO PDL 4
0072  REF  9 LAST  884        37,3555  45513 1                   CDULOGIC
0073                          37,3556  65356 1          SIN      PDDL        XCH PDL 4. SAVE SO /2
0074                          37,3557  74346 0          COS      VXSC        CO /2
0075  REF  4 LAST  884        37,3560  03572 1                   UBY/2
0076  REF  5 LAST  884        37,3561  17572 1          STODL    UBY/2       UBY/2=(-COSMCI, COCM, COSMSI)/4
0077                          37,3562  00005 1                   4D          SO /2
0078                          37,3563  57405 1          DMP      DCOMP
0079  REF  5 LAST  884        37,3564  03570 0                   UBX/2 +4    -SI /2
0080                          37,3565  77615 0          DAD
0081  REF  6 LAST  884        37,3566  03572 1                   UBY/2        INCREMENT BY (SOSI /4)
0082  REF  7 LAST  884        37,3567  17572 1          STODL    UBY/2
A0083                                                                       SO /2 FROM PDL 4
0084                          37,3570  43205 1          DMP      DAD
0085  REF  6 LAST  884        37,3571  03564 0                   UBX/2       CI /2
0086  REF  8 LAST  884        37,3572  03576 0                   UBY/2 +4
0087  REF  9 LAST  884        37,3573  27576 0          STOVL    UBY/2 +4    YB/4                PLATFORM COORDS

A0088                                                                                YB = (-COSMCI + SOSI , COCM , COSMSI + SOCI )

0089  REF 10 LAST  884        37,3574  03572 1                   UBY/2
0090                          37,3575  72505 1          VXM      VSL2
0091  REF 37 LAST  836        37,3576  01736 1                   REFSMMAT    .5 UNIT
0092  REF 11 LAST  884        37,3577  17572 1          STODL    UBY/2       Y8/2  DONE                REF COORDS
```

L CM BODY ATTITUDE USER'S PAGE NO. 3 E7 S3

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A0093                                                          CM /2 FROM PDL 2
 0094                          37,3600  76561 1        VXSC   VSL1
 0095  REF   7 LAST  884       37,3601  03564 0               UBX/2
 0096  REF   8 LAST  885       37,3602  17564 0        STODL  UBX/2          =( CMCI, NOISE, -CMSI)/2
 0097                          37,3603  77626 0        STADR                 SM /2 FROM PDL 0
 0098  REF   9 LAST  885       37,3604  50211 0        STOVL  UBX/2 +2       SM /2 REPLACES NOISE
 0099  REF  10 LAST  885       37,3605  03564 0               UBX/2          XB/2                 PLATFORM COORDS

A0100                                                  XB = ( CMCI , SM , -CMSI )

 0101                          37,3606  76505 0        VXM    VSL1
 0102  REF  38 LAST  884       37,3607  01736 1               REFSMMAT       .5 UNIT
 0103  REF  11 LAST  885       37,3610  03564 0        STORE  UBX/2          XB/2  DONE                 REF COORDS

 0104                          37,3611  76435 1        VXV    VSL1
 0105  REF  12 LAST  884       37,3612  03572 1               UBY/2
 0106  REF   2 LAST  118       37,3613  27600 1        STOVL  UBZ/2          ZB/2  DONE                 REF COORDS

A0107                                                  EQUIVALENT TO
A0108                                                  ZB = ( SOSMCI + COSI , -SOCM , -SOSMSI + COCI)

 0109  REF   8 LAST  883       37,3614  03542 1               UXA/2          -UVREL/2 = -UVA/2
 0110                          37,3615  53435 0        VXV    UNIT           GET UNIT(-UVREL*UBY)/2  = UL/2
 0111  REF  13 LAST  885       37,3616  03572 1               UBY/2          YB/2
 0112                          37,3617  50206 0        PUSH   DOT            UL/2  TO PDL 0,5
 0113  REF   4 LAST  883       37,3620  03556 1               UZA/2          UNA/2
 0114  REF   3 LAST  554       37,3621  24021 1        STOVL  COSTH          COS(ROLL)/4
 0115                          37,3622  00001 0               0              UL/2

 0116                          37,3623  77641 1        DOT
 0117  REF   4 LAST  883       37,3624  03550 1               UYA/2
 0118  REF   3 LAST  554       37,3625  34023 1        STCALL SINTH          -SIN(ROLL)/4
 0119  REF   3 LAST  554       37,3626  47256 0               ARCTRIG
 0120                          37,3627  24007 0        STOVL  6D             -(ROLL/180) /2
 0121  REF  14 LAST  885       37,3630  03572 1               UBY/2
 0122                          37,3631  72441 0        DOT    SL1            -UVA.UBY = -SIN(BETA)
 0123  REF   9 LAST  885       37,3632  03542 1               UXA/2          -UVREL/2
 0124                          37,3633  77736 0        ARCSIN
 0125                          37,3634  24010 0        STOVL  7D             -(BETA/180) /2
 0126  REF  12 LAST  885       37,3635  03564 0               UBX/2          XB/2
 0127                          37,3636  77641 1        DOT                   UL.UBX = -SIN(ALFA)
 0128                          37,3637  00001 0               0              UL/2
 0129  REF   4 LAST  885       37,3640  24023 0        STOVL  SINTH          -SIN(ALFA)/4
 0130                          37,3641  77641 1        DOT                   UL/2 FROM PDL 0
 0131  REF   3 LAST  885       37,3642  03600 1               UBZ/2
 0132  REF   4 LAST  885       37,3643  34021 0        STCALL COSTH          COS(ALFA)/4
 0133  REF   4 LAST  885       37,3644  47256 0               ARCTRIG
 0134                          37,3645  24011 1        STOVL  8D             -(ALFA/180) /2
 0135  REF  12 LAST  883       37,3646  01760 1               UNITR          UR/2                 REF COORDS
 0136                          37,3647  72441 0        DOT    SL1
```

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 0137   REF   5 LAST  885   37,3650   03556 1                UZA/2          MORE ACCURATE AT LARGE ARG.
 0138                       37,3651   77726 1          ARCCOS
 0139                       37,3652   00013 0          STORE  100           (-GAMA/180)/2

 0140                       37,3653   77551 0          TLOAD  EXIT          ANGLES IN MPAC IN THE ORDER
A0141                                                                       -( (ROLL, BETA, ALFA) /180)/2
 0142                       37,3654   00007 0                 6D           THESE VALUES CORRECT AT PIPUP TIME.
R0143   SPACER
```

P0144 BASIC SUBROUTINE TO UPDATE ATTITUDE ANGLES

```
 0145   REF  26  LAST  875   E6,1661                          EBANK= AMG

 0146   REF   1               37,3655  3 5057 0  CM/ATUP    CA     EBADG
 0147   REF  38  LAST  875    37,3656  54 003 0              TS     EBANK
 0148   REF  17  LAST  783    37,3657  50 120 1  CMTR1       INDEX  FIXLOC
 0149                         37,3660  4 0012 0              CS     10D          (GAMA/180)/2
 0150   REF   2  LAST  112    37,3661  57'722 1              XCH    GAMA
 0151   REF  74  LAST  825    37,3662  54 001 1              TS     L

 0152                         37,3663  0 0004 0              INHINT
A0153                                                              MUST REMAIN INHINTED UNTIL UPDATE OF BODY
A0154                                                              ANGLES, SO THAT GAMDIFSW IS VALID FIRST PASS
A0155                                                              INDICATOR.

 0156   REF   8  LAST  873    37,3664  4 0102 0              CS     CM/FLAGS
 0157   REF  22  LAST  778    37,3665  7 5005 0              MASK   BIT11        GAMDIFSW=94D BIT11   INITLY=0
 0158                         37,3666  0 0006 1              EXTEND               DONT CALC GAMA DOT UNTIL HAVE FORMD
A0159                                                              ONE DIFFERENCE.
 0160   REF   1               37,3667  1 3672 0              BZF    DOGAMDOT      IS OK, GO ON.
 0161   REF   9  LAST  887    37,3670  26 102 0              ADS    CM/FLAGS      KNOW BIT IS 0
 0162   REF   1               37,3671  0 3705 0              TC     NOGAMDOT      SET GAMDOT = 0

 0163   REF  75  LAST  887    37,3672  4 0001 1  DOGAMDOT    CS     L
 0164   REF   3  LAST  887    37,3673  6 1722 1              AD     GAMA          DEL GAMA/360= T GAMDOT/360
 0165                         37,3674  0 0006 1              EXTEND
 0166   REF   1               37,3675  7 3770 0              MP     TCDU          TCDU = .1 SEC,   T = 2 SEC.
 0167   REF   2  LAST  112    37,3676  55'723 1              TS     GAMDOT        GAMA DOT TCDU / 180

 0168                         37,3677  0 0006 1              EXTEND               IGNORE GAMDOT IF LEQ  .5 DEG/SEC
 0169                         37,3700  6 3702 1              BZMF   +2
 0170                         37,3701  4 0000 0              COM
 0171   REF  20  LAST  870    37,3702  6 5022 1              AD     FIVE
 0172                         37,3703  0 0006 1              EXTEND
 0173                         37,3704  6 3707 1              BZMF   +3            SET GAMDOT=+0 AS TAG IF TOO SMALL.

 0174   REF 157  LAST  834    37,3705  3 5021 1  NOGAMDOT    CA     ZERO          COME HERE INHINTED.
 0175   REF   3  LAST  887    37,3706  55'723 1              TS     GAMDOT
A0176                                                              FOR NOW LEAVE IN 2S.C
A0177                                                              UPDATE ANGLES BY CORRECTING EUILER ANG
A0178                                                              FOR ACCRUED INCREMENT SINCE PIPUP
A0179                                                              R = R EUIL + R(NOW) -R(PIPUP)
 0180   REF 283  LAST  871    37,3707  4 0154 0              CS     MPAC          GET (R EUL/180) /2
 0181                         37,3710  6 0000 1              DOUBLE               POSSIBLE OVERFLOW
 0182   REF   1               37,3711  0 3760 0              TC     CORANGOV      CORRECT FOR OVFL IF ANY
 0183                         37,3712  0 0006 1              EXTEND
 0184   REF   3  LAST  824    37,3713  61'672 0              SU     ROLL/PIP      GET INCR SINCE PIPUP
 0185   REF   3  LAST  824    37,3714  6 1664 1              AD     ROLL/180      ONLY SINGLE OVFL POSSIBLE.
 0186   REF   2  LAST  887    37,3715  0 3760 0              TC     CORANGOV      CORRECT FOR OVFL IF ANY
```

```
0187   REF   2  LAST  116   37,3716  55'770 1            TS      TEMPROLL

0188   REF 284  LAST  887   37,3717  4 0156 1            CS      MPAC +2        GET (ALFA EUL/180) /2
0189                        37,3720  6 0000 1            DOUBLE                 SAME AS FOR ROLL. NEEDED FOR EXT ATM DAP
0190   REF   3  LAST  887   37,3721  0 3760 0            TC      CORANGOV       CORRECT FOR OVFL IF ANY
0191                        37,3722  0 0006 1            EXTEND
0192   REF   2  LAST  111   37,3723  61'673 1            SU      ALFA/PIP
0193   REF   3  LAST  177   37,3724  6 1665 0            AD      ALFA/180
0194   REF   4  LAST  888   37,3725  0 3760 0            TC      CORANGOV       CORRECT FOR OVFL IF ANY
0195   REF   2  LAST  116   37,3726  55'771 0            TS      TEMPALFA

0196   REF 285  LAST  888   37,3727  4 0155 1            CS      MPAC +1        GET (BETA EUL/180) /2
0197                        37,3730  6 0000 1  CMTR2     DOUBLE
0198                        37,3731  0 0006 1            EXTEND
0199   REF   3  LAST  824   37,3732  61'674 0            SU      BETA/PIP
0200   REF   3  LAST  824   37,3733  6 1666 0            AD      BETA/180
0201   REF   2  LAST  116   37,3734  57'772 1            XCH     TEMPBETA       OVFL NOT EXPECTED.

0202   REF   4  LAST  535   37,3735  3 5051 0            CA      EBANK3
0203   REF  39  LAST  887   37,3736  54 003 0            TS      EBANK

0204   REF   1               E3,1446                     EBANK=  PHSNAMES
0205                        37,3737  0 0006 1            EXTEND
0206   REF   1              37,3740  3 3772 0            DCA     REPOSADR       THIS ASSUMES THAT THE   TC   PHASCHNG
0207   REF   2  LAST  888   37,3741  53'447 0            DXCH    PHSNAME5       IS NOT CHANGED IN       OCT  10035
A0208                                                                           SERVICER.

0209   REF   2  LAST  887   37,3742  3 5057 0            CA      EBAOG
0210   REF  40  LAST  888   37,3743  54 003 0            TS      EBANK

0211   REF  27  LAST  887   E6,1661                     EBANK=  AOG
0212                        37,3744  0 0006 1  REDOPOSE  EXTEND                 RE-STARTS COME HERE
0213   REF   3  LAST  888   37,3745  3 1771 1            DCA     TEMPROLL
0214   REF   4  LAST  887   37,3746  53'665 1            DXCH    ROLL/180
0215   REF   3  LAST  888   37,3747  3 1772 1            CA      TEMPBETA
0216   REF   4  LAST  888   37,3750  55'666 1            TS      BETA/180

0217                        37,3751  0 0003 1            RELINT

0218   REF 216  LAST  883   37,3752  0 6006 1            TC      INTPRET        CANT TC DANZIG AFTER PHASCHNG.
0219                        37,3753   51575 1  CM/POSE3  VLOAD   ABVAL          RETURN FROM CM/ATUP.  (RESTART)
0220   REF  17  LAST  883   37,3754   01177 1            VN                     2(-7)  M/CS
0221   REF   7  LAST  546   37,3755   03723 1            STORE   VMAGI          FOR DISPLAY ON CALL.

0222                        37,3756   77650 1            GOTO
0223   REF   5  LAST  845   37,3757   03324 1                    POSEXIT        ENDEXIT, STARTENT, OR SCALEPOP.

0224   REF  76  LAST  887   37,3760  54 001 1  CORANGOV  TS      L
0225   REF 179  LAST  834   37,3761  0 0002 0            TC      Q
0226   REF 191  LAST  871   37,3762  50 000 1            INDEX   A
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0227   REF   1              37,3763  3 5000 1          CA     LIMITS
0228   REF  77  LAST  888   37,3764  26 001 1          ADS    L
0229   REF 180  LAST  888   37,3765  0 0002 0          TC     Q              COSTS 2 MCT TO USE. SEE ANGOVCOR.

0230                        37,3766   45730 1 -KVSCALE 2DEC   -.81491944     -12800/(2 VS .3048)
0230                        37,3767   53410 1
0231                        37,3770   03146 1 TCDU     DEC    .1             TCDU = .1 SEC.

0232   REF  28  LAST  888   E6,1661                          EBANK= ADG
0233   REF   1              37,3771   03744 0 REPOSADR 2CADR  REDOPOSE
0233   REF   1              37,3772   76066 0
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 0001                          31,3700                 BANK   31
 00012  REF   1                36,2000                 SETLOC RTE1
 00014                         36,2466                 BANK

 0002   REF   3  LAST  280     E7,1631                 EBANK= RTEDVD
 0003   REF   1                                        COUNT  317/P37

R0050   PROGRAM DESCRIPTION - P37, RETURN TO EARTH

R0051   DESCRIPTION
R0052     A RETURN TO EARTH TRAJECTORY IS COMPUTED PROVIDED THE CSM IS OUTSIDE THE LUNAR SPHERE OF INFLUENCE AT THE
R0054   TIME OF IGNITION. INITIALLY A CONIC TRAJECTORY IS DETERMINED AND RESULTING IGNITION AND REENTRY PARAMETERS ARE
R0056   DISPLAYED TO THE ASTRONAUT. THEN IF THE ASTRONAUT SO DESIRES, A PRECISION TRAJECTORY IS DETERMINED WITH THE
R0058   RESULTING IGNITION AND REENTRY PARAMETERS DISPLAYED. UPON FINAL ACCEPTANCE BY THE ASTRONAUT, THE PROGRAM
R0060   COMPUTES AND STORES THE TARGET PARAMETERS FOR RETURN TO EARTH FOR USE BYSPS PROGRAM (P40) OR RCS PROGRAM (P41).

R0080   CALLING SEQUENCE
R0081     L       TC     P37

R0100   SUBROUTINES CALLED
R0101     PREC100
R0102       V2T100
R0103       RTENCK2
R0104       RTENCK3
R0105       TIMERAD
R0106       PARAM
R0107     V2T100
R0108       GAMDV10
R0109       XTILIM
R0110       DVCALC
R0111     RTENCK1
R0112       INTSTALL
R0113       INTEGRVS
R0114     RTEVN
R0115       RTEDISP
R0116       TMRAD100
R0117       AUGEKUGL
R0118       LAT-LONG
R0119     TMRAD100
R0120       TIMERAD
R0121     INVC100
R0122       CSMPREC
R0123     GETERAD
R01235    TIMETHET
R0124     P37OALRM
R0125     VN1645
R0126     POLY

R0150   ERASABLE INITIALIZATION REQUIRED
R0151     CSM STATE VECTOR
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R0152    NJETSFLG     NUMBER OF JETS IF THE RCS PROPULSION SYSTEM SELECTED   STATE FLAG     0=4 JETS  1=2 JETS

R0160  ASTRONAUT INPUT
R0161    SPRTETIG     TIME OF IGNITION (OVERLAYS TIG)                        DP      B28    CS
R0163    VPRED        DESIRED CHANGE IN VELOCITY AT TIG(PROGRM COMPUTED IF 0) DP      B7     METERS/CS
R0165    GAMMAEI      DESIRED FLIGHT PATH ANGLE AT REENTRY (COMPUTED IF 0)   DP      B0     REVS  + ABOVE HORIZ.
R0167    OPTION2      PROPULSION SYSTEM OPTION                               SP      B14    1=SPS. 2=RCS

R0180  OUTPUT
R0181    CONIC OR PRECISION TRAJECTORY DISPLAY
R0182      VPRED      VELOCITY MAGNITUDE AT 400,000 FT. ENTRY ALTITUDE       DP      B7     METERS/CS
R0184      T3TOT4     TRANSIT TIME TO 400,000 FT. ENTRY ALTITUDE             DP      B28    CS
R0186      GAMMAEI    FLIGHT PATH ANGLE AT 400,000 FT. ENTRY ALTITUDE        DP      B0     REVS  + ABOVE HORIZON
R0188      DELVLVC    INITIAL VELOCITY CHANGE VECTOR IN LOCAL VERTICAL COORD. VECTOR  B7     METERS/CS
R0190      LAT(SPL)   LATITUDE OF THE LANDING SITE                           DP      B0     REVS
R0192      LNG(SPL)   LONGITUDE OF THE LANDING SITE                          DP      B0     REVS
R0194    TARGETING COMPUTATION DISPLAY
R0195      TIG        RECOMPUTED TIG BASED ON THRUST OPTION                  DP      B28    CS
R0197      TTOGO      TIME FROM TIG                                          DP      B28    CS
R0199      +MGA       POSITIVE MIDDLE GIMBAL ANGLE                           DP      B0     REVS  -.02 IF REFSMFLG=0
R0201    THRUST PROGRAM COMMUNICATION
R0202      XDELVFLG   EXTERNAL DELTA V FLAG                                  STATE FLAG     SET 0 FOR LAMBERT AIMPT
R0204      NORMSW     LAMBERT AIMPT ROTATION SWITCH                          STATE FLAG     SET 0 FOR NO ROTATION
R0206      ECSTEER    CROSS PRODUCT STEERING CONSTANT                        SP      B2     SET 1
R0208      RTARG      CONICALLY INTEGRATED REENTRY POSITION VECTOR           VECTOR  B29    METERS
R0210      TPASS4     REENTRY TIME                                           DP      B28    CS

 0243  REF  89  LAST  861  36,2466  0 5412 0  P37       TC     PHASCHNG      P37 IS NOT RESTARTABLE.
 0244                      36,2467   00004 0            DCT    4

 0245  REF 217  LAST  888  36,2470  0 6006 1            TC     INTPRET
 0246                      36,2471   66170 1            AXT,1  SXA,1
 0247                      36,2472   04000 0            DCT    04000
 0248  REF   5  LAST  684  36,2473   03424 0                   ECSTEER
 02481                     36,2474   77745 1            DLOAD
 02482 REF  24  LAST  677  36,2475   15335 0                   ZEROVECS
 02483 REF   7  LAST  810  36,2476   03767 1            STORE  VPRED
 02484 REF   7  LAST  810  36,2477   03771 0            STORE  GAMMAEI
 0249                      36,2500   77776 1            EXIT
 0250  REF   1            36,2501  3 3246 1            CAF    V6N33RTE      INPUT TIG   STORED IN SPRTETIG
 0251  REF   1            36,2502  0 3235 0            TCR    P370GOF                     OVERLAYED WITH TIG
 0252                      36,2503  1 2501 0            TCF    -2            DESPLAY NEW DATA
 0253  REF   1            36,2504  3 3252 1            CAF    V6N60RTE      INPUT REENTRY ANGLE IN GAMMAEI
 0254  REF   1            36,2505  0 3211 0            TCR    P37GFRB1        AND DESIRED DELTA V IN RTEDVD
 0255                      36,2506  1 2504 0            TCF    -2            DISPLAY NEW DATA
 0500  REF 218  LAST  891  36,2507  0 6006 1  RTE299    TC     INTPRET
 0501                      36,2510   71331 0            SSP    DLOAD
 0502  REF   1            36,2511   00122 0                   OVFIND
 05025                     36,2512   00000 1                   0
 0503  REF   8  LAST  891  36,2513   03767 1                   VPRED
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0504   REF   4  LAST  890   36,2514   17632 0            STODL  RTEDVD
0505   REF   8  LAST  891   36,2515   03771 0                   GAMMAEI
0506   REF   3  LAST  280   36,2516   17634 0            STODL  RTEGAM2D
0509   REF   1              36,2517   33514 1                   IRTEB13
0510   REF   2  LAST  127   36,2520   17735 0            STODL  CONICX1
0511   REF   1              36,2521   33620 0                   C4RTE
0512   REF   2  LAST  127   36,2522   37652 1            STCALL MAMAX1
0513   REF   1              36,2523   64450 1                   INVC100        GET R(T1)/,V(T1)/,UR1/,UH/
051304                      36,2524   71214 0            CLEAR  DLOAD
051308 REF   1              36,2525   02662 1                   SLOWFLG
051312 REF   5  LAST  892   36,2526   03632 0                   RTEDVD
051316                      36,2527   51444 1            BPL    ABS
05132  REF   1              36,2530   74540 0                   RTE317
051324 REF   6  LAST  892   36,2531   03632 0            STORE  RTEDVD
051328                      36,2532   45345 1            DLOAD  DSU
051332 REF   2  LAST  127   36,2533   03646 0                   R(T1)
051336 REF   1              36,2534   33622 1                   K1RTE
05134                       36,2535   43040 1            BMN    SET
051344 REF   2  LAST  892   36,2536   74540 0                   RTE317
051348 REF   2  LAST  892   36,2537   02462 0                   SLOWFLG
0514                        36,2540   77545 0  RTE317    DLOAD  EXIT
05145  REF   3  LAST  892   36,2541   03646 0                   R(T1)
0515   REF   2  LAST  291   36,2542   0 7171 1           TC     POLY
0516                        36,2543   00002 0            DEC    2
0517                        36,2544   02544 0            2DEC   181000434.B-31
0517                        36,2545   35436 0
0518                        36,2546   14040 0            2DEC   1.507851458-2
0518                        36,2547   05066 1
0519                        36,2550   44052 0            2DEC*  -6.49993057E-9B27*
0519                        36,2551   60030 1
0520                        36,2552   26415 0            2DEC*  9.76938926E-18B56*
0520                        36,2553   25057 1
0521   REF 219  LAST  891   36,2554   0 6006 1           TC     INTPRET
0522                        36,2555   77752 1            SL1
0525   REF   2  LAST  127   36,2556   17654 0            STODL  MAMAX2          CO+C1*R+C2*R**2+C3*R**3=MAMAX2 B30
0526   REF   1              36,2557   33544 1                   M9RTEB28
0527   REF   2  LAST  127   36,2560   17730 0            STODL  NN1A
0528   REF   1              36,2561   33624 1                   K2RTE
0529   REF   2  LAST  127   36,2562   17636 1  RTE320    STODL  RCON            RCON=K2
0530   REF   4  LAST  892   36,2563   03634 0                   RTEGAM2D
0531                        36,2564   44254 1            BZE    BDSU
0532   REF   1              36,2565   74574 1                   RTE340         GOTORTE340 IF REENTRY ANGLE NOT INPUT
0533   REF   2  LAST  666   36,2566   33502 0                   1RTEB2
05335                       36,2567   71406 0            PUSH   COS                                          PL02D
0534                        36,2570   73525 1            PDDL   SIN
0535                        36,2571   45465 1            BDDV   STADR                                        PL00D
0536   REF   1              36,2572   40051 1            STCALL X(T2)           X(T2)=COT(GAM2D)                  B0
0537   REF   1              36,2573   74607 0                   RTE360
0538                        36,2574   45345 1  RTE340    DLOAD  DSU
0539   REF   4  LAST  892   36,2575   03646 0                   R(T1)
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0540   REF   2  LAST  892   36,2576   33622 1                 KIRTE
0541                        36,2577   71240 1          BMN    DLOAD
0542   REF   1              36,2600   74604 0                 RTE350
0543   REF   1              36,2601   33630 1                 K4RTE
0544   REF   2  LAST  892   36,2602   37726 0          STCALL X(T2)          X(T2)=K4
0545   REF   2  LAST  892   36,2603   74607 0                 RTE360
0546                        36,2604   77745 1  RTE350  DLOAD
0547   REF   1              36,2605   33626 0                 K3RTE
0548   REF   3  LAST  893   36,2606   03726 1          STORE  X(T2)          X(T2)=K3
0549                        36,2607   77624 1  RTE360  CALL
0550   REF   1              36,2610   65075 0                 V2T100
0551                        36,2611   52054 1          BZE    GOTO
0552   REF   1              36,2612   74614 1                 RTE367
0553   REF   1              36,2613   74776 1                 RTEALRM
0554                        36,2614   77775 1  RTE367  VLOAD
0555   REF   2  LAST  127   36,2615   03640 0                 R(T1)/
0556   REF   9  LAST  680   36,2616   16657 1          STODL  RVEC
0557   REF   3  LAST  892   36,2617   03636 1                 RCON
0558   REF   2  LAST   96   36,2620   26760 1          STOVL  RDESIRED
0559   REF   2  LAST  127   36,2621   03700 0                 V2(T1)/
0560   REF  13  LAST  680   36,2622   36746 1          STCALL VVEC
0561   REF   1              36,2623   64277 1                 TMRAD100
0562                        36,2624   77615 0          DAD
0563   REF   2  LAST  127   36,2625   03716 1                 T1
0570   REF   2  LAST  127   36,2626   17736 0          STODL  T2
0571   REF   5  LAST  892   36,2627   03634 0                 RTEGAM2D
0572                        36,2630   52054 1          BZE    GOTO
05725  REF   1              36,2631   74633 1                 RTE369
057251 REF   1              36,2632   74655 1                 RTE372
0573                        36,2633   51575 1  RTE369  VLOAD  ABVAL
0574   REF   2  LAST  127   36,2634   03710 1                 V(T2)/
0575                        36,2635   77776 1          EXIT
0576   REF   3  LAST  892   36,2636   0 7171 1         TC     POLY
0577                        36,2637   00002 0          DEC    2
0578                        36,2640   00000 1          2DEC   0
0578                        36,2641   00000 1
0579                        36,2642   47021 1          2DEC   -4.8760771E-2B4
0579                        36,2643   65002 0
0580                        36,2644   35610 0          2DEC   4.5419476E-4B11
0580                        36,2645   07722 1
0581                        36,2646   63772 0          2DEC   -1.4317675E-6B18
0581                        36,2547   63276 1
0582   REF 220  LAST  892   36,2650   0 6006 1         TC     INTPRET
05825                       36,2651   77615 0          DAD
05R251 REF   1              36,2652   01352 1                 RTED1
0583                        36,2653   52052 1          SL3    GOTO           X(T2),=D1+D2V2+D3V2**2+D4V2**3
0587   REF   1              36,2654   74657 0                 RTE373
0588                        36,2655   77745 1  RTE372  DLOAD                 X(T2),=X(T2)
0589   REF   4  LAST  893   36,2656   03726 1                 X(T2)
05895                       36,2657   41425 1  RTE373  DSU    PUSH           X(T2)ERR                        B0 PL02D
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058951 REF   5 LAST  893   36,2660   03726 1                    X(T2)
0590                       36,2661   53575 0          VLOAD     UNIT
0591   REF   2 LAST  127   36,2662   03656 1                    R(T2)/                                        858
0592   REF  15 LAST  812   36,2663   36152 1          STCALL    ALPHAV
0593   REF   3 LAST  812   36,2664   26505 0                    GETERAD
0594                       36,2665   77615 0          DAD
0606   REF   1            36,2666   33634 0                    E3RTE
0607                       36,2667   45206 1          PUSH      DSU             RCON,=(E1/(1+E2BETA11)**.5)+E3 B29 PL04D
0608   REF   4 LAST  893   36,2670   03636 1                    RCON
0609                       36,2671   45246 0          ABS       DSU
0610   REF   1            36,2672   33600 1                    EPC2RTE
0611                       36,2673   52040 1          BMN       GOTO
0612   REF   1            36,2674   74676 0                    RTE374
0613   REF   1            36,2675   74703 0                    RTE375
0614                       36,2676   51545 1  RTE374  DLOAD     ABS
0615                       36,2677   00001 0                    DOD
0617                       36,2700   50025 0          DSU       BMN
0618   REF   1            36,2701   33602 0                    EPC3RTE
0620   REF   1            36,2702   74753 0                    P37E
0621                       36,2703   43345 1  RTE375  DLOAD     DAD
0622   REF   3 LAST  892   36,2704   03730 0                    NN1A
0623   REF   1            36,2705   33522 1                    1RTEB28
0624                       36,2706   67240 0          BMN       SLOAD
0625   REF   1            36,2707   74713 1                    RTE380
0626   REF   1            36,2710   33562 0                    DCT605
0627                       36,2711   77650 1          GOTO
0628   REF   2 LAST  893   36,2712   74776 1                    RTEALRM         TOO MANY ITERATIONS
0629   REF   4 LAST  894   36,2713   03730 0  RTE380  STORE     NN1A
0630                       36,2714   53025 0          DSU       BZE
0631   REF   1            36,2715   33546 0                    M8RTEB28
0632   REF   1            36,2716   74734 1                    RTE385
0633                       36,2717   45345 1          DLOAD     DSU
0634                       36,2720   00001 0                    DOD
0635   REF   2 LAST  127   36,2721   03666 1                    DRCON
0636                       36,2722   65301 0          NORM      PDDL            X(T2)ERR-X(T2)ERR,=Z1                         PL06D
0637   REF  42 LAST  835   36,2723   00047 1                    X1
0638   REF   2 LAST  127   36,2724   03670 0                    RPRE,
0639                       36,2725   56225 1          DSU       DDV             X(T2)PRI-X(T2)=Z2                             PL04D
0640   REF   6 LAST  894   36,2726   03726 1                    X(T2)
06405                      36,2727   53605 1          DMP       SL*             DX(T2)=X(T2)ERR(Z2/Z1)
0641                       36,2730   00001 0                    DOD
06415                      36,2731   20201 0                    0,1
0642                       36,2732   77650 1          GOTO
06425  REF   1            36,2733   74736 0                    RTE390
0643                       36,2734   77745 1  RTE385  DLOAD                     DX(T2)=X(T2)ERR
06435                      36,2735   00001 0                    DOD
0644                       36,2736   14021 1  RTE390  STODL     16D             DX(T2)                                        PL02D
06445                      36,2737   77626 0                    STADR
0645   REF   5 LAST  894   36,2740   60141 0          STODL     RCON            RCON=RCON.
06455                      36,2741   77600 1          BOV
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064551 REF  3 LAST  893   36,2742   74607 0                    RTE360
0646   REF  3 LAST  894   36,2743   17666 1           STODL    DRCON       X(T2)ERR,=X(T2)ERR
06465  REF  7 LAST  894   36,2744   03726 1                    X(T2)
0647   REF  3 LAST  894   36,2745   17670 0           STODL    RPRE,       X(T2)PRI=X(T2)
06475                     36,2746   00021 1                    16D
0648                      36,2747   77615 0           DAD
06485  REF  8 LAST  895   36,2750   03726 1                    X(T2)
0649   REF  9 LAST  895   36,2751   37726 0           STCALL   X(T2)       X(T2)=X(T2)+DX(T2)
06495  REF  4 LAST  895   36,2752   74607 0                    RTE360      REITERATE
0650                      36,2753   77624 1 P37E      CALL                 DISPLAY CONIC SOLUTION
0651   REF  1             36,2754   75002 1                    RTEVN
0800                      36,2755   41345 0 RTE505    DLOAD    DMP
0801   REF  2 LAST  127   36,2756   03720 1                    PCON
0802   REF  2 LAST  127   36,2757   03754 1                    BETA1
0803                      36,2760   53021 1           BDSU     B7E
0804   REF  6 LAST  894   36,2761   03636 1                    RCON
0805   REF  1             36,2762   74770 1                    RTE510
0806                      36,2763   71240 1           BMN      DLOAD
0807   REF  2 LAST  895   36,2764   74770 1                    RTE510
0808   REF  3 LAST  892   36,2765   33502 0                    1RTEB2
0809                      36,2766   77650 1           GOTO                 ENTRY NEAR APOGEE
0810   REF  1             36,2767   74772 0                    RTE515
0811                      36,2770   57545 1 RTE510    DLOAD    DCOMP       ENTRY NEAR PERIGEE
0812   REF  4 LAST  895   36,2771   33502 0                    1RTEB2
0813   REF  2 LAST  127   36,2772   37761 0 RTE515    STCALL   PHI2
0814   REF  1             36,2773   64541 0                    PREC100     PRECISION TRAJECTORY COMPUTATION
0815                      36,2774   77654 0 RTE625    BZE
0816   REF  1             36,2775   75030 0                    P37G
0817                      36,2776   77624 1 RTEALRM   CALL
0818   REF  1             36,2777   64262 0                    P370ALRM
0818S                     36,3000   77776 1           EXIT
0819   REF  2 LAST  206   36,3001   1 2466 0          TCF      P37         RECYCLE AFTER ALARM DISPLAY
R0824
R0825                                   RETURN TO EARTH DISPLAY SUBROUTINE

0826                      36,3002   45020 1 RTEVN     STQ      CALL
0829   REF  2 LAST  127   36,3003   03763 0                    VNSTORE
0830   REF  1             36,3004   64316 1                    RTEDISP     DISPLAY PREPARATION
0831                      36,3005   77776 1           EXIT
0832   REF  1             36,3006   3 3250 0          CAF      V6N61RTE    LATITUDE,LONGITUDE,BLANK
0833   REF  1             36,3007   0 3221 0          TCR      P370GOFR      IN LAT(SPL),LNG(SPL),-
0834   REF  9 LAST  825   36,3010   3 5015 0          CAF      FOUR
0835   REF  1             36,3011   0 3215 1          TCR      37BLANK +1
0836                      36,3012   1 3017 0          TCF      +5
0837   REF  3 LAST  895   36,3013   1 2466 0          TCF      P37         RECYCLE
0841   REF  1             36,3014   3 3251 1          CAF      V6N39RTE    T21 HRS,MIN,SEC IN T3TOT4
0844   REF  2 LAST  891   36,3015   0 3235 0          TCR      P370GOF
0845   REF  4 LAST  895   36,3016   1 2466 0          TCF      P37         RECYCLE
0847   REF  2 LAST  891   36,3017   3 3252 1          CAF      V6N60RTE    DISPLAY BLANK,V(T2),FPA2
0848   REF  2 LAST  891   36,3020   0 3211 0          TCR      P37GFRB1      IN -,VPRED,GAMMAEI
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 0849   REF   5  LAST  895   36,3021  1 2466 0          TCF    P37            RECYCLE
 0856   REF   1              36,3022  3 3253 0          CAF    V6N81RTE       DISPLAY DELTA V (LV) IN DELVLVC
 0859   REF   3  LAST  895   36,3023  0 3235 0          TCR    P370GOF
 0860   REF   6  LAST  896   36,3024  1 2466 0          TCF    P37            RECYCLE
 08615  REF 221  LAST  893   36,3025  0 6006 1          TCR    INTPRET
 0862                        36,3026   77650 1          GOTO
 0863   REF   3  LAST  895   36,3027   03763 0                 VNSTORE

R0864   PRECISION DISPLAY,TARGETING COMPUTATION AND RTE END PROCESSING

 0865                        36,3030   77624 1  P37G    CALL
 0866   REF   2  LAST  895   36,3031   75002 1                  RTEVN
 0867                        36,3032   77776 1          EXIT
 0868   REF  14  LAST  778   36,3033  3 5023 0  P37N    CAF    SEVEN
 0869   REF   6  LAST  617   36,3034  55'131 1          TS     OPTION1
 0870   REF  99  LAST  870   36,3035  3 5017 1          CAF    ONE
 0871   REF  11  LAST  739   36,3036  55'132 1          TS     OPTION2
 0872   REF   1              36,3037  3 3247 0          CAF    V4N06RTE       DISPLAY RCS OR SPS OPTION  SPS ASSUMED
 0873   REF   4  LAST  896   36,3040  0 3235 0          TCR    P370GOF
 0874                        36,3041  1 3037 1          TCF    -2             RECYCLE
 0875   REF 222  LAST  895   36,3042  0 6006 1          TC     INTPRET        PROCEED
 0876                        36,3043   67201 0          SETPD  SLOAD
 0877                        36,3044   00001 0                 00D
 0878   REF  12  LAST  996   36,3045   01133 1                 OPTION2
 0879                        36,3046   53025 0          DSU    BZE
 0880   REF   2  LAST  892   36,3047   33514 1                 1RTE813
 0881   REF   1              36,3050   75057 1                 P37Q
 0882                        36,3051   60335 1          SLOAD  NORM           SPS
 0883   REF   3  LAST  727   36,3052   00111 0                 EMOOT
 0884   REF  43  LAST  894   36,3053   00047 1                 X1
 0885                        36,3054   52125 0          PDDL   GOTO
 0886   REF   1              36,3055   33552 0                 VCSPS
 0887   REF   1              36,3056   75070 1                 P37T
 0888                        36,3057   43145 0  P37Q    DLOAD  BON            RCS
 0889   REF   1              36,3060   33556 1                 MDOTRCS
 0890   REF   3  LAST  726   36,3061   00700 0                 NJETSFLG
 0891   REF   1              36,3062   75064 1                 P37R
 0892                        36,3063   77752 1          SL1
 0893                        36,3064   77752 1  P37R    SL1
 0894                        36,3065   65301 0          NORM   PDDL
 0895   REF  44  LAST  896   36,3066   00047 1                 X1
 0896   REF   1              36,3067   33554 0                 VCRCS
 0897                        36,3070   56325 0  P37T    PDDL   DDV            DV/VC                  B7 -B5 = B2 PL02D
 0898   REF   2  LAST  127   36,3071   03706 0                 DV
 0899                        36,3072   77776 1          EXIT
 0900   REF   4  LAST  893   36,3073  0 7171 1          TC     PBLY
 0901                        36,3074   00001 0          DEC    1
 0902                        36,3075   00001 0          2DEC   5.66240507E-48-3
 0902                        36,3076   05070 0
 0903                        36,3077   17527 1          2DEC   9.79487897E-18-1
 0903                        36,3100   36700 0
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0904                                36,3101   47114 0          ZDEC    -.38828195B1
0904                                36,3102   70670 1
0905   REF 223  LAST  896           36,3103   0 6005 1         TC      INTPRET
0906                                36,3104   67206 1          PUSH    SLOAD           (1-E)**(-DV/VC)=A                  B3 PL04D
0907   REF   8  LAST  727           36,3105   03076 0                  WEIGHT/G
0908                                36,3106   56205 0          DMP     DDV             DT8=(MO/MDOT)A       B16+B3-B3=B16 PL00D
0909                                36,3107   41257 1          SL*     DMP
0910                                36,3110   20165 1                  0 -12D,1
0911   REF   1                      36,3111   33560 1                  CSUBT
0912                                36,3112   77621 1          BDSU
0913   REF   3  LAST  893           36,3113   03716 1                  T1
0914   REF  68  LAST  721           36,3114   03413 1          STORE   TIG             TIG=T1-CT*DTB                      B28
0915                                36,3115   77776 1          EXIT
0916   REF   2  LAST  891           36,3116   3 3246 1         CAF     V6N33RTE        DISPLAY BIASED TIG
0917   REF   5  LAST  896           36,3117   0 3235 0         TCR     P370GOF
0918                                36,3120   1 3116 0         TCF     -2
09184  REF 158  LAST  887           36,3121   3 5021 1         CAF     ZERO
09185  REF  10  LAST  829           36,3122   55'125 1         TS      VHFCNT
09186  REF   7  LAST  829           36,3123   55'126 1         TS      TRKMKCNT
0919   REF 224  LAST  897           36,3124   0 6006 1         TC      INTPRET
09195                               36,3125   77624 1          CALL                    CONICALLY INTEGRATE FROM R1,V1 OVER T12
091951 REF   1                      36,3126   63700 0                  RTENCK1                                            PL00D
0920                                36,3127   53575 0          VLOAD   UNIT
092001 REF   3  LAST  894           36,3130   03656 1                  R(T2)/
092005                              36,3131   74315 0          PDVL    VXSC            UR2                                B1 PL06D
09201  REF   2  LAST  127           36,3132   03740 1                  UR1/
092015 REF   1                      36,3133   33564 0                  MCOS7.5
09202                               36,3134   74315 0          PDVL    VXSC            -UR1(COS7.5)                       B1 PL12D
092025 REF   1                      36,3135   03746 1                  UH/
09203  REF   1                      36,3136   33566 1                  MSIN7.5
092035                              36,3137   50255 0          VAD     DOT             K/=-UR1(COS7.5)-UH(SIN7.5)         B2 PL00D
09204                               36,3140   50015 0          DAD     BMN
092045 REF   1                      36,3141   33570 0                  MCOS22.5
09205  REF   1                      36,3142   75167 0                  P37W
092055                              36,3143   50375 0          VLOAD   DOT             K/ . UR2 GR COS22.5
09206  REF   2  LAST  897           36,3144   03746 1                  UH/
092065 REF   4  LAST  897           36,3145   03656 1                  R(T2)/
09207                               36,3146   71240 1          BMN     DLOAD
092075 REF   1                      36,3147   75153 1                  P37U
09208  REF   1                      36,3150   33572 1                  THETA165
092085                              36,3151   52006 0          PUSH    GOTO
09209  REF   1                      36,3152   75155 1                  P37V
092095                              36,3153   41545 0  P37U    DLOAD   PUSH
0921   REF   1                      36,3154   33574 1                  THETA210
092105                              36,3155   77756 0  P37V    SIN
09211  REF  10  LAST  680           36,3156   16732 0          STODL   SNTH
092115                              36,3157   43146 0          COS     CLEAR
09212  REF   7  LAST  680           36,3160   03666 1                  RVSW
092125 REF   8  LAST  680           36,3161   26734 0          STOVL   CSTH
09213  REF   3  LAST  893           36,3162   03640 0                  R(T1)/
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 092135 REF  10 LAST  893   36,3163   26657 1          STOVL  RVEC
 09214  REF   3 LAST  893   36,3164   03700 0                 V2(T1)/
 092145 REF  14 LAST  893   36,3165   36746 1          STCALL VVEC
 09215  REF   8 LAST  680   36,3166   24744 0                 TIMETHET
 0922                       36,3167   43014 0  P37W     CLEAR  CLEAR
 0923   REF   9 LAST  710   36,3170   01267 0                 XDELVFLG
 0924   REF   6 LAST  723   36,3171   03665 1                 NORMSW
 0925                       36,3172   77214 0          SET    VLOAD
 0926   REF   9 LAST  659   36,3173   01071 0                 FINALFLG
 0927                       36,3174   77626 0          STADR
 0928   REF  10 LAST  555   36,3175   60362 0          STODL  RTARG
 0929   REF   5 LAST  554   36,3176   00037 0                 T
 0933                       36,3177   77615 0          DAD
 0934   REF   4 LAST  897   36,3200   03716 1                 T1
 0936   REF  13 LAST  712   36,3201   27656 1          STOVL  TPASS4
 0937   REF   4 LAST  898   36,3202   03700 0                 V2(T1)/
 0938                       36,3203   77651 0          VSU
 0939   REF   2 LAST  127   36,3204   03672 1                 V(T1)/
 0940   REF  13 LAST  711   36,3205   37646 1          STCALL DELVSIN
 0941   REF   7 LAST  659   36,3206   73002 1                 VN1645
 0942                       36,3207   77650 1          GOTO
 0943   REF   2 LAST  897   36,3210   75167 0                 P37W
R0948
R0949   SUBROUTINE TO GO TO GOFLASHR AND BLANK R1

 0950                       36,3211   0 0006 1  P37GFRB1 EXTEND
 0951   REF   2 LAST  127   36,3212   23'762 0          QXCH   SPRTEX
 0952   REF   2 LAST  895   36,3213   0 3221 0          TCR    P370GOFR
 0953   REF 100 LAST  696   36,3214   3 5017 1  37BLANK  CAF    ONE
 0954   REF  12 LAST  756   36,3215   0 5526 0          TCR    BLANKET
 0955   REF  96 LAST  831   36,3216   1 5217 1          TCF    ENDOFJOB
 0956   REF   3 LAST  898   36,3217   0 1762 0          TC     SPRTEX          RECYCLE
 0957   REF   1             36,3220   1 3244 1          TCF    P37PROC         PROCEED
R0958
R0959   SUBROUTINE TO GO TO GOFLASHR

 0960                       36,3221   0 0006 1  P370GOFR EXTEND
 0961   REF   2 LAST  127   36,3222   23'733 1          QXCH   RTENCKEX
 0962   REF 237 LAST  874   36,3223   0 4662 1          TCR    BANKCALL
 0963   REF  14 LAST  798   36,3224    21057 0          CADR   GOFLASHR
 0964   REF  70 LAST  801   36,3225   1 4106 0          TCF    GOTOPOOH        TERMINATE
 0965                       36,3226   1 3231 0          TCF    +3
 0966                       36,3227   1 3233 1          TCF    +4
 0967   REF   3 LAST  898   36,3230   0 1733 1          TC     RTENCKEX        IMMEDIATE RETURN
 0968   REF   4 LAST  898   36,3231   51'733 1          INDEX  RTENCKEX        PROCEED
 0969                       36,3232   1 0004 1          TCF    0 +4
 0970   REF   5 LAST  898   36,3233   51'733 1          INDEX  RTENCKEX        RECYCLE
 0971                       36,3234   1 0003 0          TCF    0 +3
R0973
R0974   SUBROUTINE TO GO TO GOFLASH
```

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0975                                36,3235  0 0006 1  P37GOF   EXTEND
0976  REF   4  LAST  898            36,3236  23'762 0          QXCH    SPRTEX
0977  REF 238  LAST  898            36,3237  0 4662 1          TCR     BANKCALL
0978  REF  44  LAST  800            36,3240   20720 0          CADR    GOFLASH
0979  REF  71  LAST  898            36,3241  1 4106 0          TCF     GOTOPOOH
0980                                36,3242  1 3244 1          TCF     +2
0981  REF   5  LAST  899            36,3243  0 1762 0          TC      SPRTEX
0982  REF   6  LAST  899            36,3244  51'762 0  P37PROC  INDEX   SPRTEX
0983                                36,3245  1 0001 1          TCF     0 +1
0985                                36,3246   01441 1  V6N33RTE VN      0633
0986                                36,3247   01006 0  V4N06RTE VN      0406
0987                                36,3250   01475 0  V6N61RTE VN      0661
0988                                36,3251   01447 1  V6N39RTE VN      0639
0989                                36,3252   01474 1  V6N60RTE VN      0660
0990                                36,3253   01521 0  V6N81RTE VN      0681
0996                                32,2262                   BANK    32
0997  REF   1                       32,2000                   SETLOC  RTE
0998                                32,2262                   BANK
0999  REF   1                                                 COUNT   32/RTE
```

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P1000   ALARM DISPLAY SUBROUTINE
 1050                           32,2262   77420 1  P37OALRM STQ     EXIT
 1051   REF    7  LAST  899     32,2263   03762 1                   SPRTEX
 1055   REF  286  LAST  888     32,2264  3 0154 1           CA      MPAC
 1056   REF    3  LAST  652     32,2265  0 5764 1           TC      VARALARM
 1057   REF    1                32,2266  3 2276 0           CAF     V5N09RTE
 1058   REF  239  LAST  899     32,2267  0 4662 1           TC      BANKCALL
 1059   REF   45  LAST  899     32,2270   20720 0           CADR    GOFLASH
 1060   REF   72  LAST  899     32,2271  1 4106 0           TCF     GOTOPOOH
 1061                           32,2272  1 2266 0           TCF     -4
 1062   REF  225  LAST  897     32,2273  0 6006 1           TC      INTPRET
 1063                           32,2274   77650 1           GOTO
 1064   REF    8  LAST  900     32,2275   03762 1                   SPRTEX
 1065                           32,2276   01211 1  V5N09RTE VN      0509
```

P2000 TIME RADIUS CALLING SUBROUTINE

R2001	INPUT				
R2002	RVEC	INITIAL POSITION VECTOR	VECTOR	B29	METERS
R2004	VVEC	INITIAL VELOCITY VECTOR	VECTOR	B7	METERS/CS
R2006	RDESIRED	FINAL RADIUS FOR WHICH TRANSFER TIME IS TO BE COMPUTED	DP	B29	METERS
R2008	CONICXI	X1 SETTING FOR CONIC SUBROUTINES -2 = EARTH	SP	B14	
R2010	OUTPUT				
R2011	R(T2)/	FINAL POSITION VECTOR	VECTOR	B29	METERS
R2013	V(T2)/	FINAL VELOCITY VECTOR	VECTOR	B7	METERS/CS
R2015	T12	TRANSFER TIME TO FINAL RADIUS	DP	B28	CS

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2100                        32,2277  43020 1  TMRAD100 STQ     CLEAR
2101  REF   6  LAST  898   32,2300  03733 0                    RTENCKEX
2102  REF   8  LAST  897   32,2301  03666 1                    RVSW
2103                        32,2302  67164 0           AXC,2   SXA,2
2104                        32,2303  20000 0           DCT     20000
2105  REF   2  LAST   96    32,2304  02756 1                    SGNPDOT
2106                        32,2305  45140 0           LXC,1   CALL
2107  REF   3  LAST  892   32,2306  03734 1                    CONICX1
2108  REF   1               32,2307  25556 0                    TIMERAD
2109  REF   3  LAST  893   32,2310  27710 1           STOVL   V(T2)/                    PLOOD
2110                        32,2311  77626 0           STADR
2111  REF   5  LAST  897   32,2312  60121 0           STODL   R(T2)/
2112  REF   7  LAST  898   32,2313  00037 0                    T
2113  REF   3  LAST  128   32,2314  37724 1           STCALL  T12
2114  REF   7  LAST  901   32,2315  03733 0                    RTENCKEX
```

P2200 DISPLAY CALCULATION SUBROUTINE

R2201 DESCRIPTION
R2202 OUTPUT FOR DISPLAY IS CONVERTED TO PROPER UNITS AND PLACED IN OUTPUT STORAGE REGISTERS. LANDING SITE
R2204 COMPUTATION FOR DETERMINING LANDING SITE LATITUDE AND LONGITUDE IS INCLUDED IN THE ROUTINE.

R2206 CALLING SEQUENCE
R2207 L CALL
R2208 L+1 RTEDISP

R2209 SUBROUTINES CALLED
R2210 TMRADIOO
R2211 AUGEKUGL
R2212 LAT-LONG

R2213 ERASABLE INITIALIZATION REQUIRED
R2214 PUSHLIST
R2215 NONE
R2216 MPAC
R2217 NONE
R2218 OTHER

R2219	R(T2)/	FINAL POSITION VECTOR	VECTOR	B29	METERS
R2221	V(T2)/	FINAL VELOCITY VECTOR	VECTOR	B7	METERS/CS
R2223	T2	FINAL TIME	DP	B28	CS
R2225	V2(T1)/	POST IMPULSE INITIAL VELOCITY VECTOR	VECTOR	B7	METERS/CS
R2227	V(T1)/	INITIAL VELOCITY VECTOR	VECTOR	B7	METERS/CS
R2229	URI/	UNIT INITIAL VECTOR	VECTOR	B1	
R2231	UH/	UNIT HORIZONTAL VECTOR	VECTOR	B1	

R2233 OUTPUT

R2234	VPRED	VELOCITY MAGNITUDE AT 400,000 FT. ENTRY ALTITUDE	DP	B7	METERS/CS
R2236	T3TOT4	TRANSIT TIME TO 400,000 FT. ENTRY ALTITUDE	DP	B28	CS
R2238	GAMMAEI	FLIGHT PATH ANGLE AT 400,000 FT. ENTRY ALTITUDE	DP	B0	REVS + ABOVE HORIZ
R2240	DELVLVC	INITIAL VELOCITY CHANGE VECTOR IN LOCAL VERTICAL COORD.	VECTOR	B7	METERS/CS
R2242	LAT(SPL)	LATITUDE OF THE LANDING SITE	DP	B0	REVS
R2244	LNG(SPL)	LONGITUDE OF THE LANDING SITE	DP	B0	REVS

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2275                          32,2316   77220 1  RTEDISP  STQ     VLOAD           DISPLAY
2276  REF   9  LAST  900      32,2317   03762 1                    SPRTEX
2277  REF   4  LAST  901      32,2320   03710 1                    V(T2)/
2278                          32,2321   65256 0            UNIT    PDDL
2279                          32,2322   00045 0                    36D
2280  REF   9  LAST  891      32,2323   17767 1            STODL   VPRED           V(T2)
2281  REF   3  LAST  893      32,2324   03736 0                    T2
2282                          32,2325   77625 0            DSU
2283  REF   1                 32,2326   03413 1                    SPRTETIG
2284  REF   2  LAST  272      32,2327   26641 0            STOVL   T3TOT4          T21
2285  REF   6  LAST  901      32,2330   03656 1                    R(T2)/
2286                          32,2331   50256 0            UNIT    DOT
22865                         32,2332   77752 1            SL1
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2287                          32,2333  44326 0          ARCCOS BDSU
2288   REF   5  LAST  895     32,2334  33502 0                 1RTEB2
2289   REF   9  LAST  892     32,2335  27771 0          STOVL  GAMMAEI        FLIGHT PATH ANGLE T2
2290   REF   5  LAST  898     32,2336  03700 0                 V2(T1)/
2291                          32,2337  41451 1          VSU    PUSH
2292   REF   3  LAST  898     32,2340  03672 1                 V(T1)/
2293                          32,2341  57441 1          DOT    DCOMP
2294   REF   3  LAST  897     32,2342  03740 1                 UR1/
2295                          32,2343  41515 0          PDVL   PUSH
2296                          32,2344  63345 0          DLOAD  PDVL
2297   REF   1                32,2345  33524 1                 ZERORTE
2298                          32,2346  55441 0          DOT    VDEF
2299   REF   3  LAST  897     32,2347  03746 1                 UH/
22995                         32,2350  77772 0          VSL1
2300   REF  19  LAST  678     32,2351  17405 0          STODL  DELVLVC
230004 REF  20  LAST  903     32,2352  03405 0                 DELVLVC
23001                         32,2353  57414 1          BOFF   DCOMP
230012 REF   1                32,2354  02741 1                 RETROFLG
230014 REF   1                32,2355  64357 1                 RTD1B
230016 REF  21  LAST  903     32,2356  03405 0          STORE  DELVLVC        NEGATE X COMPONENT, RETROGRADE
230018                        32,2357  51575 1  RTD1B   VLOAD  ABVAL
230019 REF  22  LAST  903     32,2360  03405 0                 DELVLVC
23002  REF   8  LAST  719     32,2361  27773 1          STOVL  VGDISP
2301   REF   7  LAST  902     32,2362  03656 1                 R(T2)/
2302   REF  11  LAST  898     32,2363  02657 1          STORE  RVEC           ***** LANDING SITE COMPUTATION *****
2303                          32,2364  45246 0          ABVAL  DSU
2304   REF   1                32,2365  33550 1                 3048ORTE
2305   REF   3  LAST  393     32,2366  26760 1          STOVL  RDESIRED
2306   REF   5  LAST  902     32,2367  03710 1                 V(T2)/
2307   REF  15  LAST  898     32,2370  36746 1          STCALL VVEC
2308   REF   2  LAST  893     32,2371  64277 1                 TMRADLOO      R3,V3,T23 FROM TIMERAD
2309                          32,2372  53575 0          VLOAD  UNIT
2310   REF   8  LAST  903     32,2373  03656 1                 R(T2)/
2311                          32,2374  53515 0          PDVL   UNIT           UR3                          PL06D
2312   REF   6  LAST  903     32,2375  03710 1                 V(T2)/
2313                          32,2376  72441 0          DOT    SL1            GAMMAE=ARCSIN(UR3 . UV3)     PL00D
2314                          32,2377  65336 1          ARCSIN PDDL           V(T3)                        PL02D
2315                          32,2400  00045 0                 36D
2316                          32,2401  51525 1          PDDL   ABS
2317                          32,2402  45006 0          PUSH   CALL           /GAMMAE/                     PL04D
2318   REF   2  LAST  643     32,2403  64075 1                 AUGEKUGL       PHIE                         PL06D
2319                          32,2404  43215 0          DAD    DAD
2320   REF   4  LAST  901     32,2405  03724 0                 T12            T23
2321   REF   4  LAST  902     32,2406  03736 0                 T2
2322                          32,2407  00003 1          STORE  02D             T(LS) = T2&T23&TE
232204                        32,2410  53135 0          SLOAD  BZE
232208 REF   2  LAST  116     32,2411  03377 1                 P37RANGE
232212 REF   1                32,2412  64414 1                 RTD22
232216                        32,2413  00005 1          STORE  04D             OVERRIDE RANGE (PCR 261)
23222                         32,2414  73545 1  RTD22   DLOAD  SIN
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2323                                32,2415   00005 1                 04D
2325   REF   3 LAST  280            32,2416   17403 0     STODL   LNG(SPL)      LNG(SPL)=SIN(PHIE)                PL04D
2326                                32,2417   77746 1     COS
2327   REF   9 LAST  845            32,2420   03401 1     STORE   LAT(SPL)      LAT(SPL)=COS(PHIE)
2328                                32,2421   53575 0     VLOAD   UNIT
2329   REF   9 LAST  903            32,2422   03656 1             R(T2)/
2330                                32,2423   41406 0     PUSH    PUSH
2331                                32,2424   53515 0     PDVL    UNIT                                              PL22D
2332   REF   7 LAST  903            32,2425   03710 1             V(T2)/
2333                                32,2426   47315 0     PDVL    VXV
2334                                32,2427   53435 0     VXV     UNIT          UH3=UNIT(UR3 X UV3 X UR3)           PL10D
2335                                32,2430   63361 0     VXSC    PDVL
2336   REF   4 LAST  904            32,2431   03403 0             LNG(SPL)
2337                                32,2432   53361 0     VXSC    VAD                                               PL04D
2338   REF  10 LAST  904            32,2433   03401 1             LAT(SPL)
2340                                32,2434   43014 0     CLEAR   CLEAR         T(LS) IN MPAC
2341   REF  11 LAST  845            32,2435   00662 0             ERADFLAG
2342   REF  20 LAST  845            32,2436   01663 0             LUNAFLAG
23425  REF  16 LAST  894            32,2437   16152 0     STODL   ALPHAV        ALPHAV=UR3(COSPHIE)+UH3(SINPHIE)    PL02D
2343                                32,2440   77624 1     CALL
2344   REF   6 LAST  802            32,2441   26370 1             LAT-LONG
2345                                32,2442   77745 1     DLOAD
2346   REF  10 LAST  845            32,2443   01104 0             LAT
2347   REF  11 LAST  904            32,2444   17401 1     STODL   LAT(SPL)      LATITUDE LANDING SITE   *****
2348   REF   7 LAST  610            32,2445   01106 1             LONG
2349   REF   5 LAST  904            32,2446   37403 1     STCALL  LNG(SPL)      LONGITUDE LANDING SITE  *****
2350   REF  10 LAST  902            32,2447   03762 1             SPRTEX
2400   REF   2 LAST  899 TO  904:    118    118*        COUNT*  $$/RTE
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P2500   INITIAL VECTOR SUBROUTINE

R2501   DESCRIPTION
R2502     A PRECISION INTEGRATION OF THE STATE VECTOR TO THE TIME OF IGNITION ISPERFORMED.PRECOMPUTATIONS OCCUR.

R2504   CALLING SEQUENCE
R2505     L      CALL
R2506     L+1            INVC100

R2507   NORMAL EXIT MODE
R2508     AT L+2 OF CALLING SEQUENCE WITH MPAC = 0

R2509   ALARM EXIT MODE
R2510     AT L+2 OF CALLING SEQUENCE WITH MPAC = OCTAL 612 FOR STATE VECTOR IN MOONS SPHERE OF INFLUENCE

R2512   SUBROUTINES CALLED
R2513     CSMPREC

R2514   ERASABLE INITIALIZATION REQUIRED
R2515     PUSHLIST
R2516       NONE
R2517     MPAC
R2518       NONE
R2519     OTHER
R2520       SPRTETIG    TIME OF IGNITION                                    DP      B28     CS
R2522       CSM STATE VECTOR

R2523   OUTPUT
R2524     R(T1)/          INITIAL POSITION VECTOR AT TIG                    VECTOR  B29     METERS
R2526     V(T1)/          INITIAL VELOCITY VECTOR AT TIG                    VECTOR  B7      METERS/CS
R2528     T1              INITIAL VECTOR TIME (TIG)                         DP      B28     CS
R2530     UR1/            UNIT INITIAL VECTOR                               VECTOR  B1
R2532     UH/             UNIT HORIZONTAL VECTOR                            VECTOR  B1
R2534     CFPA            COSINE OF INITIAL FLIGHT PATH ANGLE               DP      B1

 2600                               32,2450   71220 1  INVC100  STQ     DLOAD
 2601   REF  11  LAST  904          32,2451   03762 1           SPRTEX
 2602   REF   2  LAST  902          32,2452   03413 1           SPRTETIG
 2603   REF  45  LAST  780          32,2453   34041 0           STCALL  TDEC1
 2604   REF   8  LAST  780          32,2454   27071 1           CSMPREC         PRECISION INTEGRATION  R0,V0 TO R1,V1
 2605                               32,2455   67175 0           VLOAD   SXA,2
 2606   REF  33  LAST  780          32,2456   00001 0           RATT
 2607   REF   2  LAST  127          32,2457   03755 0           P(T1)
 2608   REF   4  LAST  897          32,2460   27640 0           STOVL   R(T1)/
 2609   REF  25  LAST  780          32,2461   00007 0           VATT
 2610   REF   4  LAST  903          32,2462   17672 1           STODL   V(T1)/
 2611   REF   8  LAST  512          32,2463   00015 0           TAT
 2612   REF   5  LAST  898          32,2464   03716 1           STORE   T1
 2613                               32,2465   53135 0           SLOAD   BZF
 2614   REF   3  LAST  905          32,2466   03756 0           P(T1)
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2615  REF  1                 32,2467  64473 0                 INVC109
2624                         32,2470  52135 1  INVC107  SLOAD  GOTO
2625  REF  1                 32,2471  33563 1                 OCT612
2626  REF  3  LAST  894      32,2472  74776 1                 RTEALRM      R1,V1 NOT IN PROPER SPHERE OF INFLUENCE
2650                         32,2473  53575 0  INVC109  VLOAD  UNIT
2651  REF  5  LAST  905      32,2474  03640 0                 R(T1)/
2652  REF  4  LAST  903      32,2475  17740 1          STODL  UR1/         UR1/                          B1
2653                         32,2476  00045 0                 36D
2654  REF  5  LAST  892      32,2477  27646 0          STOVL  R(T1)        R(T1)                         B29
2655  REF  5  LAST  905      32,2500  03672 1                 V(T1)/
2656                         32,2501  77656 1          UNIT
2657  REF  3  LAST  128      32,2502  03746 1          STORE  UV1/
2658                         32,2503  72441 0          DOT    SL1
2659  REF  5  LAST  906      32,2504  03740 1                 UR1/
2660  REF  2  LAST  127      32,2505  03757 1          STORE  CFPA         CFPA                          B1
2661                         32,2506  45246 0          ABS    DSU
2662  REF  1                 32,2507  33576 0                 EPC1RTE
2663                         32,2510  71240 1          BMN    DLOAD
2664  REF  1                 32,2511  64520 1                 INVC115      NOT NEAR RECTILINEAR
2665  REF  6  LAST  903      32,2512  33502 0                 1RTEB2
2666                         32,2513  41525 0          PDDL   PUSH
2668  REF  2  LAST  903      32,2514  33524 1                 ZERORTE
2669                         32,2515  41466 0          VDEF   PUSH         N/ = (0,0,1)
2670                         32,2516  77650 1          GOTO
2671  REF  1                 32,2517  64524 0                 INVC120
2672                         32,2520  47375 0  INVC115  VLOAD  VXV
2673  REF  6  LAST  906      32,2521  03740 1                 UR1/
2674  REF  4  LAST  906      32,2522  03746 1                 UV1/
2675                         32,2523  77606 1          PUSH                 N/ = UR X UV                  B2
2676                         32,2524  71214 0  INVC120  CLEAR  DLOAD
2677  REF  2  LAST  903      32,2525  02661 1                 RETROFLG
2678                         32,2526  51006 0          PUSH   BPL
2679  REF  1                 32,2527  64533 0                 INVC125
2680                         32,2530  57575 1          VLOAD  VCOMP        RETROGRADE ORBIT
2681                         32,2531  43006 0          PUSH   SET
2683  REF  3  LAST  906      32,2532  02461 0                 RETROFLG
2684                         32,2533  77775 1  INVC125  VLOAD
2685                         32,2534  53435 0          VXV    UNIT
2686  REF  7  LAST  906      32,2535  03740 1                 UR1/
2687  REF  4  LAST  903      32,2536  03746 1          STORE  UH/          UH/                           B1
2688                         32,2537  77650 1          GOTO
2689  REF  12 LAST  905      32,2540  03762 1                 SPRTEX
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P3000   PRECISION TRAJECTORY COMPUTATION SUBROUTINE

R3001   DESCRIPTION
R3002     A NUMERICALLY INTEGRATED TRAJECTORY IS GENERATED WHICH FOR THE RETURN TO EARTH PROBLEM SATISFIES THE REENTRY
R3004   CONSTRAINTS (RCON AND X(T2)) ACHIEVED BY THE INITIAL CONIC TRAJECTORY AND MEETS THE DVD REQUIREMENT AS CLOSELY
R3006   AS POSSIBLE.
R3007
R3010   CALLING SEQUENCE
R3011     L       CALL
R3012     L+1             PRECI00

R3013   NORMAL EXIT MODE
R3014     AT L+2 OF CALLING SEQUENCE WITH MPAC = 0

R3015   ALARM EXIT MODE
R3016     AT L+2 OF CALLING SEQUENCE WITH MPAC =
R3017          OCTAL 605        FOR EXCESS ITERATIONS
R3018          OCTAL 613        FOR REENTRY ANGLE OUT OF LIMITS

R3019   SUBROUTINES CALLED
R3020     INTSTALL
R3021     RTENCK2
R30215    RTENCK3
R3022     TIMERAD
R3023     PARAM
R3024     V2T100

R3025   ERASABLE INITIALIZATION REQUIRED
R3026     PUSHLIST
R3027       NONE
R3028     MPAC
R3029       NONE
R3030     OTHER
R3031       R(T1)/      INITIAL POSITION VECTOR                                  VECTOR  B29/B27 METERS
R3033       V2(T1)/     POST IMPULSE INITIAL VELOCITY VECTOR                     VECTOR  B7/B5   METERS/CS
R3035       V(T1)/      INITIAL VELOCITY VECTOR                                  VECTOR  B7/B5   METERS/CS
R3039       T1          INITIAL VECTOR TIME                                      DP      B28     CS
R3041       T12         INITIAL TO FINAL POSITION TIME                           DP      B28     CS
R3045       RCON        CONIC FINAL RADIUS                                       DP      B29/B27 METERS
R3047       R(T1)       MAGNITUDE OF INITIAL POSITION VECTOR                     DP      B29/B27 METERS
R3049       X(T2)       COTANGENT OF FINAL FLIGHT PATH ANGLE                     DP      B0
R3051       X(T1)       COTANGENT OF INITIAL FLIGHT PATH ANGLE                   DP      B5
R3057       RTEDVD      DELTA VELOCITY DESIRED                                   DP      B7/B5   METERS/CS
R3059       MAMAX1      MAJOR AXIS LIMIT FOR LOWER BOUND ON GAMDV ITERATOR       DP      B30/B28 METERS
R3061       MAMAX2      MAJOR AXIS LIMIT FOR UPPER BOUND ON GAMDV ITERATOR       DP      B30/B28 METERS
R3063       UR1/        UNIT INITIAL VECTOR                                      VECTOR  B1
R3065       UH/         UNIT HORIZONTAL VECTOR                                   VECTOR  B1
R3067       BETA1       1+X(T2)**2                                               DP      B1
R3069       PHI2        PERIGEE OR APOGEE INDICATOR                              DP      B2      -1 PERIGEE,+1 APOGEE
R3071
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R3072   OUTPUT
R3073     V2(T1)/       POST IMPULSE INITIAL VELOCITY VECTOR          VECTOR  B7      METERS/CS
R3075     R(T2)/        FINAL POSITION VECTOR                         VECTOR  B29     METERS
R3077     V(T2)/        FINAL VELOCITY VECTOR                         VECTOR  B7      METERS/CS
R3079     T2            FINAL TIME                                    DP      B28     CENTISECONDS
R3081
R3100   DEBRIS
R3101     RD            FINAL R DESIRED                               DP      B29/B27 METERS
R3111     R/APRE        R/A                                           DP      B6
R3113     P/RPRE        P/R                                           DP      B4
R3115     RPRE          MAGNITUDE OF R(T2)/                           DP      B29/B27 METERS
R3117     X(T2)PRE      COTANGENT OF GAMMA2                           DP      B0
R3119     DT12          CORRECTION TO FINAL TIME T2                   DP      B28     CENTISECONDS
R3121     RCON          FINAL RADIUS                                  DP      B29/B27 METERS
R3123     DRCON         DELTA RCON                                    DP      B29/B27 METERS
R3125
 3150                             32,2541  71220 1  PREC100  STQ     DLOAD
 3151   REF  13  LAST  906       32,2542  03762 1                   SPRTEX
 3156   REF   1                  32,2543  33532 0                   1ORTE
 3157   REF   5  LAST  894       32,2544  17730 0           STODL   NN1A
 3158   REF   7  LAST  895       32,2545  03636 1                   RCON
 3159   REF   2  LAST  127       32,2546  03664 0           STORE   RD
 3164                             32,2547  77745 1  PREC120  DLOAD
 31645  REF   1                  32,2550  33542 1                   2RTEB1
 31646  REF   2  LAST  127       32,2551  17650 1           STODL   DT21PR          DT21PR = POSMAX
 3165   REF   1                  32,2552  33530 1                   M15RTE
 3166   REF   2  LAST  127       32,2553  37732 0           STCALL  NN2
 3169   REF   1                  32,2554  63726 1                   RTENCK3
 3170                             32,2555  77624 1  PREC125  CALL
 3171   REF   1                  32,2556  11637 0                   PARAM
 3172                             32,2557  77745 1           DLOAD
 3173   REF   4  LAST  667       32,2560  02742 1                   P
 3222   REF   1                  32,2561  14033 1           STODL   P/RPRE
 3223   REF   3  LAST  681       32,2562  02744 1                   R1A
 3224   REF   1                  32,2563  14035 1           STODL   R/APRE
 3225   REF   4  LAST  681       32,2564  00041 1                   R1
 3226   REF   1                  32,2565  14031 0           STODL   RPRE
 3227   REF   3  LAST  126       32,2566  03775 1                   COGA
 3228                             32,2567  77661 0           SL
 3229                             32,2570  20206 1                   S
 3230   REF   1                  32,2571  03724 0           STORE   X(T2)PRE
 3241                             32,2572  43276 0           DCOMP   DAD
 3242   REF  10  LAST  895       32,2573  03726 1                   X(T2)
 3243                             32,2574  45246 0           ABS     DSU
 3244   REF   1                  32,2575  33604 0                   EPC4RTE
 3245                             32,2576  50000 1           BOV     BMN
 32455  REF   1                  32,2577  64601 1                   PREC130
 3246   REF   1                  32,2600  64770 0                   PREC175

R3247   DESIRED REENTRY ANGLE NOT ACHIEVED
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3248                          32,2601   50145 1  PREC130  DLOAD  BMN
3249   REF   3  LAST  908     32,2602   03732 1                  NN2
3250   REF   1                32,2603   64607 1                  PREC140
3251                          32,2604   52135 1  PREC132  SLOAD  GOTO          TOO MANY ITERATIONS
3252   REF   2  LAST  894     32,2605   33562 0                  OCT605           EXIT WITH ALARM
3253   REF   1                32,2606   65073 0                  PRECX

R3259  DETERMINE RADIUS AT WHICH THE DESIRED REENTRY ANGLE WILL BE ACHIEVED

3260                          32,2607   53145 1  PREC140  DLOAD  BZE
3261   REF   6  LAST  908     32,2610   03730 0                  NN1A
3264   REF   1                32,2611   64647 0                  PREC162
3265                          32,2612   62545 1  PREC150  DLOAD  SL2                                    B2
3266   REF   2  LAST  908     32,2613   00033 1                  P/RPRE
3267                          32,2614   72405 0           DMP    SL1          BETA2=BETA1*P/R           B2 PL02
3268   REF   3  LAST  895     32,2615   03754 1                  BETA1
32685                         32,2616   71206 0           PUSH   DLOAD
3269   REF   2  LAST  908     32,2617   00035 1                  R/APRE
3270                          32,2620   41212 0           SL4    DMP
32705                         32,2621   00001 0                  ODD
3271                          32,2622   50021 1           BDSU   BMN          BETA3=1-BETA2*R/A
3272   REF   1                32,2623   33506 1                  1RTEB4
3273   REF   1                32,2624   64637 1                  PREC160
3274                          32,2625   75512 0  PREC155  SL2    SQRT
3275                          32,2626   44205 0           DMP    BDSU
3276   REF   3  LAST  895     32,2627   03761 1                  PHI2
3277   REF   1                32,2630   33504 0                  1RTEB3
3278                          32,2631   65301 0           NORM   PDDL
3279   REF  45  LAST  896     32,2632   00047 1                  X1
3280                          32,2633   56342 1           SR1    DDV          BETA4=BETA2/(1-PHI2*SQRT(BETA3))
3281                          32,2634   52057 1           SL*    GOTO                                    B1
3282                          32,2635   20200 1                  0-1,1
3283   REF   1                32,2636   64655 0                  PREC165
3284                          32,2637   60345 0  PREC160  DLOAD  NORM
32845  REF   3  LAST  909     32,2640   00035 1                  R/APRE
3285   REF  46  LAST  909     32,2641   00047 1                  X1
32855                         32,2642   53665 1           BDDV   SL*                                     B1
3286   REF   1                32,2643   33500 1                  1RTEB1
32865                         32,2644   20173 0                  0-6,1
3287                          32,2645   77650 1           GOTO
32875  REF   2  LAST  909     32,2646   64655 0                  PREC165
3288                          32,2647   60345 0  PREC162  DLOAD  NORM
32885  REF   2  LAST  908     32,2650   00031 0                  RPRE
3289   REF  47  LAST  909     32,2651   00047 1                  X1
32895                         32,2652   53665 1           BDDV   SL*          BETA4=RD/RPRE             B1
3290   REF   3  LAST  908     32,2653   03664 0                  RD
32905                         32,2654   20200 1                  0 -1,1
3291                          32,2655   41401 1  PREC165  SETPD  PUSH
32915                         32,2656   00001 0                  0
3292                          32,2657   57425 0           DSU    DCOMP
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32923  REF   2  LAST  909   32,2660   33500 1                 1RTEB1
329235 REF   2  LAST  120   32,2661   03765 0           STORE BETA12
32924                       32,2662   71240 1           BMN   DLOAD
329243 REF   1              32,2663   64674 0                 PREC168
329247 REF   2  LAST  908   32,2664   03724 0                 X(T2)PRE
32925                       32,2665   71240 1           BMN   DLOAD
329253 REF   1              32,2666   64672 0                 PREC167
329257 REF   3  LAST  910   32,2667   03765 0                 BETA12
32926                       32,2670   77676 0           DCOMP
329265 REF   4  LAST  910   32,2671   03765 0           STORE BETA12
32927                       32,2672   77745 1 PREC167   DLOAD
329275 REF   5  LAST  910   32,2673   03765 0                 BETA12
3293                        32,2674   45246 0 PREC168   ABS   DSU
3294   REF   1              32,2675   33610 0                 EPC6RTE
3295                        32,2676   71240 1           BMN   DLOAD
3296   REF   2  LAST  908   32,2677   64770 0                 PREC175
3297                        32,2700   72405 0           DMP   SL1
3298   REF   3  LAST  909   32,2701   00031 0                 RPRE
3299                        32,2702   77606 1           PUSH                  RF = NEW RADIUS
3300                        32,2703   43345 1 PREC170   DLOAD DAD
3301   REF   4  LAST  909   32,2704   03732 1                 NN2
3302   REF   2  LAST  894   32,2705   33522 1                 1RTEB28
3303   REF   5  LAST  910   32,2706   03732 1           STORE NN2
3304                        32,2707   43175 0           VLOAD SET
3305   REF  10  LAST  904   32,2710   03656 1                 R(T2)/
3306   REF   9  LAST  901   32,2711   03466 0                 RVSW
3307   REF  12  LAST  903   32,2712   26657 1           STOVL RVEC
3308   REF   8  LAST  904   32,2713   03710 1                 V(T2)/
3309                        32,2714   77765 0           SIGN
3310   REF   6  LAST  910   32,2715   03765 0                 BETA12
3311   REF  16  LAST  903   32,2716   16745 0           STODL VVEC
3312   REF   3  LAST  910   32,2717   33500 1                 1RTEB1
3313                        32,2720   57565 0           SIGN  DCOMP
3314   REF   7  LAST  910   32,2721   03765 0                 BETA12
3315                        32,2722   71354 0           LXA,2 DLOAD
3316   REF 287  LAST  900   32,2723   00154 1                 MPAC
3317                        32,2724   67140 0           LXC,1 SXA,2
3318   REF   4  LAST  901   32,2725   03734 1                 CONICX1
3320   REF   3  LAST  901   32,2726   02756 1                 SGNRDOT
3321   REF   4  LAST  903   32,2727   36760 0           STCALL RDESIRED       COMPUTE DT12 (CORRECTION TO TIME OF
3322   REF   2  LAST  901   32,2730   25556 0                 TIMERAD                NEW RADIUS)
3323                        32,2731   75345 1           DLOAD SIGN
3324   REF   8  LAST  901   32,2732   00037 0                 T
3325   REF   8  LAST  910   32,2733   03765 0                 BETA12
3326                        32,2734   60325 0           PDDL  NORM            DT21=(PHI4)DT21                  PL02D
3327   REF   3  LAST  908   32,2735   03650 1                 DT21PR
3328   REF  48  LAST  909   32,2736   00047 1                 X1
3329                        32,2737   53665 1           BDDV  SL*
3330                        32,2740   00001 0                 000
33305                       32,2741   20176 0                 0 -3,1
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3331                          32,2742  50006 1           PUSH   BMN          BETA13=(DT21)/(DT21PR)          B3 PL04D
33315  REF  1                 32,2743  64750 1                  PREC172
3332                          32,2744  65345 0           DLOAD  PDDL         BETA14=1                        B0 PL04D
33325  REF  2  LAST  908      32,2745  33542 1                  2RTEB1
3333                          32,2746  77650 1           GOTO
33335  REF  1                 32,2747  64752 0                  PREC173
3334                          32,2750  65345 0  PREC172  DLOAD  PDDL         BETA14=.6                       B0 PL04D
33345  REF  1                 32,2751  33534 0                  M.6RTE
3335                          32,2752  45271 1  PREC173  DDV    DSU
33355                         32,2753  00003 1                  D2D
3336   REF  2  LAST  909      32,2754  33504 0                  1RTEB3
33365                         32,2755  71240 1           BMN    DLOAD
3337   REF  1                 32,2756  64762 0                  PREC174
33375                         32,2757  77605 1           DMP
3338   REF  4  LAST  910      32,2760  03650 1                  DT21PR
33385                         32,2761  00001 0           STORE  DOD          DT21=(BETA14)DT21PR             B28
3339                          32,2762  41545 0  PREC174  DLOAD  PUSH
33395                         32,2763  00001 0                  DOD
3340   REF  5  LAST  911      32,2764  37650 0           STCALL DT21PR
3341   REF  1                 32,2765  63710 1                  RTENCK2
3342                          32,2766  77650 1           GOTO
3343   REF  1                 32,2767  64555 0                  PREC125
3356                          32,2770  45345 1  PREC175  DLOAD  DSU
3357   REF  4  LAST  910      32,2771  00031 0                  RPRE
3358   REF  4  LAST  909      32,2772  03664 0                  RD
3359                          32,2773  51406 1           PUSH   ABS          RPRE-RD = RERR
3360                          32,2774  50025 0           DSU    BMN
3361   REF  1                 32,2775  33612 1                  EPC7RTE
3362   REF  1                 32,2776  34703 1                  PREC220

R3363  DESIRED RADIUS HAS NOT BEEN ACHIEVED

3364                          32,2777  53145 1           DLOAD  BZE
3365   REF  7  LAST  909      32,3000  03730 0                  NN1A
3366   REF  1                 32,3001  64604 1                  PREC132         TOO MANY ITERATIONS
3367                          32,3002  53025 0           DSU    BZE
3368   REF  2  LAST  908      32,3003  33532 0                  1ORTE
3369   REF  1                 32,3004  65037 0                  PREC207
3370                          32,3005  45345 1  PREC205  DLOAD  DSU          NOT FIRST PASS OF ITERATION
3371   REF  4  LAST  895      32,3006  03670 0                  RPRE,
3372   REF  5  LAST  911      32,3007  00031 0                  RPRE            RPRE,-RPRE                      B29/B27
3373                          32,3010  55301 0           NORM   BDDV
3374   REF 22  LAST  835      32,3011  00050 1                  X2
3375   REF  4  LAST  895      32,3012  03666 1                  DRCON
33755                         32,3013  41457 1           SL*    PUSH         DRCON/(RPRE,-RPRE)=S            B2
3376                          32,3014  57600 0                  0 -2,2
33765                         32,3015  40015 1           DAD    BOV          S GR +4 OR LS -4
3377   REF  4  LAST  910      32,3016  33500 1                  1PTEB1
33775  REF  1                 32,3017  65024 1                  PREC205M
3378                          32,3020  45246 0           ABS    DSU
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 33785  REF   5  LAST  911   32,3021   33500 1                 1RTEB1
 3379                        32,3022   77640 0          BMN
 33795  REF   1              32,3023   65027 1                 PREC206
 3380                        32,3024   57545 1  PREC205M DLOAD  DCOMP        S GR 0 OR LS -4
 33805  REF   3  LAST  911   32,3025   33542 1                 2RTEB1
 3381                        32,3026   77725 1          PDDL                  S=-4                          B2
 33815                       32,3027   41345 0  PREC206 DLOAD  DMP
 3382                        32,3030   77712 0          SL2
 33825  REF   5  LAST  911   32,3031   03666 1          STORE  DRCON         DRCON=S(RERR)                 B29
 3383                        32,3032   77615 0          DAD
 3384   REF   8  LAST  908   32,3033   03636 1                 RCON
 3385   REF   9  LAST  912   32,3034   03636 1          STORE  RCON          RCON+DRCON=RCON
 3386                        32,3035   77650 1          GOTO
 3387   REF   1              32,3036   65056 1                 PREC210
 3388                        32,3037   63545 0  PREC207 DLOAD  DSQ           FIRST PASS OF ITERATION
 3389   REF   5  LAST  911   32,3040   03664 0                 RD
 3390                        32,3041   70501 1          NORM   SR1
 3391   REF  49  LAST  910   32,3042   00047 1                 X1
 3392                        32,3043   60325 0          PDDL   NORM
 3393   REF   6  LAST  911   32,3044   00031 0                 RPRE
 3394   REF  23  LAST  911   32,3045   00050 1                 X2
 3395                        32,3046   55260 0          XSU,1  BDDV
 3396   REF  24  LAST  912   32,3047   00047 1                 X2
 3397                        32,3050   77657 0          SR*
 3398                        32,3051   20600 0                 0 -1,1
 3399   REF  10  LAST  912   32,3052   03636 1          STORE  RCON          RD**2/RPRE=RCON
 3400                        32,3053   77625 0          DSU
 3401   REF   6  LAST  912   32,3054   03664 0                 RD
 3402   REF   6  LAST  912   32,3055   03666 1          STORE  DRCON         RCON-PD=DRCON
 3403                        32,3056   77745 1  PREC210 DLOAD                PREPARE FOR NEXT ITERATION
 3404   REF   7  LAST  912   32,3057   00031 0                 RPRE
 3405   REF   5  LAST  911   32,3060   17670 0          STODL  RPRE,
 3406   REF   8  LAST  911   32,3061   03730 0                 NN1A
 3407                        32,3062   77625 0          DSU
 3408   REF   3  LAST  910   32,3063   33522 1                 1RTE828
 3409   REF   9  LAST  912   32,3064   37730 1          STCALL NN1A
 3410   REF   2  LAST  893   32,3065   65075 0                 V2T100
 3411                        32,3066   52030 0          BHIZ   GOTO
 3412   REF   1              32,3067   64547 0                 PREC120
 3413   REF   2  LAST  909   32,3070   65073 0                 PRECX

R3414   DESIRED RADIUS ACHIEVED

 34145  REF   1              16,2000                   SETLOC RTE2
 34146                       16,2703                   BANK
 3415                        16,2703   45345 1  PREC220 DLOAD  DSU
 3416   REF  11  LAST  908   16,2704   03726 1                 X(T2)
 3417   REF   3  LAST  910   16,2705   03724 0                 X(T2)PRE
 3418                        16,2706   45246 0          ABS    DSU
 3419   REF   1              16,2707   34716 0                 EPCARTE
```

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 3420                          16,2710   67240 0           BMN     SLOAD
 3421  REF   1                 16,2711   65071 1                   PREC225
 3422  REF   1                 16,2712   34720 0                   OCT613
 3423                          16,2713   77650 1           GOTO
 3424  REF   3  LAST  912     16,2714   65073 0                   PRECX          IF REENTRY ANGLE OUT OF LIMITS

 34241                         16,2715   00040 0  EPC8RTE  2DEC    .002
 34241                         16,2716   30447 0
 34242                         16,2717   00613 0  OCT613   OCT     613

R3425  DESIRED FINAL ANGLE HAS BEEN REACHED

 34251 REF   2  LAST  899     32,2000                    SETLOC  RTE
 34252                         32,3071                    BANK
 3429                          32,3071   77745 1  PREC225  DLOAD
 3430  REF   3  LAST  906     32,3072   33524 1                   ZERORTE
 3431                          32,3073   77650 1  PRECX    GOTO
 3432  REF  14  LAST  908     32,3074   03762 1                   SPRTEX
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```
P3800   INTEGRATION CALLING SUBROUTINE

R3801   DESCRIPTION
R3802     PERFORMS CONIC AND PRECISION INTEGRATIONS USING SUBROUTINE INTEGRVS. THERE ARE THREE ENTRANCES (RTENCK1,
R3804   RTENCK2 AND RTENCK3) FOR DIFFERENT SOURCES OF INPUT AND DIFFERENT OPTIONS. THERE IS A COMMON SET OF OUTPUT
R3806   WHICH INCLUDES SET UP OF INPUT FOR THE PARAM SUBROUTINE

R3807   RTENCK1 (CONIC INTEGRATION)

R3808     CALLING SEQUENCE
R3809       L    CALL
R3810       L+1          RTENCK1

R3811     ERASABLE INITIALIZATION REQUIRED
R3812       SAME AS FOR THE RTENCK3 ENTRANCE

R3813   RTENCK2 (PRECISION INTEGRATION)

R3814     CALLING SEQUENCE
R3815       L    CALL
R3816       L+1          RTENCK2

R3817     ERASABLE INITIALIZATION REQUIRED
R3818       PUSHLIST
R3819       PUSHLOC-2 INTEGRATION TIME DT12 (CORRECTION TO T2)          DP      B28     CS
R3821     OTHER
R3822       R(T2)/    FINAL POSITION VECTOR                           VECTOR .B29     METERS
R3824       V(T2)/    FINAL VELOCITY VECTOR                           VECTOR  B7      METERS/CS
R3826       T2        FINAL TIME                                      DP      B28     CS

R3828   RTENCK3 (PRECISION INTEGRATION)

R3829     CALLING SEQUENCE
R3830       L    CALL
R3831       L+1          RTENCK3

R3832     ERASABLE INITIALIZATION REQUIRED
R3834       R(T1)/    INITIAL POSITION VECTOR                         VECTOR  B29     METERS
R3836       V2(T1)/   POST IMPULSE INITIAL VELOCITY VECTOR            VECTOR  B7      M/CS
R3838       T1        INITIAL VECTOR TIME                             DP      B28     CS
R3840       T2        FINAL TIME                                      DP      B28     CS

R3842   EXIT MODE
R3843     AT L+2 OF CALLING SEQUENCE
R3844   SUBROUTINES CALLED
R3845     INTSTALL
R3846     INTEGRVS

R3847   OUTPUT
R3848     PUSHLIST
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R3849       PUSHLOC-6   FINAL POSITION VECTOR R(T2)/                    VECTOR  B29     METERS
R3851       XI          CONICS MUTABLE ENTRY FOR EARTH (-2)             SP      B14
R3853     MPAC
R3854                   FINAL VELOCITY VECTOR V(T2)/                    VECTOR  B7      M/CS
R3856     OTHER
R3857       R(T2)/      AS IN PUSHLIST
R3858       V(T2)/      AS IN MPAC
R3859       T2          FINAL TIME                                      DP      B28     CS
R3861

 3890  REF   1                 31,2000                         SETLOC RTE3
 3891                          31,3700                         BANK
 3897                          31,3700   45020 1  RTENCK1      STQ    CALL
 3898  REF   8  LAST  901     31,3701   03733 0                       RTENCKEX
 3899  REF  19  LAST  633     31,3702   27442 0                       INTSTALL
 3900                          31,3703   43175 0               VLOAD   SET
 3901  REF   6  LAST  906     31,3704   03640 0                       R(T1)/
 3902  REF  12  LAST  610     31,3705   01473 0                       INTYPFLG
 3903                          31,3706   77650 1               GOTO
 3904  REF   1                 31,3707   63734 1                       RTENCK3B
R3905

 3906                          31,3710   45020 1  RTENCK2      STQ    CALL
 3907  REF   9  LAST  915     31,3711   03733 0                       RTENCKEX
 3908  REF  20  LAST  915     31,3712   27442 0                       INTSTALL
 3909                          31,3713   77214 0               CLEAR   VLOAD
 3910  REF  13  LAST  915     31,3714   01673 1                       INTYPFLG
 3911  REF  11  LAST  910     31,3715   03656 1                       R(T2)/
 3912  REF  11  LAST  512     31,3716   25535 0               STOVL   RCV
 3913  REF   9  LAST  910     31,3717   03710 1                       V(T2)/
 3914  REF  10  LAST  512     31,3720   15543 1               STODL   VCV
 3915  REF   5  LAST  903     31,3721   03736 0                       T2
 3916  REF  11  LAST  512     31,3722   01517 0               STORE   TET
 3917                          31,3723   77615 0               DAD
 3918                          31,3724   77650 1               GOTO
 3919  REF   1                 31,3725   63742 0                       RTENCK3D

R3920
 3921                          31,3726   45020 1  RTENCK3      STQ    CALL
 3922  REF  10  LAST  915     31,3727   03733 0                       RTENCKEX
 3923  REF  21  LAST  915     31,3730   27442 0                       INTSTALL
 3925                          31,3731   43175 0  RTENCK3A     VLOAD  CLEAR
 3926  REF   7  LAST  915     31,3732   03640 0                       R(T1)/
 3927  REF  14  LAST  915     31,3733   01673 1                       INTYPFLG
 3928  REF  12  LAST  915     31,3734   25535 0  RTENCK3B     STOVL  RCV
 3929  REF   6  LAST  903     31,3735   03700 0                       V2(T1)/
 3930  REF  11  LAST  915     31,3736   15543 1               STODL   VCV
 3931  REF   6  LAST  905     31,3737   03716 1                       T1
 3932  REF  12  LAST  915     31,3740   15517 0               STODL   TET
 3933  REF   6  LAST  915     31,3741   03736 0                       T2
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3934   REF  46  LAST  905   31,3742   00041 1  RTENCK3D STORE  TDEC1
3935                        31,3743   45014 0           CLEAR  CALL
3936   REF  13  LAST  513   31,3744   00263 0                  MOONFLAG
3937   REF   7  LAST  512   31,3745   27135 0                  INTEGRVS
3938                        31,3746   77775 1           VLOAD
3939   REF  34  LAST  905   31,3747   00001 0                  RATT
3950   REF  12  LAST  915   31,3750   03656 1           STORE  R(T2)/
3951                        31,3751   70125 0           PDDL   LXC,1
3952   REF   9  LAST  905   31,3752   00015 0                  TAT
3953   REF   5  LAST  910   31,3753   03734 1                  CONICX1
3954   REF   7  LAST  915   31,3754   27736 0           STOVL  T2
3955   REF  26  LAST  905   31,3755   00007 0                  VATT
3956   REF  10  LAST  915   31,3756   03710 1           STORE  V(T2)/
3957                        31,3757   77650 1           GOTO
3958   REF  11  LAST  915   31,3760   03733 0                  RTENCKEX
3959   REF   3  LAST  913   32,2000                     SETLOC RTE
3960                        32,3075                     BANK
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P4000   V2(T1) COMPUTATION SUBROUTINE

R4001   DESCRIPTION
R4002   A POST IMPULSE VELOCITY VECTOR (V2(T1)) IS COMPUTED WHICH EITHER
R4003   (1) MEETS THE INPUT VELOCITY CHANGE DESIRED (RTEDVD) IN A MINIMUM TIME  OR
R4005   (2) IF A VELOCITY CHANGE ISN'T SPECIFIED (RTEDVD) = 0), A V2(T1) IS COMPUTED WHICH MINIMIZES THE IMPULSE (DV)
R4007   AND CONSEQUENTLY FUEL.

R4008   CALLING SEQUENCE
R4009     L      CALL
R4010     L+1            V2T100

R4011   NORMAL EXIT MODE
R4012     AT L+2 OF CALLING SEQUENCE WITH MPAC = 0

R4013   ALARM EXIT MODE
R4014     AT L+2 OF CALLING SEQUENCE WITH MPAC = OCTAL 605 FOR EXCESS ITERATIONS

R4015   SUBROUTINES CALLED
R4016     GAMDV10
R4017     XT1LIM
R4018     DVCALC

R4019   ERASABLE INITIALIZATION REQUIRED
R4020   PUSHLIST
R4021     NONE
R4022   MPAC
R4023     NONE
R4024   OTHER
R4025     R(T1)       MAGNITUDE OF INITIAL POSITION VECTOR                          DP      B29/B27 METERS
R4027     RCON        MAGNITUDE OF FINAL POSITION VECTOR                            DP      B29/B27 METERS
R4029     V(T1)/      INITIAL VELOCITY VECTOR                                       VECTOR  B7/B5   METERS/CS
R4031     RTEDVD      DELTA VELOCITY DESIRED                                        DP      B7/B5   METERS/CS
R4033     UR1/        UNIT INITIAL VECTOR                                           VECTOR  B1
R4035     UH/         UNIT HORIZONTAL VECTOR                                        VECTOR  B1
R4037     X(T2)       COTANGENT OF FINAL FLIGHT PATH ANGLE                          DP      B0
R4039     X(T1)       COTANGENT OF INITIAL FLIGHT PATH ANGLE(INPUT FOR PREC)        DP      B5
R4041     CFPA        COSINE OF INITIAL FLIGHT PATH ANGLE                           DP      B1
R4043     MAMAX1      MAJOR AXIS LIMIT FOR LOWER BOUND ON GAMDV ITERATOR            DP      B30/B28 METERS
R4045     MAMAX2      MAJOR AXIS LIMIT FOR UPPER BOUND ON GAMDV ITERATOR            DP      B30/B28 METERS
R4049     PHI2        REENTRY NEAR PERIGEE OR APOGEE INDICATE (RTE ONLY)            DP       B2     -1 PERIGEE,+1 APOGEE
R4051     N1          CONIC OR PRECISION ITERATION COUNTER                          DP      B28     NEGATIVE CONIC,PLUS PREC
R4053
R4054   OUTPUT
R4055     V2(T1)/     POST IMPULSE INITIAL VELOCITY VECTOR                          VECTOR  B7/B5   METERS/CS
R4057     DV          INITIAL VELOCITY CHANGE                                       DP      B7/B5   METERS/CS
R4059     X(T1)       COTANGENT OF INITIAL FLIGHT PATH ANGLE (POST IMPULSE)         DP      B5
R4061     PCON        SEMI-LATUS RECTUM                                             DP      B28/B26 METERS
R4063     BETA1       1+X(T2)**2                                                    DP      B1
R4067
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R4068   DEBRIS
R4069     PUSHLIST
R4070       00D         X(T1),,=PREVIOUS PRECISION X(T1)                    DP      B5
R4074       02D         THETA1=BETA5*LAMBDA-1                               TP      B17
R4076       05D         THETA2=2*R(T1)*(LAMBDA-1)                           TP      B38/B36
R4078       08D         THETA3=MU**.5/R(T1)                                 DP      B-4/B-5
R4080       10D         X(T1)MIN=LOWER BOUND ON X(T1) IN GAMDV ITERATOR     DP      B5
R4082       12D         DX(T1)MAX=MAXIMUM DELTA X(T1)                       DP      B5
R4084       14D         X(T1)MAX=UPPER BOUND ON X(T1) IN GAMDV ITERATOR     DP      B5
R4086       16D         DX(T1)=ITERATOR INCREMENT                           DP      B5
R4088       31D         GAMDV10 SUBROUTINE RETURN ADDRESS
R4089       32D         DVCALC SUBROUTINE RETURN ADDRESS
R4090       33D         V2T100 SUBROUTINE RETURN ADDRESS

 4100                           32,3075   71220 1  V2T100   STQ     DLOAD
 41005                          32,3076   00041 1                   33D
 4101   REF  11 LAST  912       32,3077   03636 1                   RCON
 41013                          32,3100   45240 0           BMN     DSU          ABORT IF RCON NEGATIVE
 41015  REF   1                 32,3101   65105 0                   V2TERROR
 4102   REF   6 LAST  906       32,3102   03648 0                   R(T1)
 41023                          32,3103   77640 0           BMN
 41025  REF   1                 32,3104   65110 1                   V2T101
 4103                           32,3105   77776 1  V2TERROR EXIT                  OR IF LAMBDA LESS THAN ONE
 41035  REF   5 LAST  443       32,3106   0 5721 0          TC      PODOOO       NO SOLUTION IF LAMBDA LESS THAN 1
 4104                           32,3107   00610 0           OCT     00610
 41045                          32,3110   43001 1  V2T101   SETPD   CLEAR                                        PLOOD
 4105                           32,3111   00001 0                   0
 4106   REF   1                 32,3112   00272 0                   F2RTE
 4107                           32,3113   60345 0           DLOAD   NORM
 4108   REF  12 LAST  918       32,3114   03636 1                   RCON
 4109   REF  50 LAST  912       32,3115   00047 1                   X1
 4110                           32,3116   60325 0           PDDL    NORM
 4111   REF   7 LAST  918       32,3117   03646 0                   R(T1)
 4112   REF  33 LAST  883       32,3120   00051 0                   S1
 4113                           32,3121   00013 0           STORE   10D
 4114                           32,3122   56342 1           SR1     DDV          R1/RCON = LAMBDA                B1
 4115                           32,3123   65260 0           XSU,1   PDDL                                         PL02D
 4116   REF  34 LAST  918       32,3124   00050 1                   S1
 4117   REF  12 LAST  912       32,3125   03726 1                   X(T2)
 4118                           32,3126   77716 1           DSQ
 4120                           32,3127   43342 0           SR1     DAD
 4121   REF   6 LAST  912       32,3130   33500 1                   1RTEB1
 4122   REF   4 LAST  909       32,3131   03754 1           STORE   BETA1        1+X(T2)**2 = BETA1              B1
 4123                           32,3132   77605 1           DMP
 4124                           32,3133   00001 0                   DDD
 41245                          32,3134   00035 1           STORE   28D          BETAI*LAMBDA = BETA5
 41246                          32,3135   53605 1           DMP     SL*
 412461                         32,3136   00001 0                   DDD
 412462                         32,3137   20172 1                   0 -7,1
 4125                           32,3140   45257 0           SL*     DSU
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4126                                32,3141   20172 1                 0 -7,1
4127   REF   1                     32,3142   33516 0                 1RTEB17
4128                                32,3143   65234 1          RTB    PDDL          BETA5*LAMBDA-1 = THETA1        B17 PL05D
41282  REF   3  LAST  626           32,3144   45565 0                 TPMODE
41285  REF   7  LAST  918           32,3145   33500 1                 1RTEB1
41287                               32,3146   57457 0          SR*    DCOMP
4129                                32,3147   20601 1                 0,1
41295                               32,3150   41215 1          DAD    DMP
4130                                32,3151   00001 0                 ODD
41302  REF   8  LAST  918           32,3152   03646 0                 R(T1)
41305                               32,3153   47057 0          SL*    RTB
41307                               32,3154   20172 1                 0 -7D,1
4131   REF   4  LAST  919           32,3155   45565 0                 TPMODE
4132                                32,3156   77725 1          PDDL                 2*R(T1)*(LAMBDA-1)=THETA2  B38/B36 PL08D
4133   REF   1                     32,3157   33632 0                 RTMURTE
4134                                32,3160   70501 1          NORM   SR1
4135   REF  25  LAST  912           32,3161   00050 1                 X2
4136                                32,3162   56264 1          XSU,2  ODV
4137   REF  35  LAST  918           32,3163   00050 1                 S1
4138                                32,3164   00013 0                 10D
4139                                32,3165   65257 1          SR*    PDDL          MU**.5/R(T1)=THETA3        B-4/B-5 PL10D
4140                                32,3166   57170 0                 6,2
4141   REF   3  LAST  892           32,3167   03652 0                 MAMAX1
4142                                32,3170   41406 0          PUSH   PUSH          MAMAX1=MA
4143                                32,3171   77624 1          CALL
4144   REF   1                     32,3172   65734 1                 XT1LIM
4145                                32,3173   41476 1          DCOMP  PUSH          X(T1)MIN                   B5 PL12D
4146                                32,3174   40476 0          DCOMP  SR4
4147                                32,3175   41525 0          PDDL   PUSH          DX(T1)MAX                  B5 PL14D
4148   REF   3  LAST  892           32,3176   03654 0                 MAMAX2
4149                                32,3177   45006 0          PUSH   CALL
4150   REF   2  LAST  919           32,3200   65734 1                 XT1LIM
4151                                32,3201   50125 1          PDDL   BMN           X(T1)MAX                   B5 PL16D
4152   REF  10  LAST  912           32,3202   03730 0                 NN1A
4153   REF   1                     32,3203   65206 0                 V2T102
4154                                32,3204   77650 1          GOTO
4155   REF   1                     32,3205   65220 1                 V2T110

R4156  PROCEED HERE IF NOT PRECISION COMPUTATION

4158                                32,3206   77745 1  V2T102  DLOAD
4159   REF   7  LAST  892           32,3207   03632 0                 RTEDVO
4160                                32,3210   52054 1          BZE    GOTO
4161   REF   1                     32,3211   65213 1                 V2T105
4162   REF   1                     32,3212   65314 1                 V2T140
4163                                32,3213   50145 1  V2T105  DLOAD  BMN
4164   REF   3  LAST  906           32,3214   03757 1                 CFPA
4165   REF   2  LAST  919           32,3215   65314 1                 V2T140
4166                                32,3216   77650 1          GOTO
4167   REF   1                     32,3217   65322 1                 V2T145
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R4168   DURING A PRECISION TRAJECTORY ITERATION CONSTRAIN THE INDEPENDENT
R4169   VARIABLE TO INSURE THAT ALL CONICS PASS THROUGH RCON ON THE SAME PASS
R4170   THROUGH X(T2)

 4171                          32,3220   47145 1  V2T110   DLOAD  RTB
 4172   REF   2  LAST  919     32,3221   33516 0           IRTEB17
 4173   REF   5  LAST  919     32,3222   45565 0           TPMODE
 4174                          32,3223   65276 1           DCOMP  PDDL          -1                          B17 PL19D
 4175   REF   4  LAST  912     32,3224   33542 1           2RTEB1
 4176                          32,3225   45257 0           SR*    DSU
 41765                         32,3226   20601 1                  0,1
 4177                          32,3227   00001 0                  000
 41775                         32,3230   53605 1           DMP    SL*
 4178                          32,3231   00035 1                  28D
 41785                         32,3232   20172 1                  0 -7,1
 4179                          32,3233   76257 0           SL*    TAD
 41795                         32,3234   20172 1                  0 -7,1
 4180                          32,3235   65234 1           RTB    PDDL          BETA5(2-LAMBDA)-1=BETA6     B17 PL19D
 4181   REF   6  LAST  920     32,3236   45565 0                  TPMODE
 4182   REF   2  LAST  127     32,3237   03722 0                  X(T1)
 4183                          32,3240   00001 0           STORE  000           X(T1),,                     B5
 4184                          32,3241   77751 1           TLOAD                                            PL16D
 4185                          32,3242   53040 0           BMN    BZE
 4186   REF   1                32,3243   65250 0                  V2T115
 41865  REF   2  LAST  920     32,3244   65250 0                  V2T115
 4187                          32,3245   52061 1           SL     GOTO
 4188                          32,3246   20210 0                  7
 4189   REF   1                32,3247   65261 1                  V2T120
 4190                          32,3250   50145 1  V2T115   DLOAD  BMN
 4191   REF   4  LAST  909     32,3251   03761 1                  PHI2
 4192   REF   1                32,3252   65272 0                  V2T125
 4193                          32,3253   77676 0           DCOMP
 4194   REF   5  LAST  920     32,3254   17761 1           STODL  PHI2
 4195   REF   3  LAST  911     32,3255   33532 0                  1ORTE
 4196   REF  11  LAST  919     32,3256   03730 0           STORE  NN1A
 4197                          32,3257   77650 1           GOTO
 4198   REF   2  LAST  920     32,3260   65272 0                  V2T125
 4199                          32,3261   47166 0  V2T120   SQRT   RTB
 4200   REF   2  LAST  502     32,3262   45716 0                  DPMODE
 42005                         32,3263   50125 1           PDDL   BMN           BETA6**.5=X(T1)LIM          B5 PL18D
 4201   REF   6  LAST  920     32,3264   03761 1                  PHI2
 4202   REF   1                32,3265   65300 1                  V2T130
 4203                          32,3266   45545 1           DLOAD  STAOR                                     PL16D
 4204                          32,3267   77760 0           STORE  140           X(T1)LIM = X(T1)MAX
 4205                          32,3270   77676 0           DCOMP
 4206                          32,3271   00013 0           STORE  10D           -X(T1)LIM = X(T1)MIN
 4207                          32,3272   53145 1  V2T125   DLOAD  BZE
 4208   REF   3  LAST  920     32,3273   03722 0                  X(T1)
 4209   REF   3  LAST  919     32,3274   65314 1                  V2T140
 4210                          32,3275   52040 1           BMN    GOTO
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 4211   REF   4  LAST  920   32,3276   65314 1                    V2T140
 4212   REF   2  LAST  919   32,3277   65322 1                    V2T145
 4213                        32,3300   53145 1  V2T130   DLOAD    BZE
 4214   REF   4  LAST  920   32,3301   03722 0                    X(T1)
 4215   REF   1             32,3302   65311 1                    V2T135
 4216                        32,3303   71240 1           BMN      DLOAD                                          PL16D
 4217   REF   2  LAST  921   32,3304   65311 1                    V2T135
 4218                        32,3305   77626 0           STADR
 4219                        32,3306   77764 1           STORE    10D          X(T1)LIM = X(T1)MIN
 4220                        32,3307   77650 1           GOTO
 4221   REF   3  LAST  921   32,3310   65322 1                    V2T145
 4222                        32,3311   57545 1  V2T135   DLOAD    DCOMP                                          PL16D
 4223                        32,3312   77626 0           STADR
 4224                        32,3313   77760 0           STORE    14D          -X(T1)LIM = X(T1)MAX
 4225                        32,3314   77745 1  V2T140   DLOAD
 4226                        32,3315   00013 0                    10D
 4227   REF   5  LAST  921   32,3316   17722 0           STODL    X(T1)        X(T1)MIN = X(T1)
 4228                        32,3317   00015 0                    12D
 4229                        32,3320   52006 0           PUSH     GOTO         DX(T1)MAX = DX(T1)                PL18D
 4230   REF   1             32,3321   65327 1                    V2T150
 4231                        32,3322   77745 1  V2T145   DLOAD
 4232                        32,3323   00017 1                    14D
 4233   REF   6  LAST  921   32,3324   17722 0           STODL    X(T1)        X(T1)MAX = X(T1)
 4234                        32,3325   00015 0                    12D
 4235                        32,3326   41476 1           DCOMP    PUSH         -DX(T1)MAX = DX(T1)               PL18D
 4236                        32,3327   77624 1  V2T150   CALL                  GOTO X(T1)-DV ITERATOR
 4237   REF   1             32,3330   65457 1                    GAMDV10
 4238                        32,3331   53145 1           DLOAD    BZE          EXIT IF MINIMUM FUEL MODE
 4239   REF   8  LAST  919   32,3332   03632 0                    RTEDVD
 4240   REF   1             32,3333   65455 0                    V2T1X

R4241   CONTINUE IF TIME CRITICAL MODE

 4242                        32,3334   50025 0           DSU      BMN
 4243   REF   3  LAST  896   32,3335   03706 0                    DV
 4244   REF   1             32,3336   65341 1                    V2T155
 4245                        32,3337   77650 1           GOTO
 4246   REF   1             32,3340   65374 1                    V2T175
 4247                        32,3341   50145 1  V2T155   DLOAD    BMN
 4248   REF  12  LAST  920   32,3342   03730 0                    NN1A
 4249   REF   1             32,3343   65346 0                    V2T160
 4250                        32,3344   77650 1           GOTO
 4251   REF   1             32,3345   65416 1                    V2T185

R4252   CONIC TRAJECTORY COMPUTATION

 4253                        32,3346   53145 1  V2T160   DLOAD    BZE
 4254   REF   7  LAST  921   32,3347   03722 0                    X(T1)
 4255   REF   1             32,3350   65354 0                    V2T165
 4256                        32,3351   52040 1           BMN      GOTO
```

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4257   REF  2  LAST  921   32,3352  65354 0                    V2T165
4258   REF  1                32,3353  65453 0                    V2T300
4259                         32,3354  53145 1  V2T165   DLOAD    BZE
4260   REF  4  LAST  919     32,3355  03757 1                    CFPA
4261   REF  2  LAST  922     32,3356  65453 0                    V2T300
4262                         32,3357  71240 1           BMN      DLOAD
4263   REF  3  LAST  922     32,3360  65453 0                    V2T300
4264                         32,3361  00017 1                    14D
4265   REF  8  LAST  921     32,3362  17722 0           STODL    X(T1)          X(T1)MAX=X(T1)
4266                         32,3363  00015 0                    12D
4267                         32,3364  77676 0           DCOMP
4268                         32,3365  34021 0           STCALL   16D            -DX(T1)MAX=DX(T1)
4269   REF  2  LAST  921     32,3366  65457 1                    GAMDV10
4270                         32,3367  45345 1           DLOAD    DSU
4271   REF  9  LAST  921     32,3370  03632 0                    RTEDVD
4272   REF  4  LAST  921     32,3371  03706 0                    DV
4273                         32,3372  77640 0           BMN
4274   REF  4  LAST  922     32,3373  65453 0                    V2T300
4279                         32,3374  71214 0  V2T175   SET      DLOAD
4280   REF  2  LAST  918     32,3375  00072 1                    F2RTE
4281   REF  9  LAST  922     32,3376  03722 0                    X(T1)
42811                        32,3377  77614 1           BOFF
42812  REF  3  LAST  892     32,3400  02742 1                    SLOWFLG
42813  REF  1                32,3401  65406 0                    V2T177
42814                        32,3402  14013 0           STODL    10D            X(T1)MIN
4285                         32,3403  00015 0                    12D            DX(T1)MAX
42816                        32,3404  77650 1           GOTO
42817  REF  1                32,3405  65411 0                    V2T179
4282                         32,3406  14017 1  V2T177   STODL    14D
4283                         32,3407  00015 0                    12D
4284                         32,3410  77676 0           DCOMP
4285                         32,3411  34021 0  V2T179   STCALL   16D                    DX(T1)
4286   REF  3  LAST  922     32,3412  65457 1                    GAMDV10
4287                         32,3413  50145 1           DLOAD    BMN
42875  REF 13  LAST  921     32,3414  03730 0                    NN1A
4288   REF  5  LAST  922     32,3415  65453 0                    V2T300

R42885  PREVENT A LARGE CHANGE IN INDEPENDENT VARIABLE DURING AN ITERATION FOR A
R42885I PRECISION TRAJECTORY

4289                         32,3416  45345 1  V2T185   DLOAD    DSU
4290   REF 10  LAST  922     32,3417  03722 0                    X(T1)
4291                         32,3420  00001 0                    00D
4292                         32,3421  65246 1           ABS      PDDL           /X(T1)-X(T1)../ = BETA7
4293                         32,3422  00015 0                    12D
4294                         32,3423  44352 0           SL1      BDSU
4295                         32,3424  71240 1           BMN      DLOAD
4296   REF  6  LAST  922     32,3425  65453 0                    V2T300
4297                         32,3426  00001 0                    00D            CONTINUE IF BETA7 LARGER THAN 2DX(T1)MAX
4298   REF 11  LAST  922     32,3427  03722 0           STORE    X(T1)          X(T1),, = X(T1)
```

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4299                                32,3430  50025 0           DSU     BMN
4300                                32,3431  00017 1                   14D
4301  REF   1                      32,3432  65440 1                   V2T195
4302                                32,3433  77745 1           DLOAD
4303                                32,3434  00017 1                   14D
4304  REF  12  LAST  922           32,3435  03722 0           STORE   X(T1)          X(T1)MAX = X(T1)
4305                                32,3436  77650 1           GOTO
4306  REF   1                      32,3437  65451 1                   V2T205
4307                                32,3440  45345 1  V2T195   DLOAD   DSU
4308  REF  13  LAST  923           32,3441  03722 0                   X(T1)
4309                                32,3442  00013 0                   10D
4310                                32,3443  52040 1           BMN     GOTO
4311  REF   1                      32,3444  65446 1                   V2T200
4312  REF   2  LAST  923           32,3445  65451 1                   V2T205
4313                                32,3446  77745 1  V2T200   DLOAD
4314                                32,3447  00013 0                   10D
4315  REF  14  LAST  923           32,3450  03722 0           STORE   X(T1)          X(T1)MIN = X(T1)
4316                                32,3451  77624 1  V2T205   CALL
4317  REF   1                      32,3452  65660 1                   DVCALC
4318                                32,3453  77745 1  V2T300   DLOAD
4319  REF   4  LAST  913           32,3454  33524 1                   ZERORTE
4320                                32,3455  77650 1  V2T1X    GOTO
4321                                32,3456  00041 1                   33D
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P4400   X(T1)-DV ITERATOR SUBROUTINE

R4401   DESCRIPTION
R4402       COMPUTES A POST IMPULSE VELOCITY VECTOR (V2(T1)) WHICH REQUIRES A MINIMUM DV.
R4404   CALLING SEQUENCE
R4405     L       CALL
R4406     L+1             GAMDV10

R4407   NORMAL EXIT MODE
R4410     AT L+2 OF CALLING SEQUENCE

R4411   ALARM EXIT MODE
R4412     AT V2T1X WITH MPAC = OCTAL 605 FOR EXCESS ITERATIONS

R4413   SUBROUTINES CALLED
R4414     DVCALC

R4415   ERASABLE INITIALIZATION REQUIRED
R4416     PUSHLIST
R4417       02D         THETA1=BETA5*LAMBDA-1                                   TP      B17
R4419       05D         THETA2=2*R(T1)*(LAMBDA-1)                               TP      B38/B36
R4421       08D         THETA3=MU**.5/R(T1)                                     DP      B-4/B-5
R4423       10D         X(T1)MIN=LOWER BOUND ON INDEPENDENT VARIABLE X(T1)      DP      B5
R4425       12D         DX(T1)MAX=MAXIMUM DX(T1)                                DP      B5
R4427       14D         X(T1)MAX=UPPER BOUND ON INDEPENDENT VARIABLE X(T1)      DP      B5
R4429       16D         DX(T1)=ITERATOR INCREMENT                               DP      B5
R4431     MPAC
R4432       NONE
R4433     OTHER
R4434       V(T1)/      INITIAL VELOCITY VECTOR                                 VECTOR  B7/B5   METERS/CS
R4436       RTEDVD      DELTA VELOCITY DESIRED                                  DP      B7/B5   METERS/CS
R4438       UR1/        UNIT INITIAL VECTOR                                     VECTOR  B1
R4440       UH/         UNIT HORIZONTAL VECTOR                                  VECTOR  B1
R4442       X(T1)       COTANGENT OF INITIAL FLIGHT PATH ANGLE (FROM VERTICAL)  DP      B5
R4444       F2RTE       TIME CRITICAL OR MINIMUM FUEL MODE INDICATOR            STATE AREA      0 MIN. FUEL, 1 MIN. TIME
R4446
R4447   OUTPUT
R4448       V2(T1)/     POST IMPULSE INITIAL VELOCITY VECTOR                    VECTOR  B7/B5   METERS/CS
R4450       DV          INITIAL VELOCITY CHANGE                                 DP      B7/B5   METERS/CS
R4452       X(T1)       COTANGENT OF INITIAL FPA MEASURED FROM VERTICAL         DP      B5
R4454       PCON        SEMI-LATUS RECTUM                                       DP      B28/B26 METERS
R4456
R4457   DEBRIS
R4458     PUSHLIST
R4459       00D         X(T1),,
R4462       02D         THETA1
R4463       05D         THETA2
R4464       08D         THETA3
R4465       10D         X(T1)MIN
R4466       12D         DX(T1)MAX
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R4467      14D        X(T1)MAX
R4468      16D        DX(T1)
R4473      22D        DV,=PREVIOUS DV                                          DP      B7/B5
R4475      24D        BETA9=X(T1)+1.IDX(T1)                                    DP      B5
R4477      31D        GAMDV10 SUBROUTINE RETURN ADDRESS
R4478      32D        DVCALC SUBROUTINE RETURN ADDRESS
R4479      33D        V2T100 SUBROUTINE RETURN ADDRESS
 4490                  32,3457  77620 0  GAMDV10  STQ
 4491                  32,3460  00037 0           31D
 4500                  32,3461  45001 1  SETPD    CALL
 4501                  32,3462  00023 0           18D                                                    PL18D
 4502  REF  2 LAST 923 32,3463  65660 1           DVCALC
 4503                  32,3464  45345 1  DLOAD    DSU
 4504                  32,3465  00017 1           14D
 4505                  32,3466  00013 0           10D
 4506                  32,3467  77600 1  BOV
 4507  REF  1          32,3470  65510 0           GAMDV20
 4508                  32,3471  45206 1  PUSH     DSU       X(T1)MAX-X(T1)MIN=BETA8                      B5 PL20D
 4509  REF  1          32,3472  33614 1           EPC9RTE
 4510                  32,3473  71240 1  BMN      DLOAD
 4511  REF  1          32,3474  65656 1           GAMDVX    BOUNDS CLOSE TOGETHER
 4512                  32,3475  00023 0           18D
 4513                  32,3476  50025 0  DSU      BMN       BETA8-DX(T1)MAX
 4514                  32,3477  00015 0           12D
 4515  REF  1          32,3500  65504 0           GAMDV15
 4516                  32,3501  52001 1  SETPD    GOTO                                                   PL18D
 4517                  32,3502  00023 0           18D
 45175 REF  2 LAST 925 32,3503  65510 0           GAMDV20
 4518                  32,3504  77745 1  GAMDV15  DLOAD                                                  PL18D
 4519                  32,3505  70565 0  SIGN     SR1
 4520                  32,3506  00021 1           16D
 4521                  32,3507  00021 1  STORE    16D       BETA8(SIGNDX(T1))/2=DX(T1)
 4522                  32,3510  77745 1  GAMDV20  DLOAD
 4523  REF  1          32,3511  33526 0           M144RTE
 4524  REF  6 LAST 910 32,3512  03732 1  STORE    NN2
 4525                  32,3513  43345 1  GAMDV25  DLOAD    DAD
 4526  REF  7 LAST 925 32,3514  03732 1           NN2
 4527  REF  4 LAST 912 32,3515  33522 1           1RTER28
 4528                  32,3516  67240 0  BMN      SLOAD
 4529  REF  1          32,3517  65523 0           GAMDV30
 4530  REF  3 LAST 909 32,3520  33562 0           OCT605
 4531                  32,3521  77650 1  GOTO
 4532  REF  2 LAST 921 32,3522  65455 0           V2T1X
 4533  REF  8 LAST 925 32,3523  03732 1  GAMDV30  STORE    NN2       NN2=NN2+1
 4534                  32,3524  65345 0  DLOAD    PDDL      X(T1)=X(T1),                                 B5 PL20D
 4535  REF 15 LAST 923 32,3525  03722 0           X(T1)
 4536  REF  5 LAST 922 32,3526  03706 0           DV
 4537                  32,3527  43325 1  PDDL     DAD       DV=DV,                                       B7/B5 PL22D
 4538  REF 16 LAST 925 32,3530  03722 0           X(T1)
 4539                  32,3531  00021 1           16D
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4540   REF  17 LAST  925   32,3532   37722 1            STCALL X(T1)          X(T1)+DX(T1)=X(T1)                    B5
4541   REF   3 LAST  925   32,3533   65660 1                   DVCALC
4542                       32,3534   71214 0            BON    DLOAD
4543   REF   3 LAST  922   32,3535   00312 1                   F2RTE
4544   REF   1             32,3536   65552 0                   GAMDV35
4545   REF   6 LAST  925   32,3537   03706 0                   DV
4546                       32,3540   50025 0            DSU    BMN            CONTINUE IF FUEL CRITICAL MODE
4547                       32,3541   00025 0                   20D
4548   REF   1             32,3542   65547 1                   GAMDV33
4549                       32,3543   57545 1  GAMDV32  DLOAD   DCOMP
4550                       32,3544   00021 1                   16D
4551                       32,3545   77742 0            SR1
4552                       32,3546   00021 1            STORE  16D
4553                       32,3547   52001 1  GAMDV33   SETPD  GOTO                                                 PL18D
4554                       32,3550   00023 0                   18D
4555   REF   1             32,3551   65615 0                   GAMDV50

R4556  TIME CRITICAL MODE

4557                       32,3552   45345 1  GAMDV35   DLOAD  DSU
4558   REF  10 LAST  922   32,3553   03632 0                   RTEDVD
4559   REF   7 LAST  926   32,3554   03706 0                   DV
4560                       32,3555   41525 0            PDDL   PUSH           DVD-DV=DVERR                          B7/B5 PL22D
4561                       32,3556   51545 1  GAMDV40   DLOAD  ABS            DV,                                          PL24D
4562                       32,3557   00025 0                   20D
4563                       32,3560   50025 0            DSU    BMN
4564   REF   1             32,3561   33616 0                   EPC1ORTE
4565   REF   2 LAST  925   32,3562   65656 1                   GAMDVX
4566                       32,3563   71204 1  GAMDV45   BOVB   DLOAD
45661  REF   8 LAST  872   32,3564   57352 1                   TCDANZIG       ASSURE OVFIND IS 0
4567                       32,3565   60221 0            BDSU   NORM
4568   REF   8 LAST  926   32,3566   03706 0                   DV
4569   REF  25 LAST  919   32,3567   00050 1                   X2
4570                       32,3570   77725 1            PDDL                  DV-DV,                          B7/B5-N2 PL22D
4571                       32,3571   70501 1            NORM   SR1            DVERR                           B8/B6-N1
4572   REF  51 LAST  918   32,3572   00047 1                   X1
4573                       32,3573   65271 0            DOV    PDDL           DVERR/ DV - DV
4576                       32,3574   41221 0            BDSU   DMP                                                         PL18D
4577   REF  18 LAST  926   32,3575   03722 0                   X(T1)
4578                       32,3576   77660 1            XSU,1
4579   REF  27 LAST  926   32,3577   00047 1                   X2
45791                      32,3600   00021 1            STORE  16D            PRESERVE SIGN IF OVERFLOW
45792                      32,3601   40057 1            SR*    BOV
4580                       32,3602   20600 0                   0 -1,1
45801  REF   1             32,3603   65611 1                   GAMDV47
4581                       32,3604   00021 1            STORE  16D            (X(T1)-X(T1),)DVERR/(DV-DV,)=DX(T1)
4582                       32,3605   45246 0            ABS    DSU
4583                       32,3606   00015 0                   12D
4584                       32,3607   77640 0            BMN
4585   REF   2 LAST  926   32,3610   65615 0                   GAMDV50
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 4586                          32,3611   75345 1  GAMDV47  DLOAD  SIGN
 4587                          32,3612   00015 0                  12D
 4588                          32,3613   00021 1                  16D
 4589                          32,3614   00021 1           STORE  16D          DX(T1)MAX(SIGNDX(T1))=DX(T1)

R4590  CHECK TO KEEP INDEPENDENT VARIABLE IN BOUNDS

 4591                          32,3615   41345 0  GAMDV50  DLOAD  DMP
 4592                          32,3616   00021 1                  16D
 4593  REF   1                 32,3617   33536 1                  1.1RTE81
 4594                          32,3620   43352 1           SL1    DAD
 4595  REF  19  LAST  926      32,3621   03722 0                  X(T1)
 4596                          32,3622   00031 0           STORE  24D          X(T1)+1.1DX(T1)=BETA9          B5
 4597                          32,3623   50025 0           DSU    BMN
 4598                          32,3624   00017 1                  14D
 4599  REF   1                 32,3625   65634 0                  GAMDV55
 4600                          32,3626   45345 1           DLOAD  DSU
 4601                          32,3627   00017 1                  14D
 4602  REF  20  LAST  927      32,3630   03722 0                  X(T1)
 4603                          32,3631   77742 0           SR1
 4604                          32,3632   34021 0           STCALL 16D          (X(T1)MAX-X(T1))/2=DX(T1)      B5
 4605  REF   1                 32,3633   65647 1                  GAMDV65
 4606                          32,3634   45345 1  GAMDV55  DLOAD  DSU
 4607                          32,3635   00031 0                  24D
 4608                          32,3636   00013 0                  10D
 4609                          32,3637   52040 1           BMN    GOTO
 4610  REF   1                 32,3640   65642 1                  GAMDV60
 4611  REF   2  LAST  927      32,3641   65647 1                  GAMDV65
 4612                          32,3642   45345 1  GAMDV60  DLOAD  DSU
 4613                          32,3643   00013 0                  10D
 4614  REF  21  LAST  927      32,3644   03722 0                  X(T1)
 4615                          32,3645   77742 0           SR1
 4616                          32,3646   00021 1           STORE  16D          (X(T1)MIN-X(T1))/2=DX(T1)      B5
 4617                          32,3647   51545 1  GAMDV65  DLOAD  ABS
 4618                          32,3650   00021 1                  16D
 4619                          32,3651   50025 0           DSU    BMN
 4620  REF   2  LAST  925      32,3652   33614 1                  EPC9RTE
 4621  REF   3  LAST  926      32,3653   65656 1                  GAMDVX
 4622                          32,3654   77650 1           GOTO
 4623  REF   1                 32,3655   65513 0                  GAMDV25
 4624                          32,3656   77650 1  GAMDVX   GOTO
 4625                          32,3657   00037 0                  31D
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P4700   DV CALCULATION SUBROUTINE

R4701   INPUT
R4702     PUSHLIST
R4703       02D         THETA1=BETA5*LAMBDA-1                          TP      B17
R4705       05D         THETA2=2*R(T1)*(LAMBDA-1)                      TP      B38/B36
R4707       08D         THETA3=MU**.5/R(T1)                            DP      B-4/B-5
R4709     OTHER
R4710       X(T1)       COTANGENT OF POST IMPULSE INITIAL FLIGHT PATH ANGLE  DP      B5
R4712       V(T1)/      INITIAL VELOCITY VECTOR (PRE IMPULSE)          VECTOR  B7/B5   METERS/CS
R4714       UR1/        UNIT INITIAL VECTOR                            VECTOR  B1
R4716       UH/         UNIT HORIZONTAL VECTOR                         VECTOR  B1
R4718
R4719   OUTPUT
R4720       V2(T1)/     POST IMPULSE INITIAL VELOCITY VECTOR           VECTOR  B7/B5   METERS/CS
R4722       DV          INITIAL VELOCITY CHANGE                        DP      B7/B5   METERS/CS
R4724       PCON        SEMI-LATUS RECTUM                              DP      B28/B26 METERS
R4726
R4727   DEBRIS
R4728       28D         THETA3*PCON**.5                                DP      B10/B8-N1
R4730       C(PUSLOC)   THETA3(PCON**.5)*X(T1)*UR1/                    VECTOR  B7/B5
R4732       32D         DVCALC SUBROUTINE RETURN ADDRESS
R4733       X1          NORMALIZATION FACTOR FOR VALUE IN 28D
R4734   PUSHLOC IS RESTORED TO ITS ENTRANCE VALUE UPON EXITING DVCALC

 4750                           32,3660  71220 1  DVCALC   STQ     DLOAD
 4751                           32,3661  00040 0           320
 4752   REF  22  LAST  927      32,3662  03722 0           X(T1)
 4753                           32,3663  54316 1  DSQ      SR
 4754                           32,3664  20610 1           7
 4755                           32,3665  76276 0  DCOMP    TAD
 4756                           32,3666  00003 1           02D
 4757                           32,3667  41501 0  NORM     PUSH
 4758   REF  52  LAST  926      32,3670  00047 1           X1
 4759                           32,3671  60351 0  TLOAD    NORM
 4760                           32,3672  00006 1           050
 4761   REF  28  LAST  926      32,3673  00050 1           X2
 4762                           32,3674  70434 0  RTB      SR1
47625   REF   3  LAST  920      32,3675  45716 0           DPMODE
476251                         32,3676  56264 1  XSU,2    DDV
 4763   REF  53  LAST  928      32,3677  00046 0           X1
47635                          32,3700  77657 0  SR*
476351                         32,3701  57170 0           6,2
 4764   REF   3  LAST  895      32,3702  03720 1  STORE    PCON          THETA2/(THETA1-X(T1)**2)=PCON B28/26
 4765                           32,3703  41366 1  SQRT     DMP
 4766                           32,3704  00011 1           08D
 4767                           32,3705  77701 1  NORM
 4768   REF  54  LAST  928      32,3706  00047 1           X1
 4769                           32,3707  14035 1  STODL    28D           THETA3*PCON**.5         B10/B8 -N1
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4770  REF  23  LAST  928   32,3710   03722 0            X(T1)
4771                       32,3711   74301 0   NORM     VXSC
4772  REF  29  LAST  928   32,3712   00050 1            X2
4773  REF   9  LAST  906   32,3713   03740 1            UR1/          X(T1)*UR1/              B5+B1 -N2
4774                       32,3714   74274 0   XAD,2    VXSC
4775  REF  55  LAST  928   32,3715   00046 0            X1
4776                       32,3716   00035 1            28D
4777                       32,3717   63257 1   VSR*     PDVL          THETA3(PCON**.5)X(T1)*UR1/ B7/B5
4778                       32,3720   57207 0            0 -9D,2                  +
4779  REF   5  LAST  906   32,3721   03746 1            UH/
4780                       32,3722   53761 1   VXSC     VSR*          THETA3(PCON**.5)UH/        B7/B5
4781                       32,3723   00035 1            28D
4782                       32,3724   20575 1            0 -4,1                   =
4783                       32,3725   45455 1   VAD      STADR
4784  REF   7  LAST  915   32,3726   74077 1   STORE    V2(T1)/       V2(T1)/                    B7/B5
4785                       32,3727   51451 0   VSU      ABVAL
4786  REF   6  LAST  906   32,3730   03672 1            V(T1)/
4787  REF   9  LAST  926   32,3731   03706 0   STORE    DV            ABVAL(V2(T1)/-V1(T)/)=DV   B7/B5
4788                       32,3732   77650 1   GOTO
4789                       32,3733   00040 0            32D
```

L P37,P70 USER'S PAGE NO. 41 E7 S3

```
P4800   SUBROUTINE TO COMPUTE BOUNDS ON INDEPENDENT VARIABLE X(T1)

R4801   INPUT
R4802     PUSHLIST
R4803       PUSHLOC -4  MAJOR AXIS (MA)                          DP      B30/B28
R4805       PUSHLOC -2  MAJOR AXIS (MA) AGAIN                    DP      B30/B28
R4807       28D         BETA5=LAMBDA*BETA1                       DP      B9
R4809     OTHER
R4810       RCON                                                 DP      B29/B27
R4812       R(T1)                                                DP      B29/B27
R4814   OUTPUT
R4815     MPAC
R4816       X(T1)LIM    LIMIT ON INDEPENDENT VARIABLE X(T1)      DP      B5
R4818   DEBRIS
R4819     PUSHLIST
R4820       C(PUSHLOC)  MA-RCON                                  DP      (B30/28)-N1
R4823       C(PSHLOC)+2 MA                                       DP      B30/B28
R4825       X1          NORMALIZATION FACTOR FOR MA-RCON
R4826       20D         XT1LIM SUBROUTINE RETURN ADDRESS
R4827   PUSHLOC IS RESTORED TO ITS ENTRANCE VALUE UPON EXITING XT1LIM

 4850                       32,3734   71220 1  XT1LIM   STQ    DLOAD
 4851                       32,3735   00024 1                  20D
 4852   REF  13  LAST  918  32,3736   03636 1                  RCON
 4853                       32,3737   44342 1           SR1    BDSU
 4854                       32,3740   65301 0           NORM   PDDL      MA-RCON                    B30-N1
 4855   REF  30  LAST  929  32,3741   00050 1                  X2
 4856                       32,3742   70525 1           PDDL   SR1
 4857   REF   9  LAST  919  32,3743   03646 0                  R(T1)
 4858                       32,3744   56221 0           BDSU   DDV
 4859                       32,3745   41257 1           SL*    DMP
 4860                       32,3746   57601 1                  0-3,2                                 B3
48605                       32,3747   00035 1                  28D
 4861                       32,3750   45257 0           SL*    DSU       BETA10=BETA5(MA-RT)/(MA-RC)-1   B11
48615                       32,3751   20173 0                  0-6,1
 4862   REF   1             32,3752   33521 1                  1RTEB25 +1  1.0 B-11
48625                       32,3753   40152 0           SL1    BDV                                   B10
 4863   REF   1             32,3754   65760 0                  XT1LIM2
48635                       32,3755   52040 1           BMN    GOTO
 4864   REF   1             32,3756   65764 1                  XT1LIM5
48645   REF   1             32,3757   65762 1                  XT1LIM3
 4865                       32,3760   77745 1  XT1LIM2  DLOAD             BETA10=POSMAX IF OVERFLOW
48655   REF   5  LAST  920  32,3761   33542 1                  2RTEB1
 4866                       32,3762   52166 1  XT1LIM3  SQRT   GOTO      X(T1)=SQRT(BETA10)            B5
48665   REF   1             32,3763   65766 0                  XT1LIMX
 4867                       32,3764   77745 1  XT1LIM5  DLOAD
 4868   REF   5  LAST  923  32,3765   33524 1                  ZERORTE
 4869                       32,3766   77650 1  XT1LIMX  GOTO
 4870                       32,3767   00024 1                  20D
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P4900 CONSTANTS FOR THE P37 AND P70 PROGRAMS AND SUBROUTINES

```
 49005                  36,3254                          BANK   36
 49006  REF   1         35,2000                          SETLOC RTECON1
 49007                  35,3477                          BANK

 4901                   35,3477   20000 0  1RTEB1   2DEC   1.B-1
 4901                   35,3500   00000 1
 4902                   35,3501   10000 0  1RTEB2   2DEC   1.B-2
 4902                   35,3502   00000 1
 4903                   35,3503   04000 0  1RTEB3   2DEC   1.B-3
 4903                   35,3504   00000 1
 4904                   35,3505   02000 0  1RTEB4   2DEC   1.B-4
 4904                   35,3506   00000 1
 4910                   35,3507   00020 0  1RTEB10  2DEC   1.B-10
 4910                   35,3510   00000 1
 4912                   35,3511   00004 0  1RTEB12  2DEC   1.B-12
 4912                   35,3512   00000 1
 4913                   35,3513   00002 0  1RTEB13  2DEC   1.B-13
 4913                   35,3514   00000 1
 4917                   35,3515   00000 1  1RTEB17  2DEC   1.B-17
 4917                   35,3516   04000 0
 4925                   35,3517   00000 1  1RTEB25  2DEC   1.B-25
 4925                   35,3520   00010 0
A4926                                                    * * B25 AND B28 MUST BE CONSECUTIVE * *
 4928                   35,3521   00000 1  1RTEB28  2DEC   1.B-28
 4928                   35,3522   00001 0
 4929                   35,3523   00000 1  ZERORTE  2DEC   0
 4929                   35,3524   00000 1
 4930                   35,3525   77777 0  M144RTE  2DEC   -144.B-28
 4930                   35,3526   77557 0
 49301                  35,3527   77777 0  M15RTE   2DEC   -15
 49301                  35,3530   77760 0
 49302                  35,3531   00000 1  10RTE    2DEC   10
 49302                  35,3532   00012 1
 49303                  35,3533   54631 1  M.6RTE   2DEC   -.6
 49303                  35,3534   63145 1
 4931                   35,3535   21463 0  1.1RTEB1 2DEC   1.1B-1
 4931                   35,3536   06315 0
 49311                  35,3537   77777 0  M6RTEB28 2DEC   -6
 49311                  35,3540   77771 0
 49312                  35,3541   37777 1  2RTEB1   2OCT   3777737777
 49312                  35,3542   37777 1
 4932                   35,3543   77777 0  M9RTEB28 2DEC   -9
 4932                   35,3544   77766 0
 4933                   35,3545   77777 0  M8RTEB28 2DEC   -8
 4933                   35,3546   77767 1
 4934                   35,3547   00000 1  30480RTE 2DEC   30480.B-29
 4934                   35,3550   35610 0
 4935                   35,3551   37405 1  VCSPS    2DEC   31.510396 B-5   (SEE 2VEXHUST)
 4935                   35,3552   12250 0
```

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4936                    35,3553   33041 1  VCRCS    2DEC   27.0664B-5
4936                    35,3554   37714 1
4937                    35,3555   00003 1  MDOTRCS  2DEC   .0016375B-3
4937                    35,3556   13241 1
4938                    35,3557   20000 0  CSUBT    2DEC   .5
4938                    35,3560   00000 1
4940                    35,3561   00605 1  OCT605   OCT    00605
4941                    35,3562   00612 1  OCT612   OCT    00612
4943                    35,3563   40214 1  MCOS7.5  2DEC   -.99144486
4943                    35,3564   45256 1
4944                    35,3565   73645 1  MSIN7.5  2DEC   -.13052619
4944                    35,3566   56536 1
4945                    35,3567   70467 0  MCOS22.5 2DEC   -.923879538-2
4945                    35,3570   71205 0
4946                    35,3571   16525 1  THETA165 2DEC   .458333333
4946                    35,3572   12525 0
4947                    35,3573   22525 0  THETA210 2DEC   .583333333
4947                    35,3574   12525 0
4951                    35,3575   17775 1  EPC1RTE  2DEC   .999668-1
4951                    35,3576   06676 0
4952                    35,3577   00000 1  EPC2RTE  2DEC   100.B-29
4952                    35,3600   00062 0
4953                    35,3601   00020 0  EPC3RTE  2DEC   .001
4953                    35,3602   14223 1
4954                    35,3603   00000 1  EPC4RTE  2DEC   .00001
4954                    35,3604   05174 0
4955                    35,3605   00002 0  EPC5RTE  2DEC   .01B-6
4955                    35,3606   21727 0
4956                    35,3607   00000 1  EPC6RTE  2DEC   .000007B-1
4956                    35,3610   01654 1
4957                    35,3611   00000 1  EPC7RTE  2DEC   1000.B-29
4957                    35,3612   00764 1
4959                    35,3613   00000 1  EPC9RTE  2DEC   1.B-25
4959                    35,3614   00010 0
4960                    35,3615   00000 1  EPC10RTE 2DEC   .00018-7
4960                    35,3616   00322 1
4961                    35,3617                    BANK   35
4962  REF  2  LAST 931  35,2000                    SETLOC RTECON1
4963                    35,3617                    BANK
4964                    35,3617   75725 0  C4RTE    2DEC   -6.986643 E7B-30
4964                    35,3620   75417 1
4971                    35,3621   00325 0  K1RTE    2DEC   7.E6B-29
4971                    35,3622   23740 0
4972                    35,3623   00306 1  K2RTE    2DEC   6495000.B-29
4972                    35,3624   06614 1
4973                    35,3625   76027 0  K3RTE    2DEC   -.06105
4973                    35,3626   70156 1
4974                    35,3627   74517 1  K4RTE    2DEC   -.10453
4974                    35,3630   54131 0
4980                    35,3631   30276 1  RTMURTE  2DEC   199650.5018-18
4980                    35,3632   05001 0
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4995                    35,3633   00003 1  E3RTE    2DEC   121920.B-29
4995                    35,3634   27040 0
```

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2000                                23,3205                         BANK    23
2001   REF   1                      42,2000                         SETLOC  SBAND
2002                                42,3652                         BANK

2003   REF   1                                                      COUNT*  $$/R05
2004   REF   3  LAST  808  F4,1417                                   EBANK=  EMSALT

20061  REF 240  LAST  900  42,3652  0 4662 1  SBANDANT TC      BANKCALL        V 64 E GETS US HERE
20062  REF   8  LAST  803  42,3653   17653 1            CADR    R02BOTH         CHECK IF IMU IS ON AND ALIGNED
2007   REF 226  LAST  900  42,3654  0 6006 1            TC      INTPRET
2008                        42,3655   45034 1            RTB     CALL
2009   REF  24  LAST  790  42,3656   45510 1                    LOADTIME        PICKUP CURRENT TIME SCALED B-28
2010   REF   9  LAST  777  42,3657   47477 0                    CDUTRIG         COMPUTE SINES AND COSINES OF CDU ANGLES
2012   REF  47  LAST  916  42,3660   34041 0            STCALL  TDEC1           ADVANCE INTEGRATION TO TIME IN TDEC1
2013   REF   8  LAST  778  42,3661   27114 0                    CSMCONIC        USING CONIC INTEGRATION
2014                        42,3662   46135 1            SLOAD   BHIZ            ORIGIN OF REFERENCE INERTIAL SYSTEM IS
2015   REF  31  LAST  930  42,3663   00050 1                    X2              EARTH = 0, MOON = 2
2016   REF   1              42,3664   65577 1                    EISDI
2017                        42,3665   77775 1            VLOAD
2018   REF  35  LAST  916  42,3666   00001 0                    RATT
2019   REF   1              42,3667   00003 1            STORE   RCM             MOVE RATT TO PREVENT WIPEOUT
2020                        42,3670   45145 0            DLOAD   CALL            MOON, PUSH ON
2021   REF  10  LAST  916  42,3671   00015 0                    TAT             GET ORIGINAL TIME
2022   REF   2  LAST  624  42,3672   54115 0                    LUNPOS          COMPUTE POSITION VECTOR OF MOON
2023                        42,3673   57455 1            VAD     VCOMP           R= -(REM+RCM) = NEG. OF S/C POS. VEC
2024   REF   2  LAST  934  42,3674   00003 1                    RCM
2025                        42,3675   77650 1            GOTO
2026   REF   2  LAST  934  42,3676   65701 1                    EISOI +2
2027                        42,3677   57575 1  EISOI     VLOAD   VCOMP           EARTH, R= -RCM
2028   REF  36  LAST  934  42,3700   00001 0                    RATT
2029                        42,3701   64201 0            SETPD   MXV             RCS TO STABLE MEMBER- B-1X B-29X B+1
2030                        42,3702   00003 1                    2D              2D
2031   REF  39  LAST  885  42,3703   01736 1                    REFSMMAT        STABLE MEMBER.  B-1X B-29X B+1= B-29
2032                        42,3704   65372 1            VSL1    PDDL            8D
2033   REF  25  LAST  879  42,3705   15335 0                    HI6ZEROS
2034   REF   1              42,3706   24025 0            STOVL   YAWANG          ZERO OUT YAWANG, SET UP FOR SMNB
2035   REF   3  LAST  934  42,3707   00003 1                    RCM             TRANSFORMATION. SM COORD. SCALED B-29
2036                        42,3710   77624 1            CALL
2037   REF   5  LAST  721  42,3711   47644 1                    *SMNB*
2038   REF   1              42,3712   00003 1            STORE   R               SAVE NAV. BASE COORDINATES
2039                        42,3713   63256 0            UNIT    PDVL            14D
2040   REF   2  LAST  934  42,3714   00003 1                    R
2041                        42,3715   72431 1            VPROJ   VSL2            COMPUTE PROJECTION OF VECTOR INTO CM
2042   REF   2  LAST  286  42,3716   15327 0                    HIUNITZ         XY-PLANE, R-(R.UZ)UZ
2043                        42,3717   40045 1            BVSU    BOV             CLEAR OVERFLOW INDICATOR IF SET
2044   REF   3  LAST  934  42,3720   00003 1                    R
2045   REF   1              42,3721   65722 0                    COVCNV
2046                        42,3722   40056 0  COVCNV    UNIT    BOV             TEST OVERFLOW FOR INDICATION OF NULL
2047   REF   1              42,3723   65737 1                    NOADJUST        VECTOR
2048                        42,3724   50206 0            PUSH    DOT             20D
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2049   REF   4  LAST  396   42,3725   15333 0                HIUNITX      COMPUTE YAW ANGLE = ACOS (URP.UX)
2050                        42,3726   65552 0          SL1   ACOS         REVOLUTIONS SCALED BO
2051                        42,3727   50315 0          PDVL  DOT          22D YAWANG
2052   REF   1              42,3730   00017 1                URP
2053   REF   2  LAST  286   42,3731   15331 1                HIUNITY      COMPUTE FOLLOWING- URP.UY
2054                        42,3732   51152 0          SL1   BPL          POSITIVE
2055   REF   2  LAST  934   42,3733   65737 1                NOADJUST     YES, 0- 180 DEGREES
2056                        42,3734   45345 1          DLOAD DSU          NO, 181-360 DEGREES 20D
2057   REF  11  LAST  633   42,3735   15343 1                DPPOSMAX     COMPUTE 2 PI MINUS YAW ANGLE
2058                        42,3736   77606 1          PUSH               22D YAWANG
2059                        42,3737   50375 0  NOADJUST VLOAD  DOT        COMPUTE PITCH ANGLE
2060   REF   1              42,3740   00011 1                UR           ACOS (UR.UZ) - PI/2
2061   REF   3  LAST  934   42,3741   15327 0                HIUNITZ
2062                        42,3742   65552 0          SL1   ACOS         REVOLUTIONS BO
2063                        42,3743   77625 0          DSU
2064   REF   3  LAST  881   42,3744   15325 1                HIDP1/4
2065   REF   4  LAST  280   42,3745   16321 0          STODL RHOSB
2066   REF   2  LAST  934   42,3746   00025 0                YAWANG
2067   REF   2  LAST  280   42,3747   02323 1          STORE GAMMASB      PATCH FOR CHECKOUT
2068                        42,3750   77776 1          EXIT
20681  REF  19  LAST  789   42,3751   3 1044 0         CA    EXTVSACT     IS BIT 5 STILL ON
20682  REF  28  LAST  745   42,3752   7 5013 1         MASK  BIT5
20683                       42,3753   0 0006 1         EXTEND
20684  REF  33  LAST  633   42,3754   1 5534 1         BZF   ENDEXT       NO, WE HAVE BEEN ANSWERED
2069   REF   1              42,3755   3 3771 0         CAF   V06N51       DISPLAY ANGLES
2070   REF 241  LAST  934   42,3756   0 4662 1         TC    BANKCALL
2071   REF   3  LAST  571   42,3757    20600 0         CADR  GOMARKFR
2072   REF   7  LAST  519   42,3760   0 5625 0         TC    B5OFF        TERMINATE
2073   REF   8  LAST  935   42,3761   0 5625 0         TC    B5OFF
2074   REF  97  LAST  898   42,3762   0 5217 0         TC    ENDOFJOB     RECYCLE
2075   REF  25  LAST  736   42,3763   3 5015 0         CAF   BIT3         IMMEDIATE RETURN
2076   REF  13  LAST  898   42,3764   0 5526 0         TC    BLANKET      BLANK R3
2077   REF  59  LAST  825   42,3765   3 5017 1         CAF   BIT1         DELAY MINIMUM TIME TO ALLOW DISPLAY IN
2078   REF 242  LAST  935   42,3766   0 4662 1         TC    BANKCALL
2079   REF  13  LAST  805   42,3767    01732 0         CADR  DELAYJOB
2080   REF   2  LAST  250   42,3770   1 3654 1         TCF   SBANDANT +2
2086                        42,3771    01463 1 V06N51  VN    0651
2087                           0002          RCM      EQUALS 2D
2088                           0010          UR       EQUALS 8D
2089                           0016          URP      EQUALS 14D
2090                           0024          YAWANG   EQUALS 20D
2091                           0026          PITCHANG EQUALS 22D
2092   REF   4  LAST  934        0002          R        EQUALS RCM
2093   REF  11  LAST  738     30,2000                   SBANK= LOWSUPER
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*** END OF TROUBLE .043 ***

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R1000   NAME     TVCDAPON (TVC DAP INITIALIZATION AND STARTUP CALL)
R1001   LOG SECTION...TVCINITIALIZE                    SUBROUTINE...DAPCSM
R1002   MODIFIED BY SCHLUNDT                          21 OCTOBER 1968
R1003   FUNCTIONAL DESCRIPTION
R1004        PERFORMS TVCDAP INITIALIZATION (GAINS, TIMING PARAMETERS, FILTER VARIABLES, ETC.)
R1006        COMPUTES STEERING (S40.8) GAIN KPRIMEDT, AND ZERDES PASTDELV,+1 VARIABLE
R1008        MAKES INITIALIZATION CALL TO ..NEEDLER.. FOR TVC DAP NEEDLES-SETUP
R1009        PERFORMS INITIALIZATION FOR ROLL DAP
R1010        CALLS TVCEXECUTIVE AT TVCEXEC, VIA WAITLIST
R1011        CALLS TVCDAP CDU-RATE INITIALIZATION PKG AT DAPINIT  VIA T5
R1012        PROVIDES FOR LOADING OF LOW-BANDWIDTH COEFFS AND GAINS AT SWICHOVR
R1013   CALLING SEQUENCE - T5LOC=2CADR(TVCDAPON,EBANK=BZERO), T5=.6SECT5
R1014        IN PARTICULAR, CALLED BY ..DOTVCON.. IN P40
R10141       MRCLEAN AND TVCINIT4 ARE POSSIBLE RESTART ENTRY POINTS
R1015   NORMAL EXIT MODE
R1016        TCF RESUME
R1017   SUBROUTINES CALLED
R1018        NEEDLER, MASSPROP
R1019   ALARM OR ABORT EXIT MODES
R1020        NONE
R1021   ERASABLE INITIALIZATION REQUIRED
R1022        CSMMASS, LEMMASS, DAPDATR1 (FOR MASSPROP SUBROUTINE)
R1023        TVC PAD LOADS (SEE EBANK6 IN ERASABLE ASSIGNMENTS)
R1024        PACTOFF, YACTOFF, CDUX
R1025        TVCPHASE AND THE T5 BITS OF FLAGWRD6 (SET AT DOTVCON IN P40)
R1026   OUTPUT
R1027        ALL TVC AND ROLL DAP ERASABLES, FLAGWRD6 (BITS 13,14), T5, WAITLIST
R1028   DEBRIS
R1029        NONE

 1030   REF   1                                        COUNT* $$/INIT
 1031                        17,2147                  BANK   17
 1032   REF   3  LAST  727   17,2000                  SETLOC DAPS7
 1033                        17,2147                  BANK

 1034   REF   2  LAST  188   E6,1702                  EBANK= BZERO

 1035   REF   7  LAST  736   17,2147  22 016 0  TVCDAPON LXCH   BANKRUPT      T5 RUPT ARRIVAL (CALL BY DOTVCON - P40)
 1036                        17,2150  0 0006 1         EXTEND                 SAVE Q REQUIRED IN RESTARTS (MRCLEAN AND
10361   REF   7  LAST  736   17,2151  22 012 1         QXCH   QRUPT                TVCINIT4 ARE ENTRIES)
 1038   REF   1              17,2152  3 2534 1  MRCLEAN CAF    NZERO          NUMBER TO ZERO, LESS ONE  (MUST BE ODD)
A1039                                                                            TVC RESTARTS ENTER HERE  (NEW BANK)
 1040   REF 192  LAST  888   17,2153  10 000 0    +1     CCS    A
 1041   REF  14  LAST  731   17,2154  55'447 0         TS     CNTR
 1042   REF 159  LAST  897   17,2155  3 5021 1         CAF    ZERO
 1043   REF  78  LAST  889   17,2156  54 001 1         TS     L
 1044   REF  15  LAST  937   17,2157  51'447 1         INDEX  CNTR
 1045   REF   1              17,2160  53'530 1         DXCH   OMEGAYC         FIRST (LAST) TWO LOCATIONS
 1046   REF  16  LAST  937   17,2161  11'447 0         CCS    CNTR
 1047   REF   1              17,2162  1 2153 0         TCF    MRCLEAN +1
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10471                          17,2163  0 0006 1           EXTEND                SET UP ANOTHER T5 RUPT TO CONTINUE
10472  REF   1                 17,2164  3 2551 1           DCA     INITLOC2      INITIALIZATION AT TVCINIT1
10473  REF  12  LAST  736      17,2165  53'313 0           DXCH    T5LOC         THE PHSCHK2 ENTRY (REDOTVC) AT TVCDAPON
10474  REF  17  LAST  823      17,2166  3 4777 1           CAF     POSMAX        +3 IS IN ANOTHER BANK. MUST RESET
10475  REF   8  LAST  736      17,2167  54 030 0           TS      TIME5         BBCON TOO (FULL 2CADR), FOR THAT
10476  REF  28  LAST  736      17,2170  1 5333 0  ENDMRC   TCF     RESUME        ENTRY.

10477  REF   8  LAST  937      17,2171  22 016 0  TVCINIT1 LXCH    BANKRUPT
10478                          17,2172  0 0005 1           EXTEND
10479  REF   8  LAST  937      17,2173  22 012 1           QXCH    QRUPT

1048   REF  31  LAST  734      17,2174  0 4740 0           TC      IBNKCALL      UPDATE IXX, IAVG/TLX FOR DAP GAINS (R03
1049   REF   4  LAST  698      17,2175   13366 0           CADR    MASSPROP      OR NOUNS 46 AND 47 MUST BE CORRECT)

1050   REF   4  LAST  896      17,2176  30 110 1           CAE     EMDOT         SPS FLOW RATE, SCALED B+3 KG/CS
1051                           17,2177  0 0006 1           EXTEND
1052   REF   1                 17,2200  7 2545 0           MP      ONETHOU
1053   REF   2  LAST  105      17,2201  55'637 0           TS      TENMDOT       10-SEC MASS LOSS B+16 KG
1054                           17,2202  4 0000 0           COM
1055   REF  11  LAST  708      17,2203  6 1474 1           AD      CSMMASS
1056   REF   7  LAST  708      17,2204  55'652 0           TS      MASSTMP       DECREMENT FOR FIRST 10 SEC OF BURN

1059   REF  63  LAST  736      17,2205  31'466 1           CAE     DAPDATR1      CHECK LEM-ON/OFF
1060   REF  44  LAST  793      17,2206  7 5002 1           MASK    BIT14
1061   REF 193  LAST  937      17,2207  10 000 0           CCS     A
1062   REF  60  LAST  935      17,2210  3 5017 1           CAF     BIT1          LEM-ON (BIT1)
1063   REF  17  LAST  937      17,2211  55'447 0           TS      CNTR          LEM-OFF (ZERO)

106302 REF  18  LAST  938      17,2212  51'447 1           INDEX   CNTR          LOAD THE FILTER COEFFICIENTS
106304 REF   1                 17,2213  3 2531 1           CAF     CSMCFADR
106306 REF   2  LAST  106      17,2214  55'722 0           TS      COEFFADR
106308 REF   1                 17,2215  0 2422 1           TC      LOADCOEF

10631  REF  19  LAST  938      17,2216  51'447 1           INDEX   CNTR          PICK UP LM-OFF,-ON KTLX/I
106312 REF   1                 17,2217  31'416 0           CAE     EKTLX/I       SCALED AT 1/(8 ASCREV) OF ACTUAL VALUE
106314 REF   2  LAST  105      17,2220  55'636 1           TS      KTLX/I

10632  REF   1                 17,2221  0 2462 0           TCR     S40.15        COMPUTE 1/CONACC , VARK

1064   REF  20  LAST  938      17,2222  4 1447 0  TVCINIT2 CS      CNTR          PICK LM-OFF,-ON VALUE FOR FILTER PERIOD
1065   REF 194  LAST  938      17,2223  50 000 1           INDEX   A             DETERMINATION:
1066   REF  35  LAST  824      17,2224  3 5016 0           CAF     BIT2                BIT2 FOR CSM ONLY 40MS FILTER
1067   REF   3  LAST  721      17,2225  55'634 0           TS      KPRIMEDT            BIT3 FOR CSM/LM 80MS FILTER

1070                           17,2226  4 0000 0           COM                   PREPARE T5TVCDT
1071   REF  18  LAST  938      17,2227  6 4777 1           AD      POSMAX
1072   REF  61  LAST  938      17,2230  6 5017 1           AD      BIT1
1073   REF   3  LAST  251      17,2231  55'625 0           TS      T5TVCDT

10732  REF  36  LAST  745      17,2232  4 5001 1           CS      BIT15         RESET SWTOVER FLAG
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10733  REF   9  LAST  584   17,2233  7 0105 1          MASK   FLAGWRD9
10734  REF  10  LAST  939   17,2234  54 105 1          TS     FLAGWRD9

1074   REF  21  LAST  938   17,2235  51'447 1          INDEX  CNTR          PICK UP LEM-OFF,-ON KPRIME
1075   REF   1               17,2236  31'414 1          CAE    EKPRIME            SCALED (100 PI)/16
1076                         17,2237  0 0006 1          EXTEND
1077   REF   4  LAST  938   17,2240  7 1634 0          MP     KPRIMEDT     (TVCDT/2, SC.AT B+14CS)
1078   REF 195  LAST  938   17,2241  22 000 1          LXCH   A                  SC.AT PI/8    (DIMENSIONLESS)
1079   REF   5  LAST  939   17,2242  53'635 1          DXCH   KPRIMEDT

1080   REF  22  LAST  939   17,2243  51'447 1          INDEX  CNTR          PICK UP LEM-OFF,-ON REPFRAC
1081   REF   2  LAST  720   17,2244  31'421 1          CAE    EREPFRAC
1082   REF   4  LAST  722   17,2245  55'642 1          TS     REPFRAC

10821  REF  23  LAST  939   17,2246  51'447 1          INDEX  CNTR          PICK UP ONE-SHOT CORRECTION TIME
10822  REF   1               17,2247  3 2540 1          CAF    TCORR
10823  REF  24  LAST  939   17,2250  55'447 0          TS     CNTR

1083   REF  14  LAST  585   17,2251  3 7716 0          CAF    NEGONE        PREVENT STROKE TEST UNTIL CALLED
1084   REF   2  LAST  106   17,2252  55'654 0          TS     STRKTIME

1085   REF   1               17,2253  3 4374 0          CAF    NINETEEN      SET VCNTR FOR VARIABLE-GAIN UPDATES IN
1086   REF   4  LAST  722   17,2254  55'643 0          TS     VCNTR               10 SECONDS (TVCEXEC 1/2 SEC RATE)
10862  REF   7  LAST  707   17,2255  55'444 0          TS     V97VCNTR      FOR ENGFAIL (R41) LOGIC

1095   REF  17  LAST  734   17,2256  31'423 0  TVCINIT3 CAE    PACTOFF       TRIM VALUES TO TRIM-TRACKERS, OUTPUT
1096   REF   2  LAST  105   17,2257  55'605 1          TS     PDELOFF             TRACKERS, OFFSET-UPDATES, AND
1097   REF   4  LAST  171   17,2260  55'623 0          TS     PCMD                OFFSET-TRACKER FILTERS
1099   REF   3  LAST  699   17,2261  55'601 0          TS     DELPBAR             NOTE, LO-ORDER DELOFF,DELBAR ZEROED

1100   REF   5  LAST  731   17,2262  31'424 1          CAE    YACTOFF
1101   REF   2  LAST  105   17,2263  55'607 0          TS     YDELOFF
1102   REF   2  LAST  105   17,2264  55'624 1          TS     YCMD
1103  *REF   3  LAST  699   17,2265  55'603 1          TS     DELYBAR

11031 *REF  64  LAST  938   17,2266  31'466 1  ATTINIT  CAE    DAPDATR1      ATTITUDE-ERROR INITIALIZATION LOGIC
11032 *REF  35  LAST  873   17,2267  7 5003 0          MASK   BIT13               TEST FOR CSM OR CSM/LM
11033 *                     17,2270  0 0006 1          EXTEND
1104  *REF   1               17,2271  1 2317 1          BZF    NEEDLEIN            BYPASS INITIALIZATION FOR CSM/LM

110401*REF  62  LAST  938   17,2272  3 5017 1          CAF    BIT1                SET UP TEMPORARY COUNTER
110402*REF   3  LAST  107   17,2273  55'611 1    +5    TS     TTMP1

110403 REF   4  LAST  939   17,2274  51'611 0          INDEX  TTMP1
110404 REF   5  LAST  696   17,2275  3 1702 0          CA     ERRBTMP       ERRBTMP CONTAINS RCS ATTITUDE ERRORS
110405                      17,2276  0 0006 1          EXTEND                     ERRORY & ERRORZ (P40 AT DOTVCON)
110406 REF   1               17,2277  7 2537 0          MP     1/ATTLIM      .007325(ERROR) = 0 IF ERROR < 1.5 DEG
110407                      17,2300  0 0006 1          EXTEND
110408                      17,2301  1 2311 1          BZF    +8D                 |ERROR| LESS THAN 1.5 DEG
110409                      17,2302  0 0006 1          EXTEND
```

L TVCINITIALIZE USER'S PAGE NO. 4 E6 S3

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 11041                          17,2303  6 2306 0          BZMF   +3              |ERROR| > 1.5 DEG, AND NEG
 110411 REF   1                 17,2304  3 2536 0          CA     ATTLIM          |ERROR| > 1.5 DEG, AND POS
 110412                         17,2305  1 2307 0          TCF    +2
 110413 REF   2  LAST  940      17,2306  4 2536 1    +3    CS     ATTLIM
 110414 REF   5  LAST  939      17,2307  51'611 0    +2    INDEX  TTMP1
 110415 REF   6  LAST  939      17,2310  55'702 1          TS     ERRBTMP
 110416 REF   6  LAST  940      17,2311  11'611 1    +3    CCS    TTMP1           TEST TEMPORARY COUNTER
 110417*REF   1                 17,2312  1 2273 1          TCF    ATTINIT +5      BACK TO REPEAT FOR PITCH ERROR

 110418 REF   7  LAST  940      17,2313  3 1702 0          CA     ERRBTMP       ERRORS ESTABLISHED AND LIMITED
 110419 REF   2  LAST  105      17,2314  55'575 0          TS     PERRB
 11042  REF   8  LAST  940      17,2315  3 1703 1          CA     ERRBTMP +1
 110421 REF   2  LAST  105      17,2316  55'577 1          TS     YERRB

 1111   REF  14  LAST  736      17,2317  4 1501 0  NEEDLEIN CS     RCSFLAGS      SET BIT 3 FOR INITIALIZATION PASS AND GO
 1112   REF  26  LAST  935      17,2320  7 5015 1          MASK   BIT3               TO NEEDLER.  WILL CLEAR FOR TVC DAP
 1113   REF  15  LAST  940      17,2321  27'501 0          ADS    RCSFLAGS           (RETURNS AFTER CADR)
 1114   REF  32  LAST  938      17,2322  0 4740 0          TC     IBNKCALL
 1115   REF   6  LAST  550      17,2323   42420 1          CADR   NEEDLER

 1116   REF 160  LAST  937      17,2324  3 5021 1  TVCINIT4 CAF    ZERO          SET TVCPHASE TO INDICATE TVCDAPON-THRU-
 1117   REF   4  LAST  699      17,2325  55'644 1          TS     TVCPHASE           NEEDLEIN INITIALIZATION FINISHED.
A1118                                                                             (POSSIBLE TVC-RESTART ENTRY)

 1119   REF  18  LAST  782      17,2326  30 032 0          CAE    CDUX          PREPARE ROLL DAP
 1120   REF   6  LAST  192      17,2327  55'662 0          TS     DGANOW

 11222  REF  36  LAST  939      17,2330  3 5003 1          CAF    BIT13         IF ENGINE IS ALREADY OFF, ENGINOFF HAS
 11223                          17,2331  0 0006 1          EXTEND                     ALREADY ESTABLISHED THE POST-BURN
 11224  REF  27  LAST  829      17,2332  02 011 0          RAND   DSALMOUT           CSMMASS (MASSBACK DOES IT). DONT
 11225                          17,2333  0 0006 1          EXTEND                     TOUCH CSMMASS.  IF ENGINE IS ON,
 11226                          17,2334  1 2337 0          BZF    +3                  THEN ITS OK TO DO THE COPYCYCLE
A11227                                                                              EVEN BURNS LESS THAN 0.4SEC ARE AOK

 1123   REF   8  LAST  938      17,2335  31'652 1          CAE    MASSTMP       COPYCYCLE
 1124   REF  12  LAST  938      17,2336  55'474 0          TS     CSMMASS

 1125   REF   6  LAST  745      17,2337  3 5036 1    +3    CAF    .5SEC         CALL TVCEXECUTIVE (ROLLDAP CALL, ETC)
 1126   REF  41  LAST  825      17,2340  0 5245 1          TC     WAITLIST
 1127   REF   3  LAST  937      E6,1702                    EBANK= BZERO
 1128   REF   2  LAST  188      17,2341   02720 0          2CADR  TVCEXEC
 1128                           17,2342   34066 0

 1129                           17,2343  0 0006 1          EXTEND                CALL FOR DAPINIT
 1130   REF   1                 17,2344  3 2547 0          DCA    DAPINIT5
 1131   REF  13  LAST  938      17,2345  53'313 0          DXCH   T5LOC
 1132   REF   4  LAST  938      17,2346  31'625 1          CAE    T5TVCDT       (ALLOW TIME FOR RESTART COMPUTATIONS)
 1133   REF   9  LAST  938      17,2347  54 030 0          TS     TIME5
```

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1134  REF  29  LAST  938   17,2350  1 5333 0  ENDTVCIN TCF    RESUME


1135  REF   1              17,2351  0 2354 1  PRESWTCH TCR    SWICHOVR        ENTRY FROM V46

1136  REF  52  LAST  874   17,2352  0 4701 0           TC     POSTJUMP        THIS PROVIDES AN EXIT FROM SWITCH-OVER
1137  REF   6  LAST  454   17,2353    21272 0          CADR   PINBRNCH             (PINBRNCH DOES A RELINT)

1138                       17,2354  0 0004 0  SWICHOVR INHINT
1139  REF   5  LAST  940   17,2355  3 1644 0           CA     TVCPHASE        SAVE TVCPHASE
1140  REF   1              17,2356  55'611 1           TS     PHASETMP
1141  REF  36  LAST  938   17,2357  4 5016 1           CS     BIT2            SET TVCPHASE = -2 (INDICATES SWITCH-OVER
1142  REF   6  LAST  941   17,2360  55'644 1           TS     TVCPHASE              TO RESTART LOGIC)

1143                       17,2361  0 0006 1    +5     EXTEND                 SAVE Q FOR RETURN (RESTART ENTRY POINT,
1144  REF   1              17,2362  23'613 1           QXCH   RTRNLOC              TVCPHASE AND PHASETMP ALREADY SET)

1145  REF   1              17,2363  3 2535 0           CAF    NZEROJR         ZEROING LOOP FOR FILTER STORAGE LOCS
1146  REF   2  LAST  106   17,2364  55'676 0    +8     TS     CNTRTMP

1147  REF 161  LAST  940   17,2365  3 5021 1  MCLEANJR CA     ZERO
1148  REF  79  LAST  937   17,2366  54 001 1           TS     L
1149  REF   3  LAST  941   17,2367  51'676 1           INDEX  CNTRTMP
1150  REF   2  LAST  104   17,2370  53'541 1           DXCH   PTMP1 -1
1151  REF   4  LAST  941   17,2371  11'676 0           CCS    CNTRTMP
1152  REF 196  LAST  939   17,2372  10 000 0           CCS    A
1153  REF   2  LAST  941   17,2373  1 2364 0           TCF    SWICHOVR +8D

1154  REF  11  LAST  939   17,2374  4 0105 1           CS     FLAGWRD9        SET SWITCHOVER FLAG FOR DOWNLINK
1155  REF  37  LAST  938   17,2375  7 5001 1           MASK   BIT15
1156  REF  12  LAST  941   17,2376  26 105 1           ADS    FLAGWRD9

1157  REF   2  LAST  938   17,2377  31'420 0           CAF    EXTLX/I +2      LOW BANDWIDTH GAINS - DAP
1158  REF   3  LAST  938   17,2400  55'636 1           TS     KTLX/I
1159  REF   2  LAST  938   17,2401  0 2471 1           TCR    S40.15 +7

1160  REF   1              17,2402  3 2542 0           CAF    FKPRIMDT                      - STEERING
1161  REF   6  LAST  939   17,2403  55'634 0           TS     KPRIMEDT

1162  REF   1              17,2404  3 2543 1           CAF    FREPFRAC                      - TMC LOOP
1163  REF   5  LAST  939   17,2405  55'642 1           TS     REPFRAC

11631                      17,2406  0 0006 1           EXTEND                 UPDATE TRIM ESTIMATES
11632 REF   4  LAST  939   17,2407  3 1602 1           DCA    DELPBAR
11633 REF   3  LAST  939   17,2410  53'606 1           DXCH   PDELOFF
11634                      17,2411  0 0006 1           EXTEND
11635 REF   4  LAST  939   17,2412  3 1604 1           DCA    DELYBAR
11636 REF   3  LAST  939   17,2413  53'610 0           DXCH   YDELOFF

1164  REF   1              17,2414  3 2533 0           CA     LBCFADR
```

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 1165   REF   3  LAST  938   17,2415  55'722 0            TS      COEFFADR
 1166   REF   2  LAST  938   17,2416  0 2422 1            TC      LOADCOEF

 1167   REF   2  LAST  941   17,2417  31'611 0            CAE     PHASETMP      RESTORE TVCPHASE
 1168   REF   7  LAST  941   17,2420  55'644 1            TS      TVCPHASE

 1169   REF   2  LAST  941   17,2421  0 1613 1            TC      RTRNLOC       BACK TO PRESWITCH OR TVCRESTARTS


 1170                        17,2422  0 0006 1  LOADCOEF  EXTEND                LOAD DAP FILTER COEFFICIENTS
 1171   REF   4  LAST  942   17,2423  5 1722 1            INDEX   COEFFADR        FROM: ERASABLE FOR CSM/LM HB
 1172                        17,2424  3 0001 0            DCA     0                     FIXED    FOR CSM/LM LB
 1173   REF   2  LAST  107   17,2425  53'724 0            DXCH    N10                   FIXED    FOR CSM

 1174                        17,2426  0 0006 1            EXTEND                  NOTE: FOR CSM/LM, NORMAL COEFFICIENT
 1175   REF   5  LAST  942   17,2427  5 1722 1            INDEX   COEFFADR       LOAD WILL BE HIGH BANDWIDTH PAD LOAD
 1176                        17,2430  3 0003 1            DCA     2               ERASABLES. DURING CSM/LM SWITCHOVER,
 1177   REF   3  LAST  942   17,2431  53'726 1            DXCH    N10 +2          THIS LOGIC IS USED TO LOAD LOW BANDWIDTH
R1178                                                                            COEFFICIENTS FROM FIXED MEMORY.

 1180                        17,2432  0 0006 1            EXTEND
 1181   REF   6  LAST  942   17,2433  5 1722 1            INDEX   COEFFADR
 1182                        17,2434  3 0005 1            DCA     4
 1183   REF   4  LAST  942   17,2435  53'730 0            DXCH    N10 +4

 1184                        17,2436  0 0006 1            EXTEND
 1185   REF   7  LAST  942   17,2437  5 1722 1            INDEX   COEFFADR
 1186                        17,2440  3 0007 0            DCA     6
 1187   REF   5  LAST  942   17,2441  53'732 1            DXCH    N10 +6

 1188                        17,2442  0 0006 1            EXTEND
 1189   REF   8  LAST  942   17,2443  5 1722 1            INDEX   COEFFADR
 1190                        17,2444  3 0011 1            DCA     8D
 1191   REF   6  LAST  942   17,2445  53'734 1            DXCH    N10 +8D

 1192                        17,2446  0 0006 1            EXTEND
 1193   REF   9  LAST  942   17,2447  5 1722 1            INDEX   COEFFADR
 1194                        17,2450  3 0013 0            DCA     10D
 1195   REF   7  LAST  942   17,2451  53'736 0            DXCH    N10 +10D

 1196                        17,2452  0 0006 1            EXTEND
 1197   REF  10  LAST  942   17,2453  5 1722 1            INDEX   COEFFADR
 1198                        17,2454  3 0015 0            DCA     12D
 1199   REF   8  LAST  942   17,2455  53'740 1            DXCH    N10 +12D

 1200   REF  11  LAST  942   17,2456  51'722 1            INDEX   COEFFADR
 1201                        17,2457  3 0016 0            CA      14D
 1202   REF   9  LAST  942   17,2460  55'741 0            TS      N10 +14D

 1203   REF 181  LAST  889   17,2461  0 0002 0            TC      Q
```

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1204  REF  3 LAST 735  17,2462  31'470 0  S40.15  CAE     IXX          GAIN COMPUTATIONS (1/CONACC, VARK)
1205                   17,2463  0 0006 1          EXTEND               ENTERED FROM TVCINITIALIZE AND TVCEXEC
1206  REF  1           17,2464  7 2544 1          MP      2PI/M            2PI/M SCALED 1/(B+8 N M)
1207                   17,2465  20 001 1          DDOUBL                   IXX   SCALED B+20 KG-MSQ
1208                   17,2466  20 001 1          DDOUBL
1209                   17,2467  20 001 1          DDOUBL
1210  REF  2 LAST 105  17,2470  55'640 0          TS      1/CONACC                 SCALED B+9 SEC-SQ/REV

1211  REF  4 LAST 941  17,2471  31'636 0    +7    CAE     KTLX/I       ENTRY FROM CSM/LM V46 SWITCH-OVER
1212                   17,2472  0 0006 1          EXTEND                   SCALED (B+3 ASCREV)  1/SECSQ
1213  REF  1           17,2473  7 1472 0          MP      IAVG/TLX         SCALED B+2 SECSQ
1214                   17,2474  20 001 1          DDOUBL
1215                   17,2475  20 001 1          DDOUBL
1216  REF  2 LAST 105  17,2476  55'641 1          TS      VARK                     SCALED (B+3 ASCREV)
1217  REF 182 LAST 942 17,2477  0 0002 0          TC      Q

1218                   17,2500   37777 1  CSMN10   DEC     .99999       N10    CSM ONLY FILTER COEFFICIENTS
1219                   17,2501   67657 1           DEC     -.2549       N11/2
1220                   17,2502   01703 1           DEC     .0588        N12
1221                   17,2503   47472 0           DEC     -.7620       D11/2
1222                   17,2504   27656 1           DEC     .7450        D12

1223                   17,2505   37777 1           DEC     .99999       N20
1224                   17,2506   60361 0           DEC     -.4852       N21/2
1225                   17,2507   00000 1           DEC     0            N22
1226                   17,2510   67304 1           DEC     -.2692       D22/2
1227                   17,2511   00000 1           DEC     0            D22

1228                   17,2512   37777 1  LBN10    DEC     +.99999      N10    LOW BANDWIDTH FILTER COEFFICIENTS
1229                   17,2513   65371 1           DEC     -.3285       N11/2
1230                   17,2514   65337 0           DEC     -.3301       N12
1231                   17,2515   42700 0           DEC     -.9101       D11/2
1232                   17,2516   33045 0           DEC     +.8460       D12

1233                   17,2517   01000 0           DEC     +.03125      N20
1234                   17,2520   00000 1           DEC     0            N21/2
1235                   17,2521   00000 1           DEC     0            N22
1236                   17,2522   42700 0           DEC     -.9101       D21/2
1237                   17,2523   33045 0           DEC     +.8460       D22

1238                   17,2524   20000 0           DEC     +.5000       N30
1239                   17,2525   60730 0           DEC     -.47115      N31/2
1240                   17,2526   17145 1           DEC     +.4749       N32
1241                   17,2527   41323 0           DEC     -.9558       D31/2
1242                   17,2530   35773 1           DEC     +.9372       D32

1243  REF  1           17,2531   02500 0  CSMCFADR GENADR  CSMN10       CSM ONLY COEFFICIENTS ADDRESS
1244  REF  1           17,2532   01425 0  HBCFADR  GENADR  HBN10        HIGH BANDWIDTH COEFFICIENTS ADDRESS
```

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1245   REF  1              17,2533   02512 0  LBCFADR  GENADR LBN10          LOW BANDWIDTH COEFFICIENTS ADDRESS

1246                       17,2534   00063 1  NZERO    DEC     51            MUST BE ODD FOR MRCLEAN
1247                       17,2535   00027 1  NZEROJR  DEC     23            MUST BE ODD FOR MCLEANJR

12471                      17,2536   00210 1  ATTLIM   DEC     0.00833       INITIAL ATTITUDE ERROR LIMIT (1.5 DEG)
12472                      17,2537   00170 1  1/ATTLIM DEC     0.007325      .007325(ERROR) = 0 IF ERROR < 1.5 DEG

1248                       17,2540   00005 1  TCORR    OCT     00005         CSM
1249                       17,2541   00000 1    +1     OCT     00000         CSM/LM (HB.LB)

1250                       17,2542   00247 0  FKPRIMDT DEC     .0102         CSM/LM (LB), (.05 X .08) SCALED AT PI/8
1251                       17,2543   00232 1  FREPFRAC DEC     .0375 B-2     CSM/LM (LB),  0.0375 SCALED AT B+2

1252   REF 17 LAST 447        4374            NINETEEN =       VD1
1253                       17,2544   33074 1  2PI/M    DEC     .00331017 B+8 2PI/M, SCALED AT 1/(B+8 N-M)

1254                       17,2545   03720 1  ONETHOU  DEC     1000 B-13     KG/CS B3 TO KG/10SEC B16 CONVERSION

1255   REF  4 LAST 940     E6,1702                   EBANK=   BZERO
1256   REF  1              17,2546   03107 1  DAPINIT5 2CADR    DAPINIT
1256   REF  1              17,2547   40066 0
```

```
1257   REF  5 LAST 944     E6,1702                   EBANK=   BZERO
1258   REF  1              17,2550   02171 1  INITLOC2 2CADR    TVCINIT1
1258   REF  1              17,2551   36066 1
```

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R1000   PROGRAM NAME.... TVCEXECUTIVE, CONSISTING OF TVCEXEC, NEEDLEUP, VARGAINS
R1001                     1SHOTCHK, REPCHEK, CG.CORR, COPYCYCLES, ETC.
R1002   LOG SECTION...TVCEXECUTIVE                    SUBROUTINE...DAPCSM
R1003   MODIFIED BY SCHLUNDT                          21 OCTOBER 1968
R1004   FUNCTIONAL DESCRIPTION....

R1005        *A SELF-PERPETUATING WAITLIST TASK AT 1/2 SECOND INTERVALS WHICH:
R1006         PREPARES THE ROLL DAP WITH OGA (CDUX)
R1007         PREPARES THE ROLL FDAI NEEDLE (FLY-TO  OGA ERROR)
R1008         PREPARES THE ROLL PHASE PLANE  OGAERR  (FLY-FROM  OGA ERROR)
R1009         PREPARES THE TVC ROLLDAP TASK WAITLIST CALL (3 CS DELAY)
R1010         UPDATES THE NEEDLES DISPLAY
R1011         UPDATES VEHICLE MASS AND CALLS MASSPROP TO UPDATE INERTIA DATA
R10111        UPDATES PITCH, YAW, AND ROLL DAP GAINS FROM MASSPROP DATA
R1012         PERFORMS ONE-SHOT CORRECTION FOR TMC LOOP 0-3 SEC AFTER IGNITION
R1013         PERFORMS REPETITIVE UPDATES FOR TMC LOOP AFTER THE ONE-SHOT CORR.

R1017   CALLING SEQUENCE....

R1018        *TVCEXEC CALLED AS A WAITLIST TASK, IN PARTICULAR BY TVCINIT4 AND BY
R1019         ITSELF, BOTH AT 1/2 SECOND INTERVALS

R1020   NORMAL EXIT MODE.... TASKOVER

R1021   ALARM OR ABORT EXIT MODES.... NONE

R1022   SUBROUTINES CALLED....NEEDLER, S40.15, MASSPROP, TASKOVER, IBNKCALL

R1023   OTHER INTERFACES....

R1024        *TVCRESTART PACKAGE FOR RESTARTS
R1025        *PITCHDAP, YAWDAP FOR VARIABLE GAINS AND ENGINE TRIM ANGLES
R1027   ERASABLE INITIALIZATION REQUIRED....

R1028        *SEE TVCDAPON....TVCINIT4
R1029        *VARK AND I/CONACC (S40.15 OF TVCINITIALIZE)
R1032        *PAD LOAD EREPFRAC
R1033        *BITS 15,14 OF FLAGWRD6 (T5 BITS)
R1034        *TVCEXPHS FOR RESTARTS
R1035        *ENGINE-ON BIT (11.13) FOR RESTARTS
R1036        *CDUX, OGAD

R1037   OUTPUT....

R1038        *ROLL DAP OGANOW, FDAI NEEDLE (AK), AND PHASE PLANE OGAERR
R1039        *VARIABLE GAINS FOR PITCH/YAW AND ROLL TVC DAPS
R1040        *SINGLE-SHOT AND REPETITIVE CORRECTIONS TO ENGINE TRIM ANGLES
R1041         PACTOFF AND YACTOFF
R1046   DEBRIS.... MUCH, BUT SHAREABLE WITH RCS/ENTRY, ALL IN EBANK6
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1047                          16,2720                    BANK   16
1048  REF   1                 16,2000                    SETLOC DAPROLL
1049                          16,2720                    BANK
1050  REF   6  LAST  944      E6,1702                    EBANK= BZERO
1051  REF   1                                          COUNT* $$/TVCX

1052  REF  26  LAST  736      16,2720  4 0102 0  TVCEXEC  CS     FLAGWRD6    CHECK FOR TERMINATION (BITS 15,14 READ
1053  REF  14  LAST  736      16,2721  7 4105 0           MASK   OCT60000        10 FROM TVCDAPON TO RCSDAPON)
1054                          16,2722  0 0006 1           EXTEND
1055  REF   1                 16,2723  6 3134 1           BZMF   TVCEXFIN     TERMINATE

1056  REF   7  LAST  940      16,2724  3 5036 1           CAF    .5SEC        W.L. CALL TO PERPETUATE TVCEXEC
1057  REF  42  LAST  940      16,2725  0 5245 1           TC     WAITLIST
1058  REF   7  LAST  946      E6,1702                     EBANK= BZERO
1059  REF   3  LAST  940      16,2726   02720 0           2CADR  TVCEXEC
1059                          16,2727   34066 0

1060  REF  19  LAST  940      16,2730  30 032 0  ROLLPREP CAE    CDUX         UPDATE ROLL LADDERS (NO NEED TO RESTART-
1061  REF   7  LAST  940      16,2731  57'662 1           XCH    OGANOW           PROTECT, SINCE ROLL DAPS RE-START)
1062  REF   2  LAST  106      16,2732  57'663 0           XCH    OGAPAST

1063  REF   2  LAST  695      16,2733  31'450 1           CAE    OGAD         PREPARE ROLL FDAI NEEDLE  WITH FLY-TO
1064                          16,2734  0 0006 1           EXTEND                  ERROR (COMMAND - MEASURED)
1065  REF   8  LAST  946      16,2735  21'662 0           MSU    OGANOW
1066  REF  16  LAST  550      16,2736  55'476 1           TS     AK           FLY-TO OGA ERROR, SC.AT B-1 REVS

1067                          16,2737  0 0006 1           EXTEND              PREPARE ROLL DAP PHASE PLANE  OGAERR
1068  REF   2  LAST  732      16,2740  7 7705 0           MP     -BIT14
1069  REF   1                 16,2741  55'664 0           TS     OGAERR       PHASE-PLANE (FLY-FROM) OGAERROR,
A1070                                                                            SC.AT B+0 REVS

1071  REF  29  LAST  825      16,2742  3 6214 0           CAF    THREE        SET UP ROLL DAP TASK (ALLOW SOME TIME)
1072  REF  43  LAST  946      16,2743  0 5245 1           TC     WAITLIST
1073  REF   8  LAST  946      E6,1702                     EBANK= BZERO
1074  REF   1                 16,2744   03272 0           2CADR  ROLLDAP
1074  REF   1                 16,2745   34066 0
1075  REF  33  LAST  940      16,2746  0 4740 0  NEEDLEUP TC     IBNKCALL     DO A NEEDLES UPDATE (RETURNS AFTER CADR)
1076  REF   7  LAST  940      16,2747   42420 1           CADR   NEEDLER          (NEEDLES RESTARTS ITSELF)

1077  REF  37  LAST  940      16,2750  3 5003 1  VARGAINS CAF    BIT13        CHECK ENGINE-ON BIT TO INHIBIT VARIABLE
1078                          16,2751  0 0006 1           EXTEND                  GAINS AND MASS IF ENGINE OFF
1079  REF  28  LAST  940      16,2752  02 011 0           RAND   DSALMOUT     CHANNEL 11
1080  REF 197  LAST  941      16,2753  10 000 0           CCS    A
1081                          16,2754  1 2760 0           TCF    +4               ON , SO OK TO UPDATE GAINS AND MASS
1082  REF  39  LAST  828      16,2755  3 5016 0    +5     CAF    TWO              OFF, SO BYPASS MASS/GAIN UPDATES.
10821 REF   3  LAST  696      16,2756  55'651 0           TS     TVCEXPHS             ALSO ENTRY FROM CCS BELOW WITH
10822 REF   1                 16,2757  1 3011 0           TCF    ISHOTCHK             VCNTR = -0 (V97 R40 ENGFAIL)
10823 REF   5  LAST  939      16,2760  11'643 0           CCS    VCNTR        TEST FOR GAIN UPDATE TIME
10824                          16,2761  1 2765 0           TCF    +4               NOT YET
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10825  REF   1                16,2762  1 2771 0          TCF    GAINCHNG          NOW
108252                        16,2763  1 2763 0          TCF    +0                NOT USED
108253 REF   1                16,2764  1 2755 0          TCF    VARGAINS +5       NO. LOTHRUST (S40.8 R40)

10826  REF   3  LAST  722     16,2765  55'653 1    +4    TS     VCNTRTMP          PROTECT VCNTR AND
10827  REF  13  LAST  940     16,2766  31'474 1          CAE    CSMMASS           CSMMASS DURING AN IMPULSIVE BURN
10828  REF   9  LAST  940     16,2767  55'652 0          TS     MASSTMP
10829  REF   1                16,2770  1 3002 1          TCF    EXECCOPY

1085   REF  34  LAST  946     16,2771  0 4740 0  GAINCHNG TC     IBNKCALL          UPDATE IXX, IAVG, IAVG/TLX
1086   REF   1                16,2772   13422 1          CADR   FIXCW             MASSPROP ENTRY  (ALREADY INITIALIZED)
1087   REF  35  LAST  947     16,2773  0 4740 0          TC     IBNKCALL          UPDATE 1/CONACC, VARK
10871  REF   3  LAST  941     16,2774   36462 1          CADR   S40.15                    (S40.15 IS IN TVCINITIALIZE)
1089   REF   3  LAST  938     16,2775  4 1637 0          CS     TENMDOT           UPDATE MASS FOR NEXT 10 SEC. OF BURN
1090   REF  14  LAST  947     16,2776  6 1474 1          AD     CSMMASS
1091   REF  10  LAST  947     16,2777  55'652 0          TS     MASSTMP           KG B+16

1092   REF   2  LAST  939     16,3000  3 4374 0          CAF    NINETEEN          RESET THE VARIABLE-GAIN UPDATE COUNTER
1093   REF   4  LAST  947     16,3001  55'653 1          TS     VCNTRTMP

1094   REF   4  LAST  946     16,3002  25'651 1  EXECCOPY INCR   TVCEXPHS         RESTART-PROTECT THE COPYCYCLE          (1)

1095   REF  11  LAST  947     16,3003  31'652 1          CAE    MASSTMP           CSMMASS KG B+16
1096   REF  15  LAST  947     16,3004  55'474 0          TS     CSMMASS

1097   REF   5  LAST  947     16,3005  31'653 0          CAE    VCNTRTMP          VCNTR
1098   REF   6  LAST  946     16,3006  55'643 0          TS     VCNTR
10982  REF   8  LAST  939     16,3007  55'444 0          TS     V97VCNTR          FOR ENGFAIL (R41) MASS UPDATES AT SPSOFF

1099   REF   5  LAST  947     16,3010  25'651 1          INCR   TVCEXPHS          COPYCYCLE OVER                         (2)

1100   REF  25  LAST  939     16,3011  11'447 0  ISHOTCHK CCS    CNTR              CHECK TIME FOR ONE-SHOT OR REPCORR
1101                          16,3012  1 3016 1          TCF    +4                     NOT YET
1102   REF   1                16,3013  1 3031 1          TCF    ISHOTOK                NOW
1103   REF   1                16,3014  1 3022 0          TCF    REPCHEK                ONE-SHOT OVER, ON TO REPCORR
1104   REF   2  LAST  947     16,3015  1 3031 1          TCF    ISHOTOK                NOW  (ONE-SHOT ONLY, NO REPCORR)

1105   REF   5  LAST  941     16,3016  55'676 0    +4    TS     CNTRTMP           COUNT DOWN
1106   REF  26  LAST  773     16,3017  3 6211 0          CAF    SIX               SET UP TVCEXPHS FOR ENTRY AT CNTRCOPY
1107   REF   6  LAST  947     16,3020  55'651 0          TS     TVCEXPHS
1108   REF   1                16,3021  1 3132 0          TCF    CNTRCOPY

1109   REF   6  LAST  941     16,3022  31'642 0  REPCHEK  CAE    REPFRAC           CHECK FOR REPETITIVE UPDATES
1110                          16,3023  0 0006 1          EXTEND
1111   REF   2  LAST  946     16,3024  6 3134 1          BZMF   TVCEXFIN                 NO, OVER-AND-OUT
1112   REF   2  LAST  103     16,3025  55'446 1          TS     TEMPDAP +1               YES, SET UP CORRECTION FRACTION
1113   REF  10  LAST  895     16,3026  3 5015 0          CAF    FOUR              SET UP TVCEXPHS FOR ENTRY AT CORSETUP
1114   REF   7  LAST  947     16,3027  55'651 0          TS     TVCEXPHS
1115   REF   1                16,3030  1 3043 1          TCF    CORSETUP
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1119  REF  38  LAST  946   16,3031  3 5003 1  1SHOTOK  CAF     BIT13          CHECK ENGINE-ON BIT, NOT PERMITTING
1120                       16,3032  0 0006 1           EXTEND                     ONE-SHOT DURING ENGINE-SHUTDOWN
1121  REF  29  LAST  946   16,3033  02 011 0           RAND    DSALMOUT
1122  REF 198  LAST  946   16,3034  10 000 0           CCS     A
1123                       16,3035  1 3037 1           TCF     +2                 ONE-SHOT OK
1124  REF   3  LAST  947   16,3036  1 3134 0           TCF     TVCEXFIN           NO, TERMINATE

1125  REF   8  LAST  947   16,3037  25'651 1           INCR    TVCEXPHS                                        (3)

1168  REF   1              16,3040  3 3137 1  TEMPSET  CAF     FCORFRAC           SET UP CORRECTION FRACTION
1169  REF   3  LAST  947   16,3041  55'446 1           TS      TEMPDAP +1

1170  REF   9  LAST  948   16,3042  25'651 1           INCR    TVCEXPHS       ENTRY FROM REPCHEK AT NEXT LOCATION  (4)

1171  REF  65  LAST  939   16,3043  31'466 1  CORSETUP CAE     DAPDATR1       CHECK FOR LEM-OFF/ON
1172  REF  39  LAST  948   16,3044  7 5003 0           MASK    BIT13          (NOTE, SHOWS LEM-OFF)
1173                       16,3045  0 0006 1           EXTEND
1174                       16,3046  1 3050 0           BZF     +2             LEM IS ON,  PICK UP   TEMPDAP+1
1175  REF   4  LAST  948   16,3047  31'446 0           CAE     TEMPDAP +1     LEM IS OFF, PICK UP 2(TEMPDAP+1)
1176  REF   5  LAST  948   16,3050  6 1446 0           AD      TEMPDAP +1
1177  REF   6  LAST  948   16,3051  55'445 1           TS      TEMPDAP        CG.CORR USES TEMPDAP

1178  REF  15  LAST  939   16,3052  3 7716 0           CAF     NEGONE         SET UP FOR CNTR = -1 (ONE-SHOT DONE)
1179  REF   6  LAST  947   16,3053  55'676 0           TS      CNTRTMP            (COPYCYCLE AT  .CNTRCOPY. )

1180                       16,3054  0 0006 1  CG.CORR  EXTEND                 PITCH TMC LOOP
1181  REF   4  LAST  941   16,3055  3 1606 0           DCA     PDELOFF
1182  REF   2  LAST  106   16,3056  53'673 0           DXCH    PACTTMP
1183                       16,3057  0 0006 1           EXTEND
1184  REF   5  LAST  948   16,3060  4 1606 1           DCS     PDELOFF
1185                       16,3061  20 001 1           DDOUBL
1186                       16,3062  20 001 1           DDOUBL
1187  REF   7  LAST  940   16,3063  53'612 1           DXCH    TTMP1
1188                       16,3064  0 0006 1           EXTEND
1189  REF   5  LAST  941   16,3065  3 1602 1           DCA     DELPBAR
1190                       16,3066  20 001 1           DDOUBL
1191                       16,3067  20 001 1           DDOUBL
1192  REF   8  LAST  948   16,3070  21'612 1           DAS     TTMP1
1193                       16,3071  0 0006 1           EXTEND
1194  REF   9  LAST  948   16,3072  3 1612 0           DCA     TTMP1
1195                       16,3073  0 0006 1           EXTEND
1196  REF   7  LAST  948   16,3074  7 1445 1           MP      TEMPDAP
1197  REF   3  LAST  948   16,3075  21'673 0           DAS     PACTTMP

1198                       16,3076  0 0006 1           EXTEND                 YAW TMC LOOP
1199  REF   4  LAST  941   16,3077  3 1610 1           DCA     YDELOFF
1200  REF   2  LAST  106   16,3100  53'675 0           DXCH    YACTTMP
1201                       16,3101  0 0006 1           EXTEND
1202  REF   5  LAST  948   16,3102  4 1610 0           DCS     YDELOFF
1203                       16,3103  20 001 1           DDOUBL
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1204                              16,3104  20 001 1           DDOUBL
1205  REF  10  LAST  948          16,3105  53'612 1           DXCH    TTMP1
1206                              16,3106  0 0006 1           EXTEND
1207  REF   5  LAST  941          16,3107  3 1604 1           DCA     DELYBAR
1208                              16,3110  20 001 1           DDOUBL
1209                              16,3111  20 001 1           DDOUBL
1210  REF  11  LAST  949          16,3112  21'612 1           DAS     TTMP1
1211                              16,3113  0 0006 1           EXTEND
1212  REF  12  LAST  949          16,3114  3 1612 0           DCA     TTMP1
1213                              16,3115  0 0006 1           EXTEND
1214  REF   8  LAST  948          16,3116  7 1445 1           MP      TEMPDAP
1215  REF   3  LAST  948          16,3117  21'675 0           DAS     YACTTMP

1216  REF  10  LAST  948          16,3120  25'651 1  CORCOPY   INCR    TVCEXPHS       RESTART PROTECT THE COPYCYCLE        (5)

1217                              16,3121  0 0006 1           EXTEND                 TRIM-ESTIMATES, AND
1218  REF   4  LAST  948          16,3122  3 1673 1           DCA     PACTTMP
1219  REF  18  LAST  939          16,3123  55'423 1           TS      PACTOFF              TRIMS
1220  REF   6  LAST  948          16,3124  53'606 1           DXCH    PDELOFF

1221                              16,3125  0 0006 1           EXTEND
1222  REF   4  LAST  949          16,3126  3 1675 1           DCA     YACTTMP
1223  REF   6  LAST  939          16,3127  55'424 0           TS      YACTOFF
1224  REF   6  LAST  948          16,3130  53'610 0           DXCH    YDELOFF

1225  REF  11  LAST  949          16,3131  25'651 1           INCR    TVCEXPHS       ENTRY FROM ISHOTCHK AT NEXT LOCATION (6)

1226  REF   7  LAST  948          16,3132  31'676 1  CNTRCOPY CAE     CNTRTMP        UPDATE CNTR (RESTARTS OK, FOLLOWS CPYCY)
1227  REF  26  LAST  947          16,3133  55'447 0           TS      CNTR

1228  REF 162  LAST  941          16,3134  3 5021 1  TVCEXFIN CAF     ZERO           RESET TVCEXPHS
1229  REF  12  LAST  949          16,3135  55'651 0           TS      TVCEXPHS
1230  REF  46  LAST  833          16,3136  1 5324 0           TCF     TASKOVER       TVCEXECUTIVE FINISHED

1231                              16,3137  10000 0  FCORFRAC  DCT     10000          ONE-SHOT CORRECTION FRACTION
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L TVCEXECUTIVE USER'S PAGE NO. 6 E6 S3

L TVCMASSPROP USER'S PAGE NO. 1 EO S3

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R1000   PROGRAM NAME....MASSPROP
R1001   LOG SECTION....TVCMASSPROP      PROGRAMMER...MELANSON (ENGEL, SCHLUNDT)

R1002   FUNCTIONAL DESCRIPTION:

R1003        MASSPROP OPERATES IN TWO MODES:(1)IF LEM MASS OR CONFIGURATION ARE UPDATED (MASSPROP DOES NOT TEST
R1005   FOR THIS) THE ENTIRE PROGRAM MUST BE RUN THROUGH, BREAKPOINT VALUES AND DERIVATIVES OF THE OUTPUTS WITH
R1007   RESPECT TO CSM MASS BEING CALCULATED PRIOR TO CALCULATION OF THE OUTPUTS. (2)OTHERWISE, THE OUTPUTS CAN BE
R1009   CALCULATED USING PREVIOUSLY COMPUTED BREAKPOINT VALUES AND DERIVATIVES.

R10095  CALLING SEQUENCES

R1010      IF LEM MASS OR CONFIGURATION HAS BEEN UPDATED, TRANSFER TO MASSPROP, OTHERWISE TRANSFER TO FIXCW.
R1012           L      TC     BANKCALL OR IBNKCALL
R1013           L+1    CADR   MASSPROP
R1014                    OR
R1015           L+1    CADR   FIXCW

R1016           L+2    RETURNS VIA Q

R1017   CALLED   IN PARTICULAR BY DONOUN47 (JOB) AND TVCEXECUTIVE (TASK)

R1019   JOBS OR TASKS INITIATED - NONE

R1020   SUBROUTINES CALLED - NONE

R1021   ERASABLE INITIALIZATION REQUIRED

R1022        LEMMASS MUST CONTAIN LEM MASS SCALED AT B+16 IN KILOGRAMS
R1023        CSMMASS MUST CONTAIN CSM MASS SCALED AT B+16 IN KILOGRAMS

R1024        DAPDATR1 MUST BE SET TO INDICATE VEHICLE CONFIGURATION.
R10241             BITS (15,14,13)  =  ( 0 , 0 , 1 )     LEM OFF
R102411                               ( 0 , 1 , 0 )     LEM ON (ASCNT,DSCNT)
R102412                               ( 1 , 1 , 0 )     LEM ON (ASCNT ONLY)


R1025   ALARMS - NONE

R1026   EXIT -   TC     Q

R1027   OUTPUTS:

R1028        (1)IXX, SINGLE PRECISION SCALED AT B+20 IN KG-M SQ.
R1029        (2)IAVG, SINGLE PRECISION SCALED AT B+20 IN KG-M SQ.
R1030        (3)IAVG/TLX, SINGLE PRECISION, SCALED AT B+2 SEC-SQD
R1031        THEY ARE STORED IN CONSECUTIVE REGISTERS IXX0, IXX1, IXX2

R10311       CONVERSION FACTOR :  (SLUG-FTSQ) = 0.737562 (KG-MSQ)
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R1032   OUTPUTS ARE CALCULATED AS FOLLOWS :

R1033   (1) IF LEM DOCKED, LEMMASS IS FIRST ELIMINATED AS A PARAMETER

R1034       VARST0 = INTVALUE0 + LEMMASS(SLOPEVAL0)      IXX      BREAKPOINT VALUE
R1036       VARST1 = INTVALUE1 + LEMMASS(SLOPEVAL1)      IAVG     BREAKPOINT VALUE
R1038       VARST2 = INTVALUE2 + LEMMASS(SLOPEVAL2)      IAVG/TLX BREAKPOINT VALUE

R1040       VARST3 = INTVALUE3 + LEMMASS(SLOPEVAL3)      IAVG/TLX SLOPE  FOR CSMMASS > 33956 LBS  ( SPS > 10000 LBS)
R1042       VARST4 = INTVALUE4 + LEMMASS(SLOPEVAL4)      IAVG     SLOPE  FOR CSMMASS > 33956 LBS  ( SPS > 10000 LBS)

R1044       VARST5 = INTVALUE5 + LEMMASS(SLOPEVAL5)      IXX      SLOPE  FOR ALL VALUES OF CSMMASS

R1046       VARST6 = INTVALUE6 + LEMMASS(SLOPEVAL6)      IAVG     SLOPE  FOR CSMMASS < 33956 LBS  ( SPS < 10000 LBS)
R1048       VARST7 = INTVALUE7 + LEMMASS(SLOPEVAL7)      IAVG/TLX SLOPE  FOR CSMMASS < 33956 LBS  ( SPS < 10000 LBS)

R1050       VARST8 = INTVALUE8 + LEMMASS(SLOPEVAL8)      IAVG     DECREMENT TO BRKPT VALUE WHEN LEM DSCNT STAGE OFF
R1052       VARST9 = INTVALUE9 + LEMMASS(SLOPEVAL9)      IAVG/TLX DECREMENT TO BRKPT VALUE WHEN LEM DSCNT STAGE OFF


R1054   (2) IF LEM NOT DOCKED

R1055       VARST0 = NOLEMVAL0    WHERE THE MEANING AND SCALING OF VARST0
R1056          .          .       TO VARST9 ARE THE SAME AS GIVEN ABOVE
R1057          .          .
R1058          .          .       NOTE... FOR THIS CASE, VARST8,9 HAVE NO
R1059       VARST9 = NOLEMVAL9    MEANING (THEY ARE COMPUTED BUT NOT USED)


R1060   (3) THE FINAL OUTPUT CALCULATIONS ARE THEN DONE

R1061       IXX0 =  VARST0 + (CSMMASS + NEGBPW)VARST5          IXX

R1062       IXX1 =  VARST1 + (CSMMASS + NEGBPW)VARST(4 OR 6)   IAVG

R1063       IXX2 =  VARST2 + (CSMMASS + NEGBPW)VARST(3 OR 7)   IAVG/TLX


R1064   THE DATA USED CAME FROM CSM/LM SPACECRAFT OPERATIONAL DATA BOOK.
R10641      VOL. 3, NASA DOCUMENT SNA-8-D-027 (MARCH 1968)

R1065   PERTINENT MASS DATA :          CSM WEIGHT  (FULL)  64100 LBS
R1066                                               (EMPTY) 23956 LBS
R1067                                  LEM WEIGHT  (FULL)  32000 LBS
R1068                                              (EMPTY) 14116 LBS

R10681  (WEIGHTS ARE FROM AMENDMENT #1 (APRIL 24,1968) TO ABOVE DATA BOOK)
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1069                              25,3774                    BANK   25
1070  REF   1                    05,2000                    SETLOC DAPMASS
1071                             05,3366                    BANK
1072  REF   9  LAST  946         E6,1702                    EBANK= BZERO
1073  REF   1                                                COUNT* $$/MASP

1074  REF   2  LAST  446         05,3366  3 4334 1  MASSPROP CAF    NINE        MASSPROP USES TVC/RCS INTERUPT TEMPS
1075  REF   2  LAST  104         05,3367  55'506 1          TS     PHI333      SET UP TEN PASSES

1076  REF  66  LAST  948         05,3370  31'466 1  LEMTEST  CAE    DAPDATR1    DETERMINE LEM STATUS
1077  REF  40  LAST  948         05,3371  7 5003 0          MASK   BIT13
1078                             05,3372  0 0006 1          EXTEND
1079  REF   1                    05,3373  1 3377 0          BZF    LEMYES

1080  REF   3  LAST  953         05,3374  51'506 0  LEMNO    INDEX  PHI333      LEM NOT ATTACHED
1081  REF   1                    05,3375  3 3463 0          CAF    NOLEMVAL
1082  REF   1                    05,3376  1 3407 0          TCF    STOINST

1083  REF   4  LAST  280         05,3377  31'473 0  LEMYES   CAE    LEMNASS     LEM IS ATTACHED
1084                             05,3400  6 0000 1          DOUBLE
1085                             05,3401  0 0006 1          EXTEND
1086  REF   4  LAST  953         05,3402  5 1506 0          INDEX  PHI333
1087  REF   1                    05,3403  7 3505 0          MP     SLOPEVAL
1088                             05,3404  20 001 1          DDOUBL
1089  REF   5  LAST  953         05,3405  51'506 0          INDEX  PHI333
1090  REF   1                    05,3406  6 3473 1          AD     INTVALUE

1091  REF   6  LAST  953         05,3407  51'506 0  STOINST  INDEX  PHI333      STORAGE INST BEGIN HERE
1092  REF   3  LAST  104         05,3410  55'511 1          TS     VARSTO
1093  REF   7  LAST  953         05,3411  11'506 1          CCS    PHI333      ARE ALL TEN PASSES COMPLETED
1094  REF   5  LAST  938         05,3412  1 3367 1          TCF    MASSPROP +1 NO - GO DECREMENT PHI333

1098  REF  67  LAST  953         05,3413  11'466 0  DXTEST   CCS    DAPDATR1    IF NEG, BIT15 IS 1, LEM DSCNT STAGE OFF
1099  REF   2  LAST  947         05,3414  1 3422 1          TCF    FIXCW
1100  REF   3  LAST  953         05,3415  1 3422 1          TCF    FIXCW
1101  REF   4  LAST  953         05,3416  53'522 1          DXCH   VARSTO +8D
1102  REF   5  LAST  953         05,3417  21'513 0          DAS    VARSTO +1
1103  REF   1                    05,3420  3 3520 0          CA     DXITFIX
1104  REF   6  LAST  953         05,3421  27'520 0          ADS    VARSTO +7

1105  REF  37  LAST  941         05,3422  3 5016 0  FIXCW    CAF    BIT2        COMPUTATION PHASE BEGINS HERE.  SET UP
1106  REF   8  LAST  953         05,3423  55'506 1          TS     PHI333      THREE PASSES
1107  REF   2  LAST  104         05,3424  55'507 0          TS     PSI333

1108  REF  16  LAST  947         05,3425  31'474 1          CAE    CSMMASS     GET DELTA CSM WEIGHT - SIGN DETERMINES
1109  REF   1                    05,3426  6 3517 1          AD     NEGBPW      SLOPE LOCATIONS.
1110                             05,3427  6 0000 1          DOUBLE
1111  REF   2  LAST  104         05,3430  55'510 0          TS     TEMP333
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1112                          05,3431  0 0006 1          EXTEND
1113   REF   1                05,3432  6 3435 0          BZMF    PEGGY       DETERMINE CORRECT SLOPE
1114   REF   3  LAST  321     05,3433  3 7715 0          CAF     NEG2
1115   REF   9  LAST  953     05,3434  55'506 1          TS      PHI333

1116   REF  10  LAST  954     05,3435  51'506 0 PEGGY    INDEX   PHI333      ALL IS READY - CALCULATE OUTPUTS NOW
1117   REF   1                05,3436  31'516 1          CAE     VARST5      GET SLOPE
1118                          05,3437  0 0006 1          EXTEND
1119   REF   3  LAST  953     05,3440  7 1510 0          MP      TEMP333     MULT BY DELTA CSM WEIGHT
1120                          05,3441  6 0000 1          DOUBLE
1121   REF   3  LAST  953     05,3442  51'507 1          INDEX   PSI333
1122   REF   7  LAST  953     05,3443  6 1511 0          AD      VARST0      ADD BREAKPOINT VALUE
1123   REF   4  LAST  954     05,3444  51'507 1          INDEX   PSI333
1124   REF   4  LAST  943     05,3445  55'470 1          TS      IXX         ****** OUTPUTS (IXX0, IXX1, IXX2) ******

1125   REF   5  LAST  954     05,3446  11'507 0          CCS     PSI333      BOOKKEEPING  - MASSPROP FINISHED OR NOT
1126   REF   1                05,3447  1 3457 0          TCF     BOKKEP2     NO - GO TAKE CARE OF INDEXING REGISTERS

1127   REF  68  LAST  953     05,3450  31'466 1          CAE     DAPDATR1    UPDATE WEIGHT/G
1128   REF  45  LAST  938     05,3451  7 5002 1          MASK    BIT14
1129   REF 199  LAST  948     05,3452  10 000 0          CCS     A
1130   REF   5  LAST  953     05,3453  3 1473 0          CA      LEMMASS
1131   REF  17  LAST  953     05,3454  6 1474 1          AD      CSMMASS
1132   REF   9  LAST  897     05,3455  55'475 1          TS      WEIGHT/G    SCALED AT B+16 IN KILOGRAMS
1133   REF 183  LAST  943     05,3456  0 0002 0 ENDMASSP TC      Q

1134   REF   6  LAST  954     05,3457  55'507 0 BOKKEP2  TS      PSI333      REDUCE PSI BY ONE
1135                          05,3460  0 0006 1          EXTEND
1136   REF  11  LAST  954     05,3461  27'506 1          DIM     PHI333
1137   REF   2  LAST  954     05,3462  1 3435 1          TCF     PEGGY
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1138                05,3463   00616 0  NOLEMVAL DEC     25445. B-20
1139                05,3464   02526 1           DEC     87450. B-20
1140                05,3465   02352 1           DEC     .30715 B-2
1141                05,3466   01471 1           DEC     1.22877 E-5 B+12
1142                05,3467   00634 0           DEC     1.6096 B-6
1143                05,3470   00612 1           DEC     1.54 B-6
1144                05,3471   03706 0           DEC     7.77177 B-6
1145                05,3472   04425 0           DEC     3.46458 E-5 B+12

1146                05,3473   00644 1  INTVALUE DEC     26850 B-20
1147                05,3474   03710 1           DEC     127518 B-20
1148                05,3475   04246 0           DEC     .54059 B-2
1149                05,3476   02011 0           DEC     .153964 E-4 B+12
1150                05,3477   77501 0           DEC     -.742923 B-6
1151                05,3500   00612 1           DEC     1.5398 B-6
1152                05,3501   04656 0           DEC     9.68 B-6
1153                05,3502   10372 0           DEC     .647625 E-4 B+12
1154                05,3503   77126 1           DEC     -27228. B-20
1155                05,3504   76261 0           DEC     -.206476 B-2

1156                05,3505   00767 1  SLOPEVAL DEC     1.96307 B-6
1157                05,3506   15624 0           DEC     27.5774 B-6
1158                05,3507   03054 0           DEC     2.3548 E-5 B+12
1159                05,3510   04532 1           DEC     2.1777 E-9 B+26
1160                05,3511   10433 1           DEC     1.044 E-3 B+8
1161                05,3512   00000 1           DEC     0
1162                05,3513   22070 0           DEC     2.21068 E-3 B+8
1163                05,3514   03204 1           DEC     1.5166 E-9 B+26
1164                05,3515   77266 0           DEC     -1.284 B-6
1165                05,3516   02476 0           DEC     2. E-5 B+12

1166                05.3517   70364 1  NEGBPW   DEC     -15402.17 B-16
1167                05,3520   75420 0  DXITFIX  DEC*    -1.88275 E-5 B+12*
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R1000   NAME....TVCRESTART PACKAGE,  CONSISTING OF REDOTVC, ENABL1, 2, CMDSOUT, PHSCHK2, ETC.
R1002   LOG SECTION...TVCRESTARTS                       SUBROUTINE...DAPCSM
R1003   MODIFIED BY SCHLUNDT                           21 OCTOBER 1968
R1004   FUNCTIONAL DESCRIPTION....

R1005       *RESTART-PROOFS THE TVC DAPS, INCLUDING PITCHDAP, YAWDAP,
R1006        TVCEXECUTIVE, ROLLDAP, TVCINIT4, TVCDAPON, AND CSM/LM V46 SWTCHOVR.
R1007       *TVC RESTARTS DESERVE SPECIAL CONSIDERATION IN SEVERAL AREAS.
R1008        RESTART DOWN-TIME IS IMPORTANT BECAUSE OF THE TRANSIENTS INTRODUCED
R1009        BY THE THRUST VECTOR RETURN TO THE ACTUATOR MECHANICAL NULLS
R1010        FOLLOWING TVC- AND OPTICS-ERROR-COUNTER-DISENABLES (CHANNEL 12).
R1011        TVC    USES A MIXTURE OF WAITLIST, T5, T6, AND JOB CALLS. THERE IS
R1012        FILTER MEMORY (UP TO 6TH ORDER) TO BE PROTECTED IF WILD TRANSIENTS
R1013        ARE TO BE AVOIDED. COUNTERS ARE INVOLVED FOR ONE-SHOT
R1015        CORRECTIONS AND GAIN UPDATES. THE GIMBAL TRIM ESTIMATORS AND THE
R1016        BODY AXIS ATTITUDE ERROR INTEGRATORS INVOLVE DIGITAL SUMMATION.
R1017        DIGITAL DIFFERENTIATORS ARE INVOLVED IN THE BODY AXIS RATE ESTIMA-
R1018        TIONS AND IN THE OUTPUTTING OF ACTUATOR COMMANDS. THERE IS AN
R1019        OFFSET-TRACKER-FILTER TO PROTECT. ETC., ETC.
R1020       *THOSE QUANTITIES WHICH MUST BE PROTECTED ARE STORED IN TEMPORARY
R1021        REGISTERS AS THEY ARE COMPUTED, FOR UPDATING THE REAL REGISTERS
R1022        DURING COPYCYCLES.
R1023       *THE SEVERAL COPYCYCLES ARE EACH PROTECTED BY PHASE POINTS AT THEIR
R1024        BEGINNING AND AT THEIR TERMINATION. THE PHASE POINTS ARE SIMPLY
R1025        ..INCR.. INSTRUCTIONS,   EITHER ..INCR TVCEXPHS.. FOR COPYCYCLES
R1026        IN THE TVCEXECUTIVE, OR ..INCR TVCPHASE.. FOR THE PITCH AND YAW
R1027        COPYCYCLES. INDEXING ON EACH OF THESE POINTERS THEN PERMITS A
R1028        RETURN TO THE APPROPRIATE RESTART POINTS.
R1029       *IF A RESTART OCCURS DURING EITHER COPYCYCLE, THAT COPYCYCLE IS
R1030        COMPLETED. THEN THE NORMAL TVCINIT4....DAPINIT....PITCHDAP STARTUP
R1031        SEQUENCE IS CALLED UPON TO GET THINGS GOING AGAIN.
R1032       *TVC-ENABLE AND OPTICS-ERROR-COUNTER ENABLE MUST BE SET ASAP
R1033        (ALLOWING FOR PROCEDURAL DELAYS). THEN THE ENGINES ARE COMMANDED
R1034        TO THE P,YACTOFF TRIM VALUES. THE DAPS ARE THEN READY TO GO ON THE
R1035        AIR, WITH THE REGULAR STARTUP SEQUENCE, EITHER AT MRCLEAN FOR A
R1036        COMPLETE INITIALIZATION OR AT TVCINIT4 FOR A PARTIAL INITIALIZATION
R1037       *FOR RESTARTS PRIOR TO THE SETTING OF THE T5 BITS AT DOTVCON THE
R1038        PRE40.6 SECTION OF S40.6 TAKES CARE OF RE-ESTABLISHING TRIMS.
R1039       *IF A RESTART OCCURS DURING THE TVCEXEC....TVCEXFIN SEQUENCE THE
R1040        COMPUTATIONS WILL BE COMPLETED, STARTING AT THE APPROPRIATE RESTART
R1041        POINT, AFTER THE DAPS ARE READY TO GO ON THE AIR.
R1042       *IF A RESTART OCCURS PRIOR TO TVCINIT4 (TVCPHASE = -1) E.G. DURING
R1043        THE EARLY DAP INITIALIZATION PHASE, THE DAP STARTUP SEQUENCE IS
R1044        ENTERED AT MRCLEAN FOR A FULL INITIALIZATION.
R10441      *FOR RESTARTS DURING CSM/LM V46 SWITCH-OVER, TVCPHASE IS SET TO -2,
R10442       AND THE RESTART LOGIC GOES BACK TO REDO SWITCH-OVER (AFTER THE
R10443       NORMAL DAP RESTART SEQUENCE IS FOLLOWED).
R1045       *RESTARTS ARE NOT CRITICAL TO THE ROLL DAP PERFORMANCE$ HENCE THE
R1046        THE ROLL DAP IS MERELY RESTARTED.
R1050       *RESTARTS DURING A STROKE TEST (STROKER IS NON-ZERO) WILL CAUSE THE
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R1051         STROKE TEST TO BE TERMINATED. A NEW V68 ENTRY WILL BE REQUIRED
R1052         TO GET IT GOING AGAIN (NO AUTOMATIC RESTART).
R1054        *REDOTVC IS REACHED FOLLOWING ANY RESTART WHICH FINDS THE T5 BITS
R1055         (BITS 15,14 OF FLAGWRD6) SET FOR TVC. DOTVCON SETS TVCPHASE = -1
R1056         AND TVC EXPHS = 0 JUST BEFORE SETTING THESE BITS, JUST BEFORE
R1057         MAKING THE T5 CALL TO TVCDAPON. ON A NORMAL SHUTDOWN DOTVCRCS
R1058         CALLS RCSDAPON, WHICH RESETS THE T5 BITS FOR RCS.
R1060   CALLING SEQUENCE....T5, IN PARTICULAR BY ELRSKIP OF FRESH START/RESTART

R1061   NORMAL EXIT MODES....RESUME, NODRSM, POSTJUMP (TO TVCINIT4 OR MRCLEAN)

R1062   ALARM OR ABORT EXIT MODES....NONE

R1063   SUBROUTINES CALLED....

R1064         *PCOPY+1, YCOPY+1 (PITCH AND YAW COPYCYCLES)
R1065         *ENABLE1,2, CMDSOUT (RE-ESTABLISH ACTUATOR TRIMS)
R1067         *MRCLEAN OR TVCINIT4 (TVCDAP INITIALIZATIONS)
R10671        *SWICHOVR +5  (CSM/LM V46 SWITCH-OVER)
R1068         *EXRSTRT AND TVCEXECUTIVE PHASE POINTS 1 THRU 6
R1069         *WAITLIST, IBNKCALL, POSTJUMP, ISWCALL

R1070   OTHER INTERFACES....DOTVCON AND RCSDAPON (T5 BITS), ELRSKIP (CALLS IT)
R1071   ERASABLE INITIALIZATION REQUIRED....

R1072         *T5 BITS (1,0), TVCPHASE (-2,-1,0,1,2,3), TVCEXPHS (1 THRU 6)
R1073         *TVC DAP VARIABLES
R1074         *OPERATIONS PERFORMED BY REDOTVC ARE BASED ON THE ASSUMPTION THAT
R1075          THE TVC DAPS ARE RUNNING NORMALLY

R1076   OUTPUT....

R1077         *PITCH AND YAW TVC DAP COPYCYCLES COMPLETED IF INTERUPTED
R1078         *TVCEXECUTIVE COMPLETED IF INTERUPTED
R1079         *STROKE TEST TERMINATED IF INTERRUPTED
R10791        *CSM/LM V46 SWITCH-OVER REPEATED IF INTERRUPTED
R1080         *ACTUATOR TRIMS RE-ESTABLISHED (ACTUATORS BACK ON THE AIR)
R1081         *TVC DAP INITIALIZATION AS REQUIRED
R1082         *ALL TVC DAP OPERATIONS ON THE AIR

R1083   DEBRIS....TVC TEMPORARIES IN EBANK6
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1084                              16,3140                    BANK    16
1085  REF   2  LAST  946          16,2000                    SETLOC  DAPROLL
1086                              16,3140                    BANK
1087  REF   8  LAST  942          E6,1644                    EBANK=  TVCPHASE
1088  REF   1                                                COUNT*  $$/RSRT


1089  REF   9  LAST  938          16,3140  22 016 0  REDOTVC  LXCH    BANKRUPT   TVC RESTART PACKAGE
1090                              16,3141  0 0006 1          EXTEND
1091  REF   9  LAST  938          16,3142  22 012 1          QXCH    QRUPT      (  ..TCR..  IN  ..FINCOPY..  )

1092  REF  13  LAST  949          16,3143  11'651 0  EXECPHS  CCS     TVCEXPHS   CHECK TVCEXECUTIVE PHASE
1093                              16,3144  1 3146 0          TCF     +2             MUST RESTART TVCEXECUTIVE
1094  REF   1                     16,3145  1 3152 0          TCF     TVCDAPHS       NO NEED TO RESTART TVCEXECUTIVE

1095  REF   3  LAST  953          16,3146  3 4334 1          CAF     NINE       9CS DELAY TO FORCE EXRSTRT TO OCCUR
1096  REF  44  LAST  946          16,3147  0 5245 1          TC      WAITLIST       BEFORE PITCHDAP, AFTER CMDSOUT
1097  REF  14  LAST  958          E6,1651                    EBANK=  TVCEXPHS
1098  REF   1                     16,3150   03253 0          2CADR   EXRSTRT
1098  REF   1                     16,3151   34066 0


1099  REF   2  LAST  137          16,3152  4 7700 0  TVCDAPHS CS      OCT37776   CHECK BITS 15 AND 1 OF TVCPHASE TO SEE
1100  REF   9  LAST  958          16,3153  7 1644 1          MASK    TVCPHASE       DAP RESTART LOCATION  (-1,1,2,3)
1101  REF 200  LAST  954          16,3154  10 000 0          CCS     A
1102  REF   1                     16,3155  1 3240 0          TCF     FINCOPY            FINISH THE COPYCYCLE FIRST
1103  REF   1                     16,3156  1 3163 1          TCF     ENABL1             JUST PREPARE THE OUTCOUNTERS AND GO

1104  REF  10  LAST  958          16,3157  4 1644 1          CS      TVCPHASE   TEST FOR TVCPHASE = -2
11041 REF  38  LAST  953          16,3160  7 5016 1          MASK    BIT2           (THIS INDICATES RESTART OCCURRED
11042                             16,3161  0 0006 1          EXTEND                  DURING CSM/LM V46 SWITCH-OVER)
11043 REF   1                     16,3162  1 3244 1          BZF     TRIM/CMD   NO, TVCPHASE = -1, RSTRT WAS IN TVCINIT

1105  REF  22  LAST  443          16,3163  3 5010 0  ENABL1   CAF     BIT8       TVC ENABLE, FOLLOWED BY 40 MS (MIN) WAIT
11052 REF  23  LAST  887          16,3164  6 5005 1          AD      BIT11      SET BIT FOR OPTICS-DAC-ENABLE ALSO
1106                              16,3165  0 0006 1          EXTEND             (ENABL1 ENTERED FROM TVCDAPHS / FINCOPY)
1107  REF  33  LAST  734          16,3166  05 012 1          WOR     CHAN12
1108  REF   1                     16,3167  3 3257 1          CAF     TVCADDR    WAIT.  CALLING ENABL2  (BBCON THERE)
1109  REF  14  LAST  940          16,3170  55'312 1          TS      T5LOC
1110  REF   2  LAST  958          16,3171  3 3263 0          CAF     TVCADDR +4         60MS  (TVCEXADR)
1111  REF  10  LAST  940          16,3172  54 030 0          TS      TIME5

1112  REF  30  LAST  941          16,3173  1 5333 0          TCF     RESUME


1113  REF  10  LAST  958          16,3174  22 016 0  ENABL2   LXCH    BANKRUPT   CONTINUE PREPARATION OF OUTCOUNTERS

1114  REF  39  LAST  958          16,3175  3 5016 0          CAF     BIT2       OPTICS ERROR CNTR ENABLE, 4MS MIN WAIT
1115                              16,3176  0 0006 1          EXTEND
1116  REF  34  LAST  958          16,3177  05 012 1          WOR     CHAN12
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1117   REF   3  LAST  958   16,3200  3 3261 1          CAF     TVCADDR +2      WAIT, CALLING CMDSOUT (BBCON THERE)
1118   REF  15  LAST  958   16,3201  55'312 1          TS      T5LOC
1119   REF   3  LAST  958   16,3202  3 7700 1          CAF     OCT37776        20MS
1120   REF  11  LAST  958   16,3203  54 030 0          TS      TIME5

1121   REF   2  LAST  192   16,3204  1 5335 0          TCF     NOQRSM


1122   REF  11  LAST  958   16,3205  22 016 0  CMDSOUT LXCH    BANKRUPT        CONTINUE PREPARATION OF OUTCOUNTERS
1123                        16,3206  0 0006 1          EXTEND
1124   REF  10  LAST  958   16,3207  22 012 1          QXCH    QRUPT

1125   REF 163  LAST  949   16,3210  4 5021 0          CS      ZERO            MOST RECENT ACTUATOR COMMANDS
1126   REF   5  LAST  939   16,3211  6 1623 1          AD      PCMD                (AVOID +0)
1127   REF   3  LAST  731   16,3212  54 054 1          TS      TVCPITCH
1128   REF 164  LAST  959   16,3213  4 5021 0          CS      ZERO
1129   REF   3  LAST  939   16,3214  6 1624 0          AD      YCMD
1130   REF   2  LAST  731   16,3215  54 053 0          TS      TVCYAW

1131   REF   3  LAST  731   16,3216  3 5062 0          CAF     PRIO6           RELEASE THE COUNTERS (BITS 11,12)
1132                        16,3217  0 0006 1          EXTEND
1133   REF   7  LAST  731   16,3220  05 014 1          WOR     CHAN14

1138   REF  11  LAST  958   16,3221  11'644 1  PHSCHK2 CCS     TVCPHASE        CHECK TVCPHASE AGAIN
1139   REF   1               16,3222  1 3232 0          TCF     CHKSTRK
1140   REF   2  LAST  959   16,3223  1 3232 0          TCF     CHKSTRK
1141   REF 201  LAST  958   16,3224  10 000 0          CCS     A               A CONTAINS THE DIMINISHED ABSOLUTE OF
1142                        16,3225  0 3230 0          TC      +3              TVCPHASE (-2 BECOMES +1, -1 BECOMES +0)

114201 REF  53  LAST  941   16,3226  0 4701 0          TC      POSTJUMP            REPEAT TVC INITIALIZATION
114202 REF   2  LAST  937   16,3227   36152 1          CADR    MRCLEAN             (DO NOT RETURN)

114203 REF  36  LAST  947   16,3230  0 4740 0    +3    TC      IBNKCALL            REPEAT CSM/LM V46 SWITCH-OVER
114204 REF   3  LAST  941   16,3231   36361 0          CADR    SWICHOVR +5         (RETURN TO CHECK FOR STROKE TEST)

11421  REF   3  LAST  251   16,3232  11'574 1  CHKSTRK CCS     STROKER         CHECK FOR STROKE TEST IN PROGRESS
11422  REF   1               16,3233  1 3250 1          TCF     TSTINITJ        YES, KILL IT
11423                        16,3234  1 3236 1          TCF     +2              NO, PROCEED
11424  REF   2  LAST  959   16,3235  1 3250 1          TCF     TSTINITJ        YES, KILL IT

1143   REF  54  LAST  959   16,3236  0 4701 0    +4    TC      POSTJUMP            IF POSITIVE OR ZERO, RESTART AT
1144   REF   1               16,3237   36324 1          CADR    TVCINIT4                TVCINIT4 (ZEROS TVCPHASE, AND
A1145                                                                               CALLS TVC DAPS VIA DAPINIT)
1146   REF  12  LAST  959   16,3240  51'644 0  FINCOPY INDEX   TVCPHASE       PICK UP THE APPROPRIATE COPYCYCLE
1147   REF   1               16,3241  3 3257 1          CAF     TVCCADR
1148   REF   1               16,3242  0 4744 1          TCR     ISWCALL         RE-ENTER THE COPYCYCLE, RETURN AT END
1149   REF   2  LAST  958   16,3243  1 3163 1          TCF     ENABLI          NOW PREPARE THE OUTCOUNTERS


1150                        16,3244  0 0006 1  TRIM/CMD EXTEND                  TVCDAPON INITIALIZATION NOT COMPLETED,
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1151   REF  19  LAST  949   16,3245  3 1424 1            DCA     PACTOFF          EG.  P,YCMD MAY NOT BE SET.  SET...
1152   REF   6  LAST  959   16,3246  53'624 1            DXCH    PCMD
1153   REF   3  LAST  959   16,3247  1 3163 1            TCF     ENABL1           NOW PREPARE THE OUTCOUNTERS

1154   REF 165  LAST  959   16,3250  3 5021 1  TSTINITJ  CAF     ZERO             DISABLE STROKE TEST (-0 SHOWS PRIOR V68)
1155   REF   4  LAST  959   16,3251  55'574 1            TS      STROKER          (+0 MEANS NEW V68 REQUIRED FOR STARTUP)

11552  REF   3  LAST  959   16,3252  1 3236 1            TCF     CHKSTRK +4

1161   REF  15  LAST  958   16,3253  51'651 1  EXRSTRT   INDEX   TVCEXPHS         TVCEXECUTIVE RESTARTS....GO TO
1162   REF   1               16,3254  3 3263 0            CAF     TVCEXADR             APPROPRIATE RESTART POINT
1163   REF 202  LAST  959   16,3255  50 000 1            INDEX   A
1164                        16,3256  1 0000 0            TCF     0

R1165  TVC RESTART TABLES.... ORDER IS REQUIRED.  HI-ORDER WORDS ONLY, OF 2CADRS, SINCE BBCON IS ALREADY THERE.

1167   REF   2  LAST  959   16,3257           TVCADDR   =       TVCCADR          TABLE OF CADRS, UNUSED LOCS FOR GENADRS
1168   REF   1               16,3257  03174 0  TVCCADR  GENADR  ENABL2          (FOR T5 CALL, UNUSED TABLE LOC)
1169   REF   1               16,3260  40675 1    +1     CADR    PCOPY +1         PITCH COPYCYCLE
1170   REF   1               16,3261  03205 0    +2     GENADR  CMDSOUT          (FOR T5 CALL, UNUSED TABLE LOC)
1171   REF   1               16,3262  41051 0    +3     CADR    YCOPY +1         YAW COPYCYCLE
1172                        16,3263  37772 1  TVCEXADR OCT     37772            (UNUSED TABLE LOC, FILL WITH 60MS, T5)
1173   REF   2  LAST  947   16,3264  03003 1    +1     GENADR  EXECCOPY +1      TVCEXECUTIVE RESTART POINTS (ORDERED)
1174   REF   2  LAST  946   16,3265  03011 1    +2     GENADR  1SHOTCHK
1175   REF   1               16,3266  03040 0    +3     GENADR  TEMPSET
1176   REF   2  LAST  947   16,3267  03043 0    +4     GENADR  CORSETUP
1177   REF   1               16,3270  03121 0    +5     GENADR  CORCOPY +1
1178   REF   2  LAST  947   16,3271  03132 1    +6     GENADR  CNTRCOPY
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R1000   PROGRAM NAME....TVCDAP, CONSISTING OF PITCHDAP, YAWDAP, ETC.
R1001   LOG SECTION...TVCDAPS                          SUBROUTINE...DAPCSM
R1002   MODIFIED BY SCHLUNDT                          21 OCTOBER 1968
R1003   FUNCTIONAL DESCRIPTION....

R1004         SELF-PERPETUATING T5 TASKS WHICH GENERATE THE COMMAND SIGNALS
R1005         FOR THE PITCH AND YAW SPS GIMBAL ACTUATORS DURING TVC (SPS) BURNS.
R1006         IN RESPONSE TO BODY-AXIS RATE COMMANDS FROM CROSS-PRODUCT STEERING
R1007         (S40.8).  IF NO STEERING (IMPULSIVE BURNS) MAINTAINS ATTITUDE-HOLD
R1008         ABOUT THE REFERENCE (INITIAL) DIRECTIONS (ZERO RATE COMMANDS).

R1009         THE PITCH AND YAW LOOPS ARE SEPARATE, BUT STRUCTURED IDENTICALLY.
R1010         EACH ATTITUDE-RATE LOOP INCLUDES GIMBAL ANGLE RATE DERIVATION,
R1011         GIMBAL/BODY AXIS TRANSFORMATION, BODY-AXIS ATTITUDE ERROR
R1012         INTEGRATION WITH ERROR LIMITING, THE GENERALIZED 6TH-ORDER FILTER
R1013         FOR CSM OR CSM/LM OPERATION, A FILTER OUTPUT LIMITER,
R1014         CG-OFFSET TRACKER FILTER, AND THE CG-TRACKER MINOR LOOP.

R1015         THE DAPS ARE CYCLIC, CALLING EACH OTHER AT 1/2  THE DAP SAMPLE
R1016         TIME, AS DETERMINED BY TSTVCDT. THE ACTUATOR COMMANDS ARE
R1017         REGENERATED AS ANALOG VOLTAGES BY THE OPTICS ERROR COUNTERS, WHICH
R1018         TRANSMIT THE SIGNAL TO THE ACTUATOR SERVOS WHEN THERE IS PROPER CDU
R1019         MODING.

R1027   CALLING SEQUENCE.... (TYPICALLY)

R1028         T5 CALL OF TVCDAPON (TVCINITIALIZE) BY DOTVCON (P40)
R1029         T5 CALL OF DAPINIT (TVCDAPS) BY TVCINIT4 (TVCINITIALIZE)
R1031         T5 CALL OF PITCHDAP BY DAPINIT
R1032         T5 CALL OF YAWDAP BY PITCHDAP
R1033         T5 CALL OF PITCHDAP BY YAWDAP
R1034                   ETC.
R1035         (AUTOMATIC SEQUENCING FROM TVCDAPON)

R1036   NORMAL EXIT MODE....RESUME

R1037   ALARM OR ABORT EXIT MODES....NONE

R1038   SUBROUTINES CALLED....

R1039             HACK FOR STROKE TEST (V68) WAVEFORM GENERATION
R1041             PCOPY, YCOPY FOR COPY-CYCLES (USED ALSO BY TVC RESTART PACKAGE)
R1042             DAPINIT FOR INITIAL CDUS FOR RATE MEASUREMENTS
R1043             ERRORLIM, ACTLIM FOR INPUT (ATTITUDE-ERROR INTEGRATION) AND
R1044                   OUTPUT (ACTUATOR COMMAND) LIMITING, COMMON TO PITCH AND
R1045                   YAW DAPS
R1046             FWDFLTR (INCLUDING OPTVARK) AND PRECOMP, TO COMPUTE FILTER
R1047                OUTPUTS AND STORAGE VALUES
R1048             RESUME
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R1043   OTHER INTERFACES....

R1050         S40.8 CROSS-PRODUCT STEERING FOR BODY AXIS RATE  COMMANDS OMEGAY,ZC
R1051         S40.15 FOR THE INITIAL DAP GAINS VARK AND 1/CONACC
R1052         TVCEXECUTIVE FOR DAP GAIN UPDATES AND TMC LOOP OPERATIONS
R1055         TVCRESTART PACKAGE FOR TVC RESTART PROTECTION.

R1056   ERASABLE INITIALIZATION REQUIRED....

R1057         PAD-LOAD ERASABLES ( SEE ERASABLE ASSIGNMENTS )
R1059         CONFIGURATION BITS  (14, 13)  OF DAPDATR1 AS IN R03
R1060         ENGINE-ON BIT (11.13) FOR RESTARTS
R1061         TVCPHASE FOR RESTARTS ( SEE DOTVCON, AND TVCINIT4 )
R1062         T5 BITS (15,14 OF FLAGWRD6) FOR RESTARTS
R1063         MISCELLANEOUS VARIABLES SET UP OR COMPUTED BY TVCDAPON....TVCINIT4,
R1064             INCLUDING THE ZEROING OF TEMPORARIES BY  MRCLEAN
R1065         COUX,Y,Z AND SINCDUX....COSCDUZ AS PREPARED BY QUICTRIG (WITH
R1066             UPDATES EVERY 1/2 SECOND)
R1067         ALSO G+N PRIMARY, TVC ENABLE, AND OPTICS ERROR COUNTER ENABLE
R1068             UNLESS BENCH-TESTING.

R1069   OUTPUT....

R1070         TVCPITCH AND TVCYAW WITH COUNTER RELEASE (11.14 AND 11.13 INCREMEN-
R1071             TAL  COMMANDS TO OPTICS ERROR COUNTERS), FILTER NODES, BODY-
R1072             AXIS ATTITUDE ERROR INTEGRATOR, TOTAL ACTUATOR COMMANDS,
R1073             OFFSET-TRACKER-FILTER OUTPUTS, ETC.
R1074   DEBRIS....

R1075         MUCH, SHAREABLE WITH RCS/ENTRY, IN EBANK6 ONLY


 1076                              17,2552                    BANK   17
 1077   REF   1                   20,2000                    SETLOC DAP52
 1078                              20,2530                    BANK

 1079   REF  10  LAST  953        E6,1702                    EBANK= BZERO

 1080   REF   1                                              COUNT* $$/DAPS
```

P1081 PITCH TVCDAP STARTS HERE....(INCORPORATES CSM/LEM DAP FILTER, MODOR DESIGN)

```
1083  REF  12  LAST  959   20,2530  22 016 0  PITCHDAP LXCH   BANKRUPT      T5 ENTRY, NORMAL OR VIA DAPINIT
1084                       20,2531  0 0006 1            EXTEND
1085  REF  11  LAST  959   20,2532  22 012 1            QXCH   QRUPT

1086  REF   1              20,2533  3 3475 1            CAF    YAWT5         SET UP T5 CALL FOR YAW AUTOPILOT (LOW-
1087  REF  16  LAST  959   20,2534  55'312 1            TS     T5LOC               ORDER PART OF 2CADR ALREADY THERE)
1088  REF   5  LAST  940   20,2535  31'625 1            CAE    T5TVCDT
1089  REF  12  LAST  959   20,2536  54 030 0            TS     TIME5

1090  REF   5  LAST  960   20,2537  11'574 1  PSTROKER  CCS    STROKER       (STRKFLG) CHECK FOR STROKE TEST
1091  REF   1              20,2540  0 3533 1            TC     HACK          TEST-START OR TEST-IN-PROGRESS
1092                       20,2541  1 2543 0            TCF    +2            NO-TEST
1093  REF   2  LAST  963   20,2542  0 3533 1            TC     HACK          TEST-IN-PROGRESS

1094  REF   9  LAST  782   20,2543  30 033 1  PCDUDOTS  CAE    CDUY          COMPUTE CDUYDOT (USED BY PITCH AND YAW)
1095  REF   2  LAST  105   20,2544  57'645 1            XCH    PCDUYPST
1096                       20,2545  0 0006 1            EXTEND
1097  REF   3  LAST  963   20,2546  21'645 0            MSU    PCDUYPST
1098  REF   1              20,2547  0 2560 0            TCR    RLIMTEST            RATE TEST
1099  REF   2  LAST  105   20,2550  55'647 1            TS     MCDUYDOT            (MINUS, SC.AT 1/2TVCDT REVS/SEC)

1100  REF  12  LAST  782   20,2551  30 034 0            CAE    CDUZ          COMPUTE CDUZDOT (USED BY PITCH AND YAW)
1101  REF   2  LAST  105   20,2552  57'646 1            XCH    PCDUZPST
1102                       20,2553  0 0006 1            EXTEND
1103  REF   3  LAST  963   20,2554  21'646 0            MSU    PCDUZPST
1104  REF   2  LAST  963   20,2555  0 2560 0            TCR    RLIMTEST            RATE TEST
1105  REF   2  LAST  106   20,2556  55'650 1            TS     MCDUZDOT            (MINUS, SC.AT 1/2TVCDT REVS/SEC)
1106  REF   1              20,2557  1 2571 1            TCF    PINTEGRL

1107  REF  13  LAST  949   20,2560  55'611 1  RLIMTEST  TS     TTMP1         TEST FOR EXCESSIVE CDU RATES (GREATER
1108                       20,2561  0 0006 1            EXTEND                    THAN 2.33 DEG IN ONE SAMPLE PERIOD)
1109  REF   1              20,2562  7 3476 0            MP     1/RTLIM
1110                       20,2563  0 0006 1            EXTEND
1111                       20,2564  1 2567 0            BZF    +3
1112  REF 166  LAST  960   20,2565  3 5021 1            CAF    ZERO
1113  REF  14  LAST  963   20,2566  55'611 1            TS     TTMP1
1114  REF  15  LAST  963   20,2567  31'611 0            CAE    TTMP1
1115  REF 184  LAST  954   20,2570  0 0002 0            TC     Q

1116                       20,2571  0 0006 1  PINTEGRL  EXTEND               COMPUTE INTEGRAL OF BODY-AXIS PITCH-RATE
1117  REF   3  LAST  940   20,2572  3 1576 1            DCA    PERRB               ERROR, SC.AT B-1 REVS
1118  REF   9  LAST  940   20,2573  53'703 0            DXCH   ERRBTMP

1119                       20,2574  0 0006 1            EXTEND
1120  REF   2  LAST  937   20,2575  3 1530 0            DCA    OMEGAYC
1121  REF  10  LAST  963   20,2576  21'703 0            DAS    ERRBTMP
```

```
1122  REF  5 LAST  763  20,2577  4 0746 0          CS     COSCDUZ      PREPARE BODY-AXIS PITCH RATE, OMEGAYB
1123                    20,2600  0 0006 1          EXTEND
1124  REF  5 LAST  763  20,2601  7 0750 1          MP     COSCDUX
1125                    20,2602  20 001 1          DDOUBL
1126                    20,2603  0 0006 1          EXTEND
1127  REF  3 LAST  963  20,2604  7 1647 1          MP     MCDUYDOT
1128                    20,2605  20 001 1          DDOUBL
1129  REF  1            20,2606  53'536 1          DXCH   OMEGAYB

1130  REF  3 LAST  963  20,2607  4 1650 1          CS     MCDUZDOT
1131                    20,2610  0 0006 1          EXTEND
1132  REF  5 LAST  763  20,2611  7 0742 1          MP     SINCDUX
1133                    20,2612  20 001 1          DDOUBL
1134  REF  2 LAST  964  20,2613  21'536 1          DAS    OMEGAYB      (COMPLETED OMEGAYB, SC.AT 1/2TVCDT REVS)

1135                    20,2614  0 0006 1          EXTEND               PICK UP -OMEGAYB (SIGN CHNG. INTEGRATE)
1136  REF  3 LAST  964  20,2615  4 1536 1          DCS    OMEGAYB
1137  REF 11 LAST  963  20,2616  21'703 0          DAS    ERRBTMP

1138  REF  1            20,2617  0 3124 0 PERORLIM TCR    ERRORLIM     PITCH BODY-AXIS-ERROR  INPUT LIMITER

1139                    20,2620  0 0006 1 PFORWARD EXTEND                  PREPARE THE FILTER STORAGE LOCATIONS
1140  REF  3 LAST  941  20,2621  3 1542 0          DCA    PTMP1        FOR THE PITCH CHANNEL
1141  REF  2 LAST  106  20,2622  53'707 1          DXCH   TMP1
1142                    20,2623  0 0006 1          EXTEND
1143  REF  2 LAST  104  20,2624  3 1546 1          DCA    PTMP3
1144  REF  2 LAST  106  20,2625  53'713 1          DXCH   TMP3
1145                    20,2626  0 0006 1          EXTEND
1146  REF  2 LAST  105  20,2627  3 1552 1          DCA    PTMP5
1147  REF  2 LAST  106  20,2630  53'717 0          DXCH   TMP5

1148  REF  1            20,2631  0 3156 0          TCR    FWDFLTR      GO COMPUTE PRESENT OUTPUT
A1149                                                                 (INCLUDES VARIABLE GAIN PACKAGE)

1150                    20,2632  0 0006 1 POFFSET  EXTEND
1151  REF  7 LAST  949  20,2633  3 1606 0          DCA    PDELOFF
1152  REF  4 LAST  107  20,2634  21'705 0          DAS    CMDTMP       NOW SCALED AT B+0 ASCREV

1153  REF  1            20,2635  0 3137 1 PACLIM   TCR    ACTLIM       ROUND OFF & LIMIT PITCH ACTUATOR COMMAND

1154  REF  7 LAST  960  20,2636  4 1623 0 POUT     CS     PCMD         INCREMENTAL PITCH COMMAND
1155  REF  5 LAST  964  20,2637  6 1704 0          AD     CMDTMP
1156  REF  4 LAST  959  20,2640  26 054 1          ADS    TVCPITCH     UPDATE THE ERROR COUNTER (NO RESTART-
A1157                                                                       PROTECT, SINCE ERROR CNTR ZEROED)

1158  REF 24 LAST  958  20,2641  3 5005 1          CAF    BIT11        BIT FOR TVCPITCH COUNT RELEASE
1159                    20,2642  0 0006 1          EXTEND
1160  REF  8 LAST  959  20,2643  05 014 1          WOR    CHAN14

1161                    20,2644  0 0006 1 PPRECOMP EXTEND                  PREPARE THE FILTER STORAGE FOR PITCH
```

```
1162  REF  2  LAST  104   20,2645  3 1544 0          DCA     PTMP2
1163  REF  2  LAST  106   20,2646  53'711 0          DXCH    TMP2
1164                       20,2647  0 0006 1          EXTEND
1165  REF  2  LAST  104   20,2650  3 1550 0          DCA     PTMP4
1166  REF  2  LAST  106   20,2651  53'715 1          DXCH    TMP4
1167                       20,2652  0 0006 1          EXTEND
1168  REF  2  LAST  105   20,2653  3 1554 1          DCA     PTMP6
1169  REF  2  LAST  106   20,2654  53'721 0          DXCH    TMP6

1170  REF  1               20,2655  0 3247 0          TCR     PRECOMP          TO THE FILTER FOR PRECOMPUTATION

1171  REF  6  LAST  948   20,2656  31'602 1 DELBARP  CAE     DELPBAR +1       UPDATE PITCH OFFSET-TRACKER-FILTER
1172                       20,2657  0 0006 1          EXTEND
1173  REF  1               20,2660  7 3500 0          MP      E(-AT)
1174  REF  2  LAST  106   20,2661  55'701 1          TS      DELBRTMP +1
1175  REF  7  LAST  965   20,2662  31'601 1          CAE     DELPBAR
1176                       20,2663  0 0006 1          EXTEND
1177  REF  2  LAST  965   20,2664  7 3500 0          MP      E(-AT)
1178  REF  3  LAST  965   20,2665  21'701 1          DAS     DELBRTMP
1179  REF  6  LAST  964   20,2666  31'704 0          CAE     CMDTMP
1180                       20,2667  0 0006 1          EXTEND
1181  REF  1               20,2670  7 3477 1          MP      1-E(-AT)
1182  REF  4  LAST  965   20,2671  21'701 1          DAS     DELBRTMP

1183  REF  2  LAST  960   20,2672  0 2674 0 PCOPYCYC TCR     PCOPY            PITCH COPYCYCLE

1184  REF  31 LAST  958   20,2673  1 5333 0 PDAPEND  TCF     RESUME           PITCH DAP COMPLETED
```

P1185 PITCH TVCDAP COPYCYCLE SUBROUTINE (CALLED VIA PITCH TVCDAP OR TVC RESTART PACKAGE)

```
 1187   REF  13  LAST  959   20,2674  25'644 0  PCOPY    INCR    TVCPHASE        RESTART-PROTECT THE COPYCYCLE.      (1)
A1188                                                                             NOTE POSSIBLE RE-ENTRY FROM RESTART
A1189                                                                             PACKAGE, SHOULD A RESTART OCCUR
A1190                                                                             DURING PITCH COPYCYCLE.

 1191                          20,2675  0 0006 1           EXTEND
 1192   REF   3  LAST  964   20,2676  3 1707 0           DCA     TMP1
 1193   REF   4  LAST  964   20,2677  53'542 1           DXCH    PTMP1
 1194                         20,2700  0 0006 1           EXTEND
 1195   REF   3  LAST  965   20,2701  3 1711 1           DCA     TMP2
 1196   REF   3  LAST  965   20,2702  53'544 1           DXCH    PTMP2
 1197                         20,2703  0 0006 1           EXTEND
 1198   REF   3  LAST  964   20,2704  3 1713 0           DCA     TMP3
 1199   REF   3  LAST  964   20,2705  53'546 0           DXCH    PTMP3
 1200                         20,2706  0 0006 1           EXTEND
 1201   REF   3  LAST  965   20,2707  3 1715 0           DCA     TMP4
 1202   REF   3  LAST  965   20,2710  53'550 1           DXCH    PTMP4
 1203                         20,2711  0 0006 1           EXTEND
 1204   REF   3  LAST  964   20,2712  3 1717 1           DCA     TMP5
 1205   REF   3  LAST  964   20,2713  53'552 0           DXCH    PTMP5
 1206                         20,2714  0 0006 1           EXTEND
 1207   REF   3  LAST  965   20,2715  3 1721 1           DCA     TMP6
 1208   REF   3  LAST  965   20,2716  53'554 0           DXCH    PTMP6

 1209                         20,2717  0 0006 1  PMISC    EXTEND                  MISC....PITCH-RATE-ERROR INTEGRATOR
 1210   REF  12  LAST  964   20,2720  3 1703 1           DCA     ERRBTMP
 1211   REF   5  LAST  550   20,2721  55'477 0           TS      AK1             FOR PITCH NEEDLES, SC.AT B-1 REVS
 1212   REF   4  LAST  963   20,2722  53'576 0           DXCH    PERRB

 1213   REF   7  LAST  965   20,2723  31'704 0           CAE     CMDTMP          PITCH ACTUATOR COMMAND
 1214   REF   8  LAST  964   20,2724  55'623 0           TS      PCMD

 1215                         20,2725  0 0006 1           EXTEND                  PITCH OFFSET-TRACKER-FILTER
 1216   REF   5  LAST  965   20,2726  3 1701 0           DCA     DELBRTMP
 1217   REF   8  LAST  965   20,2727  53'602 0           DXCH    DELPBAR

 1218   REF  14  LAST  966   20,2730  25'644 0           INCR    TVCPHASE        PITCH COPYCYCLE COMPLETED           (2)

 1219   REF 185  LAST  963   20,2731  0 0002 0           TC      Q
```

P1220 YAW TVCDAP STARTS HERE....(INCORPORATES CSM/LEM DAP FILTER, MODOR DESIGN)

```
1222  REF  13  LAST  963   20,2732  22 016 0  YAWDAP   LXCH   BANKRUPT      T5 ENTRY, NORMAL
1223                       20,2733  0 0006 1           EXTEND
1224  REF  12  LAST  963   20,2734  22 012 1           QXCH   QRUPT

1225  REF   1              20,2735  3 3473 1           CAF    PITCHT5       SET UP T5 CALL FOR PITCH AUTOPILOT (LOW-
1226  REF  17  LAST  963   20,2736  55'312 1           TS     T5LOC               ORDER PART OF 2CADR ALREADY THERE)
1227  REF   6  LAST  963   20,2737  31'625 1           CAE    T5TVCDT
1228  REF  13  LAST  963   20,2740  54 030 0           TS     TIME5

1229  REF   6  LAST  963   20,2741  11'574 1  YSTROKER CCS    STROKER       (STRKFLG) CHECK FOR STROKE TEST
1230  REF   3  LAST  963   20,2742  0 3533 1           TC     HACK          TEST-START OR TEST-IN-PROGRESS
1231                       20,2743  1 2745 1           TCF    +2            NO-TEST
1232  REF   4  LAST  967   20,2744  0 3533 1           TC     HACK          TEST-IN-PROGRESS

A1233                                                                      USE BODY RATES FROM PITCHDAP (PCDUDOTS)

1234                       20,2745  0 0006 1  YINTEGRL EXTEND               COMPUTE INTEGRAL OF BODY-AXIS YAW-RATE
1235  REF   3  LAST  940   20,2746  3 1600 0           DCA    YERRB               ERROR, SC.AT B-1 REVS
1236  REF  13  LAST  966   20,2747  53'703 0           DXCH   ERRBTMP

1237                       20,2750  0 0006 1           EXTEND
1238  REF   1              20,2751  3 1532 1           DCA    OMEGAZC
1239  REF  14  LAST  967   20,2752  21'703 0           DAS    ERRBTMP

1240  REF   6  LAST  964   20,2753  30 746 1           CAE    COSCDUZ       PREPARE BODY-AXIS YAW-RATE, OMEGAZB
1241                       20,2754  0 0006 1           EXTEND
1242  REF   6  LAST  964   20,2755  7 0742 1           MP     SINCDUX
1243                       20,2756  20 001 1           DDOUBL
1244                       20,2757  0 0006 1           EXTEND
1245  REF   4  LAST  964   20,2760  7 1647 1           MP     MCDUYDOT
1246                       20,2761  20 001 1           DDOUBL
1247  REF   1              20,2762  53'540 0           DXCH   OMEGAZB

1248  REF   4  LAST  964   20,2763  4 1650 1           CS     MCDUZDOT
1249                       20,2764  0 0006 1           EXTEND
1250  REF   6  LAST  964   20,2765  7 0750 1           MP     COSCDUX
1251                       20,2766  20 001 1           DDOUBL
1252  REF   2  LAST  967   20,2767  21'540 0           DAS    OMEGAZB       (COMPLETED OMEGAZB, SC.AT 1/2TVCDT REVS)

1253                       20,2770  0 0006 1           EXTEND                PICK UP -OMEGAZB (SIGN CHNG, INTEGRATE)
1254  REF   3  LAST  967   20,2771  4 1540 0           DCS    OMEGAZB
1255  REF  15  LAST  967   20,2772  21'703 0           DAS    ERRBTMP

1256  REF   2  LAST  964   20,2773  0 3124 0  YERORLIM TCR    ERRORLIM      YAW  BODY-AXIS-ERROR  INPUT LIMITER

1257                       20,2774  0 0006 1  YFORWARD EXTEND                    PREPARE THE FILTER STORAGE LOCATIONS
1258  REF   2  LAST  105   20,2775  3 1556 0           DCA    YTMP1              FOR THE YAW CHANNEL
```

```
 1259   REF   4  LAST  966   20,2776  53'707 1          DXCH   TMP1
 1260                       20,2777  0 0006 1          EXTEND
 1261   REF   2  LAST  105   20,3000  3 1562 1          DCA    YTMP3
 1262   REF   4  LAST  966   20,3001  53'713 1          DXCH   TMP3
 1263                       20,3002  0 0006 1          EXTEND
 1264   REF   2  LAST  105   20,3003  3 1566 0          DCA    YTMP5
 1265   REF   4  LAST  966   20,3004  53'717 0          DXCH   TMP5

 1266   REF   2  LAST  964   20,3005  0 3156 0          TCR    FWDFLTR        GO COMPUTE PRESENT OUTPUT
A1267                                                                        (INCLUDES VARIABLE GAIN PACKAGE)

 1268                       20,3006  0 0006 1 YOFFSET  EXTEND
 1269   REF   7  LAST  949   20,3007  3 1610 1          DCA    YDELOFF
 1270   REF   8  LAST  966   20,3010  21'705 0          DAS    CMDTMP         NOW SCALED AT 8+0 ASCREV

 1271   REF   2  LAST  964   20,3011  0 3137 1 YACLIM   TCR    ACTLIM         ROUND OFF & LIMIT YAW ACTUATOR COMMAND

 1272   REF   4  LAST  959   20,3012  4 1624 1 YOUT     CS     YCMD           INCREMENTAL YAW  COMMAND
 1273   REF   9  LAST  968   20,3013  6 1704 0          AD     CMDTMP
 1274   REF   3  LAST  959   20,3014  26 053 0          ADS    TVCYAW         UPDATE THE ERROR COUNTER (NO RESTART-
A1275                                                                              PROTECT, SINCE ERROR CNTR ZEROED)

 1276   REF  29  LAST  824   20,3015  3 5004 0          CAF    BIT12          BIT FOR TVCYAW COUNT RELEASE
 1277                       20,3016  0 0006 1          EXTEND
 1278   REF   9  LAST  964   20,3017  05 014 1          WOR    CHAN14

 1279                       20,3020  0 0006 1 YPRECOMP EXTEND                 PREPARE THE FILTER STORAGE FOR YAW
 1280   REF   2  LAST  105   20,3021  3 1560 0          DCA    YTMP2
 1281   REF   4  LAST  966   20,3022  53'711 0          DXCH   TMP2
 1282                       20,3023  0 0006 1          EXTEND
 1283   REF   2  LAST  105   20,3024  3 1564 1          DCA    YTMP4
 1284   REF   4  LAST  966   20,3025  53'715 1          DXCH   TMP4
 1285                       20,3026  0 0006 1          EXTEND
 1286   REF   2  LAST  105   20,3027  3 1570 1          DCA    YTMP6
 1287   REF   4  LAST  966   20,3030  53'721 0          DXCH   TMP6

 1288   REF   2  LAST  965   20,3031  0 3247 0          TCR    PRECOMP        TO THE FILTER FOR PRECOMPUTATION

 1289   REF   6  LAST  949   20,3032  31'604 1 DELBARY  CAE    DELYBAR +1     UPDATE YAW  OFFSET-TRACKER-FILTER
 1290                       20,3033  0 0006 1          EXTEND
 1291   REF   3  LAST  965   20,3034  7 3500 0          MP     E(-AT)
 1292   REF   6  LAST  966   20,3035  55'701 1          TS     DELBRTMP +1
 1293   REF   7  LAST  968   20,3036  31'603 0          CAE    DELYBAR
 1294                       20,3037  0 0006 1          EXTEND
 1295   REF   4  LAST  968   20,3040  7 3500 0          MP     E(-AT)
 1296   REF   7  LAST  968   20,3041  21'701 1          DAS    DELBRTMP
 1297   REF  10  LAST  968   20,3042  31'704 0          CAE    CMDTMP
 1298                       20,3043  0 0006 1          EXTEND
 1299   REF   2  LAST  965   20,3044  7 3477 1          MP     1-E(-AT)
 1300   REF   8  LAST  968   20,3045  21'701 1          DAS    DELBRTMP
```

1301 REF 2 LAST 960 20,3046 0 3050 1 YCOPYCYC TCR YCOPY YAW COPYCYCLE

1302 REF 32 LAST 965 20,3047 1 5333 0 YDAPEND TCF RESUME YAW DAP COMPLETED

P1303 YAW TVCDAP COPYCYCLE SUBROUTINE (CALLED VIA YAW TVCDAP OR TVC RESTART PACKAGE)

```
 1305   REF  15  LAST  966   20,3050  25'644 0  YCOPY   INCR    TVCPHASE        RESTART-PROTECT THE COPYCYCLE.      (3)
A1306                                                                              NOTE POSSIBLE RE-ENTRY FROM RESTART
A1307                                                                              PACKAGE. SHOULD A RESTART OCCUR
A1308                                                                              DURING YAW  COPYCYCLE.

 1309                          20,3051  0 0006 1           EXTEND
 1310   REF   5  LAST  968   20,3052  3 1707 0           DCA     TMP1
 1311   REF   3  LAST  967   20,3053  53'556 1           DXCH    YTMP1
 1312                          20,3054  0 0006 1           EXTEND
 1313   REF   5  LAST  968   20,3055  3 1711 1           DCA     TMP2
 1314   REF   3  LAST  968   20,3056  53'560 1           DXCH    YTMP2
 1315                          20,3057  0 0006 1           EXTEND
 1316   REF   5  LAST  968   20,3060  3 1713 0           DCA     TMP3
 1317   REF   3  LAST  968   20,3061  53'562 0           DXCH    YTMP3
 1318                          20,3062  0 0006 1           EXTEND
 1319   REF   5  LAST  968   20,3063  3 1715 0           DCA     TMP4
 1320   REF   3  LAST  968   20,3064  53'564 0           DXCH    YTMP4
 1321                          20,3065  0 0006 1           EXTEND
 1322   REF   5  LAST  968   20,3066  3 1717 1           DCA     TMP5
 1323   REF   3  LAST  968   20,3067  53'566 1           DXCH    YTMP5
 1324                          20,3070  0 0006 1           EXTEND
 1325   REF   5  LAST  968   20,3071  3 1721 1           DCA     TMP6
 1326   REF   3  LAST  968   20,3072  53'570 0           DXCH    YTMP6

 1327                          20,3073  0 0006 1  YMISC    EXTEND              MISC....YAW-RATE-ERROR INTEGRATOR
 1328   REF  16  LAST  967   20,3074  3 1703 1           DCA     ERRBTMP
 1329   REF   5  LAST  550   20,3075  55'500 1           TS      AK2                 FOR YAW  NEEDLES. SC.AT B-I REVS
 1330   REF   4  LAST  967   20,3076  53'600 1           DXCH    YERRB

 1331   REF  11  LAST  968   20,3077  31'704 0           CAE     CMDTMP
 1332   REF   5  LAST  968   20,3100  55'624 1           TS      YCMD

 1333                          20,3101  0 0006 1           EXTEND
 1334   REF   9  LAST  968   20,3102  3 1701 0           DCA     DELBRTMP
 1335   REF   8  LAST  968   20,3103  53'604 0           DXCH    DELYBAR

 1336   REF 167  LAST  963   20,3104  3 5021 1           CAF     ZERO            YAW  COPYCYCLE COMPLETED
 1337   REF  16  LAST  970   20,3105  55'644 1           TS      TVCPHASE            RESET TVCPHASE

 1338   REF 186  LAST  966   20,3106  0 0002 0           TC      Q
```

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P1339 SUBROUTINES COMMON TO BOTH PITCH AND YAW DAPS....

R1340 INITIALIZATION PACKAGE FOR CDURATES....

```
 1341   REF  14  LAST  967   20,3107  22 016 0  DAPINIT  LXCH   BANKRUPT        T5 RUPT ENTRY (CALLED BY TVCINT4)

 1342   REF  16  LAST  948   20,3110  3 7716 0           CAF    NEGONE             SET UP
 1343   REF   7  LAST  967   20,3111  6 1625 1           AD     T5TVCDT            T5 CALL FOR PITCHDAP IN TVCDT SECS
 1344   REF   3  LAST  436   20,3112  6 5001 0           AD     NEGMAX             (T5TVCDT = POSMAX - TVCDT/2 +1)
 1345   REF   8  LAST  971   20,3113  6 1625 1           AD     T5TVCDT
 1346   REF  14  LAST  967   20,3114  54 030 0           TS     TIME5
 1347   REF   2  LAST  967   20,3115  3 3473 1           CAF    PITCHT5            (BBCON ALREADY THERE)
 1348   REF  18  LAST  967   20,3116  55'312 1           TS     T5LOC

 1349   REF  10  LAST  963   20,3117  30 033 1           CAE    CDUY           READ AND STORE CDUS FOR DIFFERENTIATOR
 1350   REF   4  LAST  963   20,3120  55'645 0           TS     PCDUYPST           PAST-VALUES
 1351   REF  13  LAST  963   20,3121  30 034 0           CAE    CDUZ
 1352   REF   4  LAST  963   20,3122  55'646 0           TS     PCDUZPST

 1353   REF   3  LAST  959   20,3123  1 5335 0           TCF    NOQRSM
```

R1354 BODY-AXIS-ERROR INPUT LIMITER PACKAGE....

```
 1355   REF  17  LAST  970   20,3124  31'702 0  ERRORLIM CAE    ERRBTMP        CHECK FOR INPUT-ERROR LIMIT
 1356                       20,3125  0 0006 1           EXTEND                     CHECKS UPPER WORD ONLY
 1357   REF   1             20,3126  7 5015 1           MP     1/ERRLIM
 1358                       20,3127  0 0006 1           EXTEND
 1359                       20,3130  1 3136 1           BZF    +6
 1360   REF  18  LAST  971   20,3131  11'702 1           CCS    ERRBTMP
 1361   REF   1             20,3132  3 5003 1           CAF    ERRLIM
 1362                       20,3133  1 3135 1           TCF    +2
 1363   REF   2  LAST  971   20,3134  4 5003 0           CS     ERRLIM
 1364   REF  19  LAST  971   20,3135  55'702 1           TS     ERRBTMP        LIMIT WRITES OVER UPPER WORD ONLY

 1365   REF 187  LAST  970   20,3136  0 0002 0           TC     Q
```

R1366 ACTUATOR-COMMAND LIMITER PACKAGE....

```
 1367   REF  12  LAST  970   20,3137  31'705 1  ACTLIM   CAE    CMDTMP +1      ROUND UP FOR OUTPUT
 1368                       20,3140  6 0000 1           DOUBLE
 1369   REF  80  LAST  941   20,3141  54 001 1           TS     L
 1370   REF 168  LAST  970   20,3142  3 5021 1           CAF    ZERO
 1371   REF  13  LAST  971   20,3143  6 1704 0           AD     CMDTMP

 1372                       20,3144  0 0006 1           EXTEND         CHECK FOR ACTUATOR COMMAND LIMIT
 1373   REF   1             20,3145  7 3472 1           MP     1/ACTSAT
 1374                       20,3146  0 0006 1           EXTEND
```

```
1375                                20,3147  1 3155 1           BZF     +6
1376   REF  14  LAST  971           20,3150  11'704 1           CCS     CMDTMP          APPLY LIMITS
1377   REF   1                     20,3151  3 3471 0           CAF     ACTSAT
1378                                20,3152  1 3154 0           TCF     +2
1379   REF   2  LAST  972           20,3153  4 3471 1           CS      ACTSAT
1380   REF  15  LAST  972           20,3154  55'704 1           TS      CMDTMP          LIMITS WRITE OVER CMDTMP

1381   REF 188  LAST  971           20,3155  0 0002 0           TC      Q


R1382  FILTER COMPUTATIONS FOR PRESENT OUTPUT.................

1383   REF 169  LAST  971           20,3156  3 5021 1  FWDFLTR  CAF     ZERO
1384   REF   2  LAST  105           20,3157  55'615 0           TS      DAP1
1385   REF   2  LAST  105           20,3160  55'617 1           TS      DAP2
1386   REF   2  LAST  105           20,3161  55'621 1           TS      DAP3
1387   REF  16  LAST  972           20,3162  55'704 1           TS      CMDTMP

1388   REF  10  LAST  970           20,3163  55'700 0           TS      DELBRTMP

1389   REF  20  LAST  971           20,3164  31'703 1  1DAPCAS  CAE     ERRBTMP +1      FIRST DAP CASCADE
1390                                20,3165  0 0006 1           EXTEND
1391   REF  10  LAST  942           20,3166  7 1723 1           MP      N10                     N10
1392   REF   3  LAST  972           20,3167  55'616 0           TS      DAP1 +1
1393   REF  21  LAST  972           20,3170  3 1702 0           CA      ERRBTMP
1394                                20,3171  0 0006 1           EXTEND
1395   REF  11  LAST  972           20,3172  7 1723 1           MP      N10                     N10
1396   REF   4  LAST  972           20,3173  21'616 0           DAS     DAP1
1397   REF   6  LAST  970           20,3174  53'707 1           DXCH    TMP1
1398   REF   5  LAST  972           20,3175  21'616 0           DAS     DAP1

1399   REF   6  LAST  972           20,3176  31'616 1  2DAPCAS  CAE     DAP1 +1         SECOND DAP CASCADE
1400                                20,3177  0 0006 1           EXTEND
1401   REF  12  LAST  972           20,3200  7 1730 0           MP      N10 +5                  N20
1402   REF   3  LAST  972           20,3201  55'620 0           TS      DAP2 +1
1403   REF   7  LAST  972           20,3202  3 1615 1           CA      DAP1
1404                                20,3203  0 0006 1           EXTEND
1405   REF  13  LAST  972           20,3204  7 1730 0           MP      N10 +5                  N20
1406   REF   4  LAST  972           20,3205  21'620 0           DAS     DAP2
1407   REF   6  LAST  970           20,3206  53'713 1           DXCH    TMP3
1408   REF   5  LAST  972           20,3207  21'620 0           DAS     DAP2

1409   REF  69  LAST  954           20,3210  31'466 1           CAE     DAPDATR1        TEST FOR LEM ON OR OFF
1410   REF  46  LAST  954           20,3211  7 5002 1           MASK    BIT14
1411   REF 203  LAST  960           20,3212  10 000 0           CCS     A
1412   REF   1                     20,3213  1 3220 0           TCF     3DAPCAS         LEM ON
1413                                20,3214  0 0006 1           EXTEND                  LEM OFF
1414   REF   6  LAST  972           20,3215  3 1620 1           DCA     DAP2
1415   REF   3  LAST  972           20,3216  53'622 1           DXCH    DAP3
1416   REF   1                     20,3217  1 3232 0           TCF     DPTVARK
```

```
1417  REF   7  LAST  972   20,3220  31'620 1  3DAPCAS  CAE     DAP2 +1          THIRD DAP CASCADE
1418                       20,3221  0 0006 1           EXTEND
1419  REF  14  LAST  972   20,3222  7 1735 0           MP      N10 +10D              N30
1420  REF   4  LAST  972   20,3223  55'622 1           TS      DAP3 +1
1421  REF   8  LAST  973   20,3224  3 1617 0           CA      DAP2
1422                       20,3225  0 0006 1           EXTEND
1423  REF  15  LAST  973   20,3226  7 1735 0           MP      N10 +10D              N30
1424  REF   5  LAST  973   20,3227  21'622 1           DAS     DAP3
1425  REF   6  LAST  970   20,3230  53'717 0           DXCH    TMP5
1426  REF   6  LAST  973   20,3231  21'622 1           DAS     DAP3

1427  REF   7  LAST  973   20,3232  4 1622 1  OPTVARK  CS      DAP3 +1          VARIABLE GAIN PACKAGE
1428                       20,3233  0 0006 1           EXTEND                   (ALSO, SIGN CHANGE IN FORWARD LOOP)
1429  REF   3  LAST  943   20,3234  7 1641 1           MP      VARK             SCALED AT 1/(8 ASCREV) OF ACTUAL VALUE
1430  REF  17  LAST  972   20,3235  55'705 0           TS      CMDTMP +1
1431  REF   8  LAST  973   20,3236  4 1621 1           CS      DAP3
1432                       20,3237  0 0006 1           EXTEND
1433  REF   4  LAST  973   20,3240  7 1641 1           MP      VARK
1434  REF  18  LAST  973   20,3241  21'705 0           DAS     CMDTMP

1435  REF  19  LAST  973   20,3242  53'705 0           DXCH    CMDTMP           FIX UP SCALING - SCALED B+3 ASCREVS
1436                       20,3243  20 001 1           DDOUBL
1437                       20,3244  20 001 1           DDOUBL
1438  REF  20  LAST  973   20,3245  53'705 0           DXCH    CMDTMP                    - SCALED B+1 ASCREVS
A14381                                                                         NOTE - THERE IS AN INHERANT GAIN OF
A14382                                                                         (B+1 ASCREVS) ON THE OUTPUT DACS.

1439  REF 189  LAST  972   20,3246  0 0002 0           TC      Q

R1440  FILTER PRECOMPUTATIONS FOR NEXT PASS.....................

1441  REF 170  LAST  972   20,3247  3 5021 1  PRECOMP   CAF     ZERO             ***** FIRST CASCADE FILTER **********
1442  REF  16  LAST  963   20,3250  55'611 1           TS      TTMP1
1443  REF   3  LAST  107   20,3251  55'613 0           TS      TTMP2

1444  REF  22  LAST  972   20,3252  3 1703 1           CA      ERRBTMP +1       MULTIPLY INPUT BY
1445                       20,3253  0 0006 1           EXTEND
1446  REF  16  LAST  973   20,3254  7 1724 0           MP      N10 +1                N11/2
1447  REF  17  LAST  973   20,3255  55'612 1           TS      TTMP1 +1
1448  REF  23  LAST  973   20,3256  3 1702 0           CA      ERRBTMP
1449                       20,3257  0 0006 1           EXTEND
1450  REF  17  LAST  973   20,3260  7 1724 0           MP      N10 +1                N11/2
1451  REF  18  LAST  973   20,3261  21'612 1           DAS     TTMP1

1452  REF   8  LAST  972   20,3262  4 1616 0           CS      DAP1 +1          MULTIPLY OUTPUT BY
1453                       20,3263  0 0006 1           EXTEND
1454  REF  18  LAST  973   20,3264  7 1726 1           MP      N10 +3                D11/2
1455  REF   4  LAST  973   20,3265  55'614 1           TS      TTMP2 +1
1456  REF   9  LAST  973   20,3266  4 1615 0           CS      DAP1
```

```
1457                                20,3267  0 0006 1          EXTEND
1458  REF  19  LAST  973            20,3270  7 1726 1          MP      N10 +3          D11/2
1459  REF   5  LAST  973            20,3271  21'614 1          DAS     TTMP2

1460  REF   6  LAST  974            20,3272  53'614 1          DXCH    TTMP2
1461  REF  19  LAST  973            20,3273  21'612 1          DAS     TTMP1
1462  REF  20  LAST  974            20,3274  53'612 1          DXCH    TTMP1
1463                                20,3275  20 001 1          DDOUBL
1464  REF   6  LAST  970            20,3276  21'711 0          DAS     TMP2

1465  REF   7  LAST  974            20,3277  53'711 0          DXCH    TMP2
1466  REF   7  LAST  972            20,3300  53'707 1          DXCH    TMP1

1467  REF 171  LAST  973            20,3301  3 5021 1          CAF     ZERO
1468  REF  21  LAST  974            20,3302  55'611 1          TS      TTMP1
1469  REF   8  LAST  974            20,3303  55'710 1          TS      TMP2

1470  REF  24  LAST  973            20,3304  3 1703 1          CA      ERRBTMP +1      MULTIPLY INPUT BY
1471                                20,3305  0 0006 1          EXTEND                  SECOND-ORDER NUMERATOR COEFF.
1472  REF  20  LAST  974            20,3306  7 1725 1          MP      N10 +2            N12
1473  REF  22  LAST  974            20,3307  55'612 1          TS      TTMP1 +1
1474  REF  25  LAST  974            20,3310  3 1702 0          CA      ERRBTMP
1475                                20,3311  0 0006 1          EXTEND
1476  REF  21  LAST  974            20,3312  7 1725 1          MP      N10 +2          N12
1477  REF  23  LAST  974            20,3313  21'612 1          DAS     TTMP1

1478  REF  10  LAST  973            20,3314  4 1616 0          CS      DAP1 +1             MULTIPLY OUTPUT BY
1479                                20,3315  0 0006 1          EXTEND
1480  REF  22  LAST  974            20,3316  7 1727 0          MP      N10 +4                D12
1481  REF   9  LAST  974            20,3317  55'711 0          TS      TMP2 +1
1482  REF  11  LAST  974            20,3320  4 1615 0          CS      DAP1
1483                                20,3321  0 0006 1          EXTEND
1484  REF  23  LAST  974            20,3322  7 1727 0          MP      N10 +4          D12
1485  REF  10  LAST  974            20,3323  21'711 0          DAS     TMP2

1486  REF  24  LAST  974            20,3324  53'612 1          DXCH    TTMP1
1487  REF  11  LAST  974            20,3325  21'711 0          DAS     TMP2


1488  REF 172  LAST  974            20,3326  3 5021 1  2CASFLTR CAF     ZERO        *****SECOND CASCADE FILTER*****
1489  REF  25  LAST  974            20,3327  55'611 1          TS      TTMP1
1490  REF   7  LAST  974            20,3330  55'613 0          TS      TTMP2

1491  REF  12  LAST  974            20,3331  3 1616 1          CA      DAP1 +1         MULTIPLY INPUT BY
1492                                20,3332  0 0006 1          EXTEND
1493  REF  24  LAST  974            20,3333  7 1731 1          MP      N10 +6            N21/2
1494  REF  26  LAST  974            20,3334  55'612 1          TS      TTMP1 +1
1495  REF  13  LAST  974            20,3335  3 1615 1          CA      DAP1
1496                                20,3336  0 0006 1          EXTEND
1497  REF  25  LAST  974            20,3337  7 1731 1          MP      N10 +6          N21/2
```

```
1498   REF  27  LAST  974   20,3340  21'612 1        DAS     TTMP1

1499   REF   9  LAST  973   20,3341  4 1620 0        CS      DAP2 +1         MULTIPLY OUTPUT BY
1500                        20,3342  0 0006 1        EXTEND
1501   REF  26  LAST  974   20,3343  7 1733 0        MP      N10 +8D           D21/2
1502   REF   8  LAST  974   20,3344  55'614 1        TS      TTMP2 +1
1503   REF  10  LAST  975   20,3345  4 1617 1        CS      DAP2
1504                        20,3346  0 0006 1        EXTEND
1505   REF  27  LAST  975   20,3347  7 1733 0        MP      N10 +8D           D21/2
1506   REF   9  LAST  975   20,3350  21'614 1        DAS     TTMP2

1507   REF  10  LAST  975   20,3351  53'614 1        DXCH    TTMP2
1508   REF  28  LAST  975   20,3352  21'612 1        DAS     TTMP1
1509   REF  29  LAST  975   20,3353  53'612 1        DXCH    TTMP1
1510                        20,3354  20 001 1        DDOUBL
1511   REF   6  LAST  970   20,3355  21'715 1        DAS     TMP4

1512   REF   7  LAST  975   20,3356  53'715 1        DXCH    TMP4
1513   REF   7  LAST  972   20,3357  53'713 1        DXCH    TMP3

1514   REF 173  LAST  974   20,3360  3 5021 1        CAF     ZERO
1515   REF  30  LAST  975   20,3361  55'611 1        TS      TTMP1
1516   REF   8  LAST  975   20,3362  55'714 0        TS      TMP4

1517   REF  14  LAST  974   20,3363  3 1616 1        CA      DAP1 +1         MULTIPLY INPUT  BY
1518                        20,3364  0 0006 1        EXTEND
1519   REF  28  LAST  975   20,3365  7 1732 1        MP      N10 +7            N22
1520   REF  31  LAST  975   20,3366  55'612 1        TS      TTMP1 +1
1521   REF  15  LAST  975   20,3367  3 1615 1        CA      DAP1
1522                        20,3370  0 0006 1        EXTEND
1523   REF  29  LAST  975   20,3371  7 1732 1        MP      N10 +7            N22
1524   REF  32  LAST  975   20,3372  21'612 1        DAS     TTMP1

1525   REF  11  LAST  975   20,3373  4 1620 0        CS      DAP2 +1         MULTIPLY OUTPUT BY
1526                        20,3374  0 0006 1        EXTEND
1527   REF  30  LAST  975   20,3375  7 1734 1        MP      N10 +9D           D22
1528   REF   9  LAST  975   20,3376  55'715 1        TS      TMP4 +1
1529   REF  12  LAST  975   20,3377  4 1617 1        CS      DAP2
1530                        20,3400  0 0006 1        EXTEND
1531   REF  31  LAST  975   20,3401  7 1734 1        MP      N10 +9D           D22
1532   REF  10  LAST  975   20,3402  21'715 1        DAS     TMP4

1533   REF  33  LAST  975   20,3403  53'612 1        DXCH    TTMP1
1534   REF  11  LAST  975   20,3404  21'715 1        DAS     TMP4


1535   REF  70  LAST  972   20,3405  31'466 1        CAE     DAPDATR1        TEST FOR LEM ON OR OFF
1536   REF  41  LAST  953   20,3406  7 5003 0        MASK    BIT13
1537   REF 204  LAST  972   20,3407  10 000 0        CCS     A
1538   REF 190  LAST  973   20,3410  0 0002 0        TC      Q               EXIT IF LEM OFF
```

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```
1539  REF 174  LAST  975   20,3411  3 5021 1  3CASFLTR CAF    ZERO        *****THIRD CASCADE FILTER*****
1540  REF  34  LAST  975   20,3412  55'611 1            TS     TTMP1
1541  REF  11  LAST  975   20,3413  55'613 0            TS     TTMP2

1542  REF  13  LAST  975   20,3414  3 1620 1            CA     DAP2 +1          MULTIPLY INPUT BY (1/2)
1543                        20,3415  0 0006 1            EXTEND
1544  REF  32  LAST  975   20,3416  7 1736 0            MP     N10 +11D           N31/2
1545  REF  35  LAST  976   20,3417  55'612 1            TS     TTMP1 +1
1546  REF  14  LAST  976   20,3420  3 1617 0            CA     DAP2
1547                        20,3421  0 0006 1            EXTEND
1548  REF  33  LAST  976   20,3422  7 1736 0            MP     N10 +11D           N31/2
1549  REF  36  LAST  976   20,3423  21'612 1            DAS    TTMP1

1550  REF   9  LAST  973   20,3424  4 1622 1            CS     DAP3 +1
1551                        20,3425  0 0006 1            EXTEND
1552  REF  34  LAST  976   20,3426  7 1740 1            MP     N10 +13D           D31/2
1553  REF  12  LAST  976   20,3427  55'614 1            TS     TTMP2 +1
1554  REF  10  LAST  976   20,3430  4 1621 1            CS     DAP3
1555                        20,3431  0 0006 1            EXTEND
1556  REF  35  LAST  976   20,3432  7 1740 1            MP     N10 +13D           D31/2
1557  REF  13  LAST  976   20,3433  21'614 1            DAS    TTMP2

1558  REF  14  LAST  976   20,3434  53'614 1            DXCH   TTMP2
1559  REF  37  LAST  976   20,3435  21'612 1            DAS    TTMP1
1560  REF  38  LAST  976   20,3436  53'612 1            DXCH   TTMP1
1561                        20,3437  20 001 1            DDOUBL
1562  REF   6  LAST  970   20,3440  21'721 0            DAS    TMP6

1563  REF   7  LAST  976   20,3441  53'721 0            DXCH   TMP6
1564  REF   7  LAST  973   20,3442  53'717 0            DXCH   TMP5

1565  REF 175  LAST  976   20,3443  3 5021 1            CAF    ZERO
1566  REF  39  LAST  976   20,3444  55'611 1            TS     TTMP1
1567  REF   8  LAST  976   20,3445  55'720 1            TS     TMP6

1568  REF  15  LAST  976   20,3446  3 1620 1            CA     DAP2 +1          MULTIPLY INPUT BY
1569                        20,3447  0 0006 1            EXTEND
1570  REF  36  LAST  976   20,3450  7 1737 1            MP     N10 +12D           N32
1571  REF  40  LAST  976   20,3451  55'612 1            TS     TTMP1 +1
1572  REF  16  LAST  976   20,3452  3 1617 0            CA     DAP2
1573                        20,3453  0 0006 1            EXTEND
1574  REF  37  LAST  976   20,3454  7 1737 1            MP     N10 +12D           N32
1575  REF  41  LAST  976   20,3455  21'612 1            DAS    TTMP1

1576  REF  11  LAST  976   20,3456  4 1622 1            CS     DAP3 +1
1577                        20,3457  0 0006 1            EXTEND
1578  REF  38  LAST  976   20,3460  7 1741 0            MP     N10 +14D           D32
1579  REF   9  LAST  976   20,3461  55'721 0            TS     TMP6 +1
1580  REF  12  LAST  976   20,3462  4 1621 1            CS     DAP3
1581                        20,3463  0 0006 1            EXTEND
```

```
1582   REF  39  LAST  976   20,3464  7 1741 0        MP     N10 +14D          D32
1583   REF  10  LAST  976   20,3465  21'721 0        DAS    TMP6

1584   REF  42  LAST  976   20,3466  53'612 1        DXCH   TTMP1
1585   REF  11  LAST  977   20,3467  21'721 0        DAS    TMP6

1586   REF 191  LAST  975   20,3470  0 0002 0        TC     Q
```

P1587 CONSTANTS FOR AUTOPILOTS

R1588 NOTE....1 ASCREV (ACTUATOR CMD SCALING) = 85.41 ARCSEC/BIT OR 1.07975111 REVS (85.41X16384/3600/360)

R1590 1 SPASCREV (SPECIAL ACTUATOR CMD SCALING) = 1.04620942 REVS

```
1592                        20,3471   00375 0  ACTSAT    DEC     253           ACTUATOR LIMIT (6 DEG),  SC.AT 1ASCREV
1593                        20,3472   00101 1  1/ACTSAT  DEC     .0039525692   RECIPROCAL (1/253)

1594  REF  42  LAST  975     5003             ERRLIM    EQUALS  BIT13         FILTER INPUT LIMIT....B-3 REVS (45DEG).
1595  REF  27  LAST  940     5015             1/ERRLIM  EQUALS  BIT3                SC.AT B-1 REV, AND ITS RECIPROCAL

1596  REF   1                 20,3473   02530 0  PITCHT5   GENADR  PITCHDAP      UPPER WORDS OF T5 2CADRS, LOWER WORDS
1597  REF   2  LAST  944     20,3474   03107 1  DAPT5     GENADR  DAPINIT            (BBCON) ALREADY THERE.  ORDER IS
1598  REF   1                 20,3475   02732 0  YAWT5     GENADR  YAWDAP             REQUIRED.

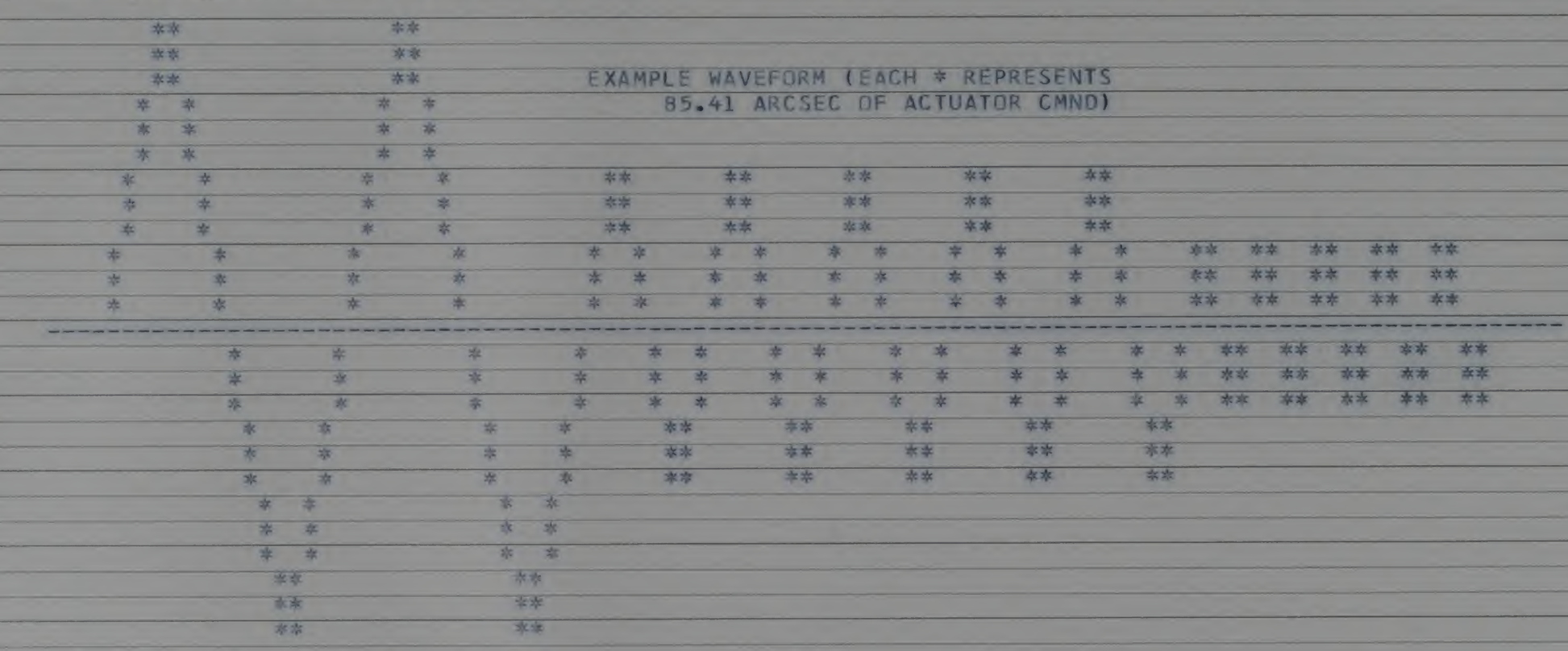
1599                        20,3476   00115 1  1/RTLIM   DEC     0.004715      .004715(CDUDIF) = 0 IF CDUDIF < 2.33 DEG
1600                        20,3477   00243 1  1-E(-AT)  OCT     00243         AT = .01SEC....EITHER(1/A=4SEC, T=40MS),
1601                        20,3500   37535 0  E(-AT)    OCT     37535                              OR(1/A=8SEC, T=80MS)
```

```
R1000   NAME     STROKE TEST PACKAGE   (INCLUDING INITIALIZATION PACKAGE)
R1001   LOG SECTION...TVCSTROKETEST                  SUBROUTINE...DAPCSM
R1002   MODIFIED BY SCHLUNDT                         21 OCTOBER 1968
R1003   FUNCTIONAL DESCRIPTION....
R1004        STROKE TEST PACKAGE GENERATES A WAVEFORM DESIGNED TO EXCITE BENDING
R1005        STRKTSTI (STROKE TEST INITIALIZATION) IS CALLED AS A JOB BY V68.
R1006                 IT INITIALIZES ALL ERASABLES REQD FOR A STROKE TEST, AND
R1007                 THEN TESTS FOR CSM/LM (BIT 13 OF DAPDATR1). IF CSM/LM,
R1008                 IN EITHER HIGH OR LOW-BANDWIDTH MODE, THE TEST IS STARTED
R1009                 IMMEDIATELY. IF NOT CSM/LM, PROGRAM EXITS WITH NO ACTION.
R1015        HACK (STROKE TEST) GENERATES THE WAVEFORM BY DUMPING PULSE BURSTS
R1016                 OF PROPER SIGN AND IN PROPER SEQUENCE DIRECTLY INTO
R1017                 TVCPITCH, WORKING IN CONJUNCTION WITH BOTH PITCH AND YAW
R1018                 TVC DAPS, WITH INTERMEDIATE WAITLIST CALLS. NOTE, HOWEVER
R1019                 THAT THE STROKE TEST IS PERFORMED ONLY IN THE PITCH AXIS.
R1020                 AN EXAMPLE WAVEFORM IS GIVEN BELOW, TO DEMONSTRATE STROKE-
R1021                 TEST PARAMETER SELECTION
R1022        RESTARTS CAUSE TEST TO BE TERMINATED. ANOTHER V68 REQD IF TEST
R1023                 IS TO BE RE-RUN.
R1027        PULSE BURST SIZE IS PAD-LOADED (ESTROKER) SO THAT AMPLITUDE OF
R1028                 WAVEFORM CAN BE CHANGED.  THERE ARE TEN PULSE BURSTS IN
R1029                 THE HALF-AMPLITUDE OF THE FIRST FREQUENCY SET IN THE
R1030                 STANDARD WAVEFORM.  AMPLITUDE IS 10(ESTROKER)(1/42.15),
R1031                 NOMINALLY 50/42.15  =  1.185 DEG
R1032   CALLING SEQUENCE....
R1033        EXTENDED VERB 68 SETS UP STRKTSTI JOB
R1034        PITCH AND YAW TVCDAPS, FINDING STROKER NON-ZERO, DO A  ..TC HACK..
R1035        AN INTERNALLY-GENERATED WAITLIST CALL ENTERS AT  ..HACKWLST..
R1036   NORMAL EXIT MODES....
R1037        TC BUNKER  (..Q.. IF ENTRY FROM DAP, ..TCTSKOVR.. IF FROM WAITLIST)LIST
R1039   SUBROUTINES CALLED....
R1040        WAITLIST
R1041   ALARM OR ABORT EXIT MODES....
R1042        NONE
R1043   ERASABLE INITIALIZATION REQUIRED....
R1044        ESTROKER (PAD-LOAD)
R1045        STROKER,  CADDY,  REVS,  CARD,  N
R1046   OUTPUT....
R1047        STRKTSTI...INITIALIZATION FOR STROKE TEST
R1048        HACK, HACKWLST...PULSE BURSTS INTO TVCPITCH VIA..ADS..
R1049                          RESETS STROKER = +0 WHEN TEST COMPLETED
R1050   DEBRIS....
R1051        N = CADDY = +0,  CARD = -0,  REVS = -1
R1052        BUNKER
R1053
```

L TVCSTROKETEST USER'S PAGE NO. 2 E0 S3

P1054 EXAMPLE STROKE TEST WAVE FORM, DEMONSTRATING PARAMETER SELECTION

R1055 NOTE....THIS IS NOT THE OFFICIAL WAVEFORM....



R1107 FCARD = +3 (NUMBER OF SETS)
R1108 ESTROKER = +3 (PULSE BURST SIZE, SC.AT 85.41 ARCSEC/BIT)

R1109 SET1..
R1110 FREVS = +3 (NUMBER REVERSALS MINUS 1)
R1111 FCADDY = +4 (NUMBER OF PULSE BURSTS IN 1/2 AMPLITUDE)
R1112 SET2..
R1113 FCARD1 = +9 (NUMBER REVERSALS MINUS 1)
R1114 FCARD4 = +2 (NUMBER OF PULSE BURSTS IN 1/2 AMPLITUDE)
R1115 SET3..
R1116 FCARD2 = +9 (NUMBER REVERSALS MINUS 1)
R1117 FCARD5 = +1 (NUMBER OF PULSE BURSTS IN 1/2 AMPLITUDE)
R1118 SET4..
R1119 FCARD3 = +0 (NUMBER REVERSALS MINUS 1)
R1120 FCARD6 = +0 (NUMBER OF PULSE BURSTS IN 1/2 AMPLITUDE)

L TVCSTROKETEST USER'S PAGE NO. 3 EO S3

P1121 STROKE TEST INITIALIZATION PACKAGE (AS A JOB, FROM VERB 68)

```
1122                                17,2552                 BANK    17
1123   REF   2  LAST  962           20,2000                 SETLOC  DAPS2
1124                                20,3501                 BANK

1125   REF   1                                              COUNT*  $$/STRK
1126   REF   2  LAST  106           E6,1655                 EBANK=  CADDY

1127   REF   1                      20,3501  0 3512 1 STRKTSTI TCR    TSTINIT        STROKE TEST INITIALIZATION PKG (CALLED
A1128                                                                                  AS A JOB BY VERB68)

1129                                20,3502  0 0004 0 STRKCHK INHINT

1130   REF  71  LAST  975           20,3503  31'466 1        CAE     DAPDATR1       CHECK FOR CSM/LM CONFIGURATION
1131   REF  47  LAST  972           20,3504  7 5002 1        MASK    BIT14
1132                                20,3505  0 0006 1        EXTEND
1133                                20,3506  1 3511 0        BZF     +3

1138   REF   5  LAST  562           20,3507  31'413 0        CAE     ESTROKER       BEGIN ON NEXT DAP PASS (PITCH OR YAW)
1139   REF   7  LAST  967           20,3510  55'574 1        TS      STROKER        (STROKING DONE IN PITCH ONLY. HOWEVER)

1143   REF  98  LAST  935           20,3511  1 5217 1        TCF     ENDOFJOB

1144   REF   1                      20,3512  4 3522 0 TSTINIT CS     FCADDY         NORMAL ENTRY FROM STRKTSTI
1145   REF   3  LAST  981           20,3513  55'655 1        TS      CADDY
1146   REF   2  LAST  106           20,3514  55'656 1        TS      N                      NOTE SGN CHNG FCADDY(+) TO CADDY(-)

1147   REF   1                      20,3515  3 3523 0        CAF     FREVS
1148   REF   2  LAST  106           20,3516  55'660 1        TS      REVS

1149   REF   1                      20,3517  4 3524 0        CS      FCARD                  NOTE SGN CHNG FCARD(+) TO CARD(-)
1150   REF   2  LAST  106           20,3520  55'661 0        TS      CARD

1151   REF 192  LAST  977           20,3521  0 0002 0        TC      Q              RETURN TO STRKTSTI+1  (OR CHKSTRK+2OR+4)
```

L TVCSTROKETEST USER'S PAGE NO. 4 E6 S3

```
P1152   THE OFFICIAL STROKE TEST WAVEFORM (3 JAN, 1967) CONSISTS OF FOUR STROKE SETS, AS FOLLOWS....

R1154         SET 1...10 BURSTS IN 1/2 AMP,   4 REVERSALS
R1155         SET 2... 6 BURSTS IN 1/2 AMP,   6 REVERSALS
R1156         SET 3... 5 BURSTS IN 1/2 AMP,  10 REVERSALS
R1157         SET 4... 4 BURSTS IN 1/2 AMP,  14 REVERSALS
R1158   THE PULSE BURST SIZE (ESTROKER) IS PAD-LOADED (5 BITS AS OF 3JAN,1967)
R1159   THE REMAINING WAVEFORM-GENERATING PARAMETERS ARE AS FOLLOWS....

 1160                        20,3522   00012 1  FCADDY   DEC     10          NO. PULSE BURSTS IN 1/2 AMP, SET1..(+10)
 1161                        20,3523   00003 1  FREVS    DEC      3          NO. REVERSALS MINUS 1, SET1.....(  3)

 1162                        20,3524   00004 0  FCARD    DEC      4          NO. STROKE SETS.....(+ 4)

 1163                        20,3525   00005 1  FCARD1   DEC      5          NO. REVERSALS MINUS 1, SET2.....(  5)

 1164                        20,3526   00011 1  FCARD2   DEC      9                                3.....(  9)
 1165                        20,3527   00015 0  FCARD3   DEC     13                                4.....( 13)

 1166                        20,3530   00006 1  FCARD4   DEC      6          NO. PULSE BURSTS IN 1/2 AMP, SET2..(+ 6)
 1167                        20,3531   00005 1  FCARD5   DEC      5                                SET3..(+ 5)
 1168                        20,3532   00004 0  FCARD6   DEC      4                                SET4..(+ 4)

 1169   REF  40  LAST  958     5016             20MS     =      BIT2

R1170   STROKE TEST PACKAGE PROPER....

 1171   REF   2  LAST  106   E6,1657                        EBANK= BUNKER

 1172                        20,3533   0 0006 1  HACK     EXTEND              ENTRY (IN T5 RUPT) FROM TVCDAPS
 1173   REF   3  LAST  982   20,3534   23'657 1           QXCH   BUNKER       SAVE Q FOR DAP RETURN

 1174   REF   1              20,3535   3 5016 0           CAF    20MS         2DAPSX2(PASSES/DAP)X2(CS/PASS)=BCS=TVCDT
 1175   REF  45  LAST  958   20,3536   0 5245 1           TC     WAITLIST
 1176   REF   4  LAST  982   E6,1657                      EBANK= BUNKER
 1177   REF   1              20,3537    03542 1          2CADR  HACKWLST
 1177   REF   1              20,3540    40066 0
 1178                        20,3541   1 3544 0           TCF    +3

 1179   REF   1              20,3542   3 4367 1  HACKWLST CAF    TCTSKOVR     ENTRY FROM WAITLIST
 1180   REF   5  LAST  982   20,3543   55'657 0           TS     BUNKER       BUNKER IS TC TASKOVER

 1181   REF   8  LAST  981   20,3544   3 1574 0           CA     STROKER      STROKE
 1182   REF   5  LAST  964   20,3545   26 054 1           ADS    TVCPITCH

 1183   REF  25  LAST  964   20,3546   3 5005 1           CAF    BIT11        RELEASE THE ERROR COUNTERS
 1184                        20,3547   0 0006 1           EXTEND
 1185   REF  10  LAST  968   20,3550   05 014 1           WOR    CHAN14
 1186   REF   4  LAST  981   20,3551   25'655 0           INCR   CADDY        COUNT DOWN THE NO. BURSTS, THIS SLOPE
```

```
1187  REF  5  LAST  982   20,3552  4 1655 1          CS      CADDY
1188                       20,3553  0 0006 1          EXTEND
1189                       20,3554  6 3556 1          BZMF    +2
1190  REF  6  LAST  982   20,3555  0 1657 1          TC      BUNKER          EXIT, WHILE ON A SLOPE

1191  REF  3  LAST  981   20,3556  11'660 1          CCS     REVS
1192  REF  1               20,3557  1 3577 0          TCF     REVUP           POSITIVE REVS
1193  REF  2  LAST  983   20,3560  1 3603 0          TCF     REVUP +4        FINAL REVERSAL. THIS SET

1194  REF  3  LAST  981   20,3561  25'661 1          INCR    CARD            NEGATIVE REVS SET LAST PASS, READY FOR
1195  REF  4  LAST  983   20,3562  4 1661 0          CS      CARD                  THE NEXT SET. CHECK IF NO MORE SETS
1196                       20,3563  0 0006 1          EXTEND
1197  REF  1               20,3564  1 3575 1          BZF     STROKILL        ALL SETS COMPLETED

1198  REF  5  LAST  983   20,3565  51'661 1          INDEX   CARD
1199  REF  2  LAST  981   20,3566  3 3530 1          CAF     FCARD +4        PICK UP NO. REVERSALS (-), NEXT SET
1200  REF  4  LAST  983   20,3567  55'660 1          TS      REVS            REINITIALIZE
1201  REF  6  LAST  983   20,3570  51'661 1          INDEX   CARD
1202  REF  3  LAST  983   20,3571  4 3533 0          CS      FCARD +7        PICK UP NO. BURSTS IN 1/2AMP, NEXT SET
1203  REF  3  LAST  981   20,3572  55'656 1          TS      N               REINITIALIZE
1204  REF  6  LAST  983   20,3573  55'655 1          TS      CADDY
1205  REF  7  LAST  983   20,3574  0 1657 1          TC      BUNKER          EXIT, AT END OF SET

1206  REF  9  LAST  982   20,3575  55'574 1  STROKILL TS      STROKER         RESET (TO +0) TO END TEST
1207  REF  8  LAST  983   20,3576  0 1657 1          TC      BUNKER          EXIT, STROKE TEST FINIS

1208  REF  5  LAST  983   20,3577  55'660 1  REVUP    TS      REVS            ALL REVERSALS EXCEPT LAST OF SET
1209  REF  4  LAST  983   20,3600  3 1656 0          CA      N
1210                       20,3601  6 0000 1          DOUBLE                  2 X 1/2AMP
1211                       20,3602  1 3606 0          TCF     +4

1212  REF 101  LAST  898   20,3603  4 5017 0    +4    CS      ONE             FINAL REVERSAL, THIS SET
1213  REF  6  LAST  983   20,3604  55'660 1          TS      REVS            PREPARE TO BRANCH TO NEW BURST
1214  REF  5  LAST  983   20,3605  3 1656 0          CA      N               JUST RETURN TO ZERO, FINAL SLOPE OF SET
1215  REF  7  LAST  983   20,3606  55'655 1          TS      CADDY           CADUP

1216  REF 10  LAST  983   20,3607  4 1574 1          CS      STROKER         CHANGE SIGN OF SLOPE
1217  REF 11  LAST  983   20,3610  55'574 1          TS      STROKER
1218  REF  9  LAST  983   20,3611  0 1657 1          TC      BUNKER          EXIT AT A REVERSAL (SLOPE CHANGE)
```

L TVCROLLDAP USER'S PAGE NO. 1 E0 S3

```
R1000   PROGRAM NAME...TVC ROLL AUTOPILOT
R1001   LOG SECTION...TVCROLLDAP                    SUBROUTINE...DAPCSM
R1002   MODIFIED BY SCHLUNDT                       21 OCTOBER 1968

R1005   FUNCTIONAL DESCRIPTION....

R1006       *AN ADAPTATION OF THE LEM P-AXIS CONTROLLER
R1007       *MAINTAIN OGA WITHIN 5 DEG DEADBND OF OGAD, WHERE OGAD = OGA AS SEEN
R1008        BY IGNITION (P40)
R1009       *MAINTAIN OGA RATE LESS THAN 0.1 DEG/SEC LIMIT CYCLE RATE
R1012       *SWITCHING LOGIC IN PHASE PLANE.... SEE GSOP CHAPTER 3
R1013       *USES T6 CLOCK TO TIME JET FIRINGS
R1014       *MAXIMUM JET FIRING TIME = 2.56 SECONDS, LIMITED TO 2.5 IF GREATER
R1015       *MINIMUM JET FIRING TIME = 15 MS
R1016       *JET PAIRS FIRE ALTERNATELY
R1017       *AT LEAST 1/2 SECOND DELAY BEFORE A NEW JET PAIR IS FIRED
R1018       *JET FIRINGS MAY NOT BE EXTENDED, ONLY SHORTENED. WHEN RE-EVALUATION
R1019        OF A JET FIRING TIME IS MADE ON A LATER PASS

R1020   CALLING SEQUENCE....

R1021       *ROLLDAP CALL VIA WAITLIST, IN PARTICULAR BY TVCEXEC (EVERY 1/2 SEC)
R1022        WITH A 3CS DELAY TO ALLOW FREE TIME FOR OTHER RUPTS (DWNRPT, ETC.)

R1023   NORMAL EXIT MODES.... ENDOFJOB

R1024   ALARM OR ABORT EXIT MODES.... NONE

R1025   SUBROUTINES CALLED.....NONE

R1026   OTHER INTERFACES....

R1027       *TVCEXEC SETS UP ROLLDAP TASK EVERY 1/2 SECOND AND UPDATES 1/CONACC
R1028        EVERY 10 SECONDS (VIA MASSPROP AND S40.15)
R1029       *RESTARTS SUSPEND ROLL DAP COMPUTATIONS UNTIL THE NEXT 1/2 SEC
R1030        SAMPLE PERIOD. (THE PART OF TVCEXECUTIVE THAT CALLS ROLL DAP IS
R1031        NOT RESTARTED.) THE OGAD FROM IGNITION IS MAINTAINED.

R1032   ERASABLE INITIALIZATION REQUIRED....

R1033       *1/CONACC   (S40.15)
R1034       *OGAD (CDUX AT IGNITION)
R1035       *OGANOW  (CDUX AT TVCINIT4 AND TVCEXECUTIVE)
R1036       *OGAPAST  (OGANOW AT TVCEXECUTIVE)
R10362      *ROLLFIRE = TEMREG = ROLLWORD = 0   (MRCLEAN LOOP IN TVCDAPON)
R1037   OUTPUT....

R1038       *ROLL JET PAIR FIRINGS
```

L TVCROLLDAP USER'S PAGE NO. 2 E0 S3

R1040 DEBRIS.... MISCELLANEOUS, SHAREABLE WITH RCS/ENTRY, IN EBANK6 ONLY

```
P1041   SOME NOTES ON THE ROLL AUTOPILOT, AND IN PARTICULAR, ON ITS SWITCHING
R1042   LOGIC.  SEE SECTION THREE OF THE GSOP (SUNDISK/COLOSSUS) FOR DETAILS.


R1043   SWITCHING LOGIC IN THE PHASE PLANE....

R1044                                   OGARATE
R1045                                     *
R1046                                     *
R1047    * * * * * * * * * * * *          *
R1048                                     *     (REGION 1, SEE TEXT BELOW)
R1049                                 *   *
R1050                                     *
R1051   * * * * * * *     (COAST)     *     ...PARABOLA (SWITCHING = CONTROL)
R1052                  *                  *   .
R1053                    *                *  *
R1054                      *              *                (FIRE NEG ROLL JETS)
R1055                        *            *     *
R1056        (-DB,+LMCRATE)....*           *
R1057                          *          *        *
R1058                          *          *                              OGAERROR
R1059   ***************************************************************************
R1060                                     *          *                (-AK, OGAERR)
R1061                          *          *          *      (REGION 6-PRIME)
R1062                                     *          *      (SEE TEXT BELOW)
R1063                        *            *        *
R1064                                     *             *     ...STRAIGHT LINE
R1065      (FIRE POS ROLL JETS)      *    *               *  .
R1066                                     *   (COAST)        *
R1067                                     *                    * * * * * * * * * * *
R1068                                     *                          -MINLIM
R1069                                     *    *
R1070                                     *
R1071                                     *          * * * * * * * * * * * * * * * * *
R1072                                     *                          -MAXLIM
R1073                                     *
R1074                                     *

R1075   SWITCHING PARABOLAS ARE CONTROL PARABOLAS, THUS REQUIRING KNOWLEDGE OF
R1076        CONTROL ACCELERATION CONACC, OR ITS RECIPROCAL, 1/CONACC, THE TVC
R1077        ROLL DAP GAIN  (SEE TVCEXECUTIVE VARIABLE GAIN PACKAGE).  JET
R1078        FIRING TIME IS SIMPLY THAT REQUIRED TO ACHIEVE THE DESIRED OGARATE,
R1079        SUBJECT TO THE LIMITATIONS DISCUSSED UNDER FUNCTIONAL DESCRIPTION,
R1080        ABOVE.

R1081   THE THREE CONTROL REGIONS  (+, -, AND ZERO TORQUE) ARE COMPRIZED OF
R1082        TWELVE SUBSET REGIONS  ( 1...6, AND THE CORRESPONDING 1-PRIME...
R1083        6-PRIME )  SEE SECTION 3 OF THE GSOP  (SUNDISK OR COLOSSUS)
```

```
P1084   GIVEN THE OPERATING POINT NOT IN THE COAST REGION, THE DESIRED OGARATE
R1085         IS AT THE POINT OF PENETRATION OF THE COAST REGION BY THE CONTROL
R1086         PARABOLA WHICH PASSES THROUGH THE OPERATING POINT. FOR REGION 3
R1087         DESIRED OGARATE IS SIMPLY +-MAXLIM. FOR REGIONS 1 OR 6 THE SOLUTION
R1088         TO A QUADRATIC IS REQUIRED (THE PENETRATION IS ALONG THE STRAIGHT
R1089         LINE OR MINLIM BOUNDRY SWITCH LINES). AN APPROXIMATION IS MADE
R1090         INSTEAD. TAKE AN OPERATING POINT IN REGION 6' . PASS A TANGENT TO
R1091         THE CONTROL PARABOLA THROUGH THE OPERATING POINT, AND FIND ITS
R1092         INTERSECTION WITH THE STRAIGHT LINE SECTION OF THE SWITCH CURVE...
R1093         THE INTERSECTION DEFINES DESIRED OGARATE. IF THE OPERATING POINT IS
R1094         CLOSE TO THE SWITCH LINE, THE APPROXIMATION IS QUITE GOOD (INDEED
R1095         THE APPROXIMATE AND QUADRATIC SOLUTIONS CONVERGE IN THE LIMIT AS
R1096         THE SWITCH LINE IS APPROACHED). IF THE OPERATING POINT IS NOT CLOSE
R1097         TO THE SWITCH LINE, THE APPROXIMATE SOLUTION GIVES VALID TREND
R1098         INFORMATION (DIRECTION OF DESIRED OGARATE) AT LEAST. THE
R1099         RE-EVALUATION OF DESIRED OGARATE IN SUBSEQUENT ROLL DAP PASSES (1/2
R1100         SECOND INTERVALS) WILL BENEFIT FROM THE CONVERGENT NATURE OF THE
R1101         APPROXIMATION.

R11021  FOR LARGE OGAERROR THE TANGENT INTERSECTS +-MINLIM SWITCH BOUNDRY BEFORE
R11022        INTERSECTING THE STRAIGHT LINE SWITCH. HOWEVER THE MINLIM IS
R11023        IGNORED IN COMPUTING THE FIRING TIME, SO THAT THE EXTENSION (INTO
R11024        THE COAST REGION) OF THE STRAIGHT LINE SWITCH IS WHAT IS FIRED TO.
R11025        IF THE ROLL DAP FINDS ITSELF IN THE COAST REGION BEFORE REACHING
R11026        THE DESIRED INTERSECTION (IE, IN THE REGION BETWEEN THE MINLIM
R11027        AND THE STRAIGHT LINE SWITCH) IT WILL EXIBIT NORMAL COAST-REGION
R11028        BEHAVIOR AND TURN OFF THE JETS. THE PURPOSE OF THIS FIRING POLICY
R11029        IS TO MAINTAIN STATIC ROLL STABILITY IN THE EVENT OF A JET
R1103         FAILED-ON.

R1113   WHEN THE OPERATING POINT IS IN REGION 1 THE SAME APPROXIMATION IS
R1114         MADE, BUT AT AN ARTIFICIALLY-CREATED OR DUMMY OPERATING POINT,
R1115         DEFINED BY.. OGAERROR = INTERSECTION OF CONTROL PARABOLA  AND
R1116         OGAERROR AXIS. OGARATE = +-LMCRATE WHERE SIGN IS OPPOSITE THAT OF
R1117         REAL OPERATING POINT RATE.  WHEN THE OPERATING POINT HAS PASSED
R1118         FROM REGION 1 TO REGION 6', THE DUMMY POINT IS NO LONGER REQUIRED,
R1119         AND THE SOLUTION REVERTS TO THAT OF A REGULAR REGION 6' POINT.


R1120   EQUATION FOR SWITCHING PARABOLA (SEE FIGURE ABOVE)....
R1121                                    2
R1122         SOGAERROR = (DB - (SOGARATE) (1/CONACC)/2) SGN(SOGARATE)


R1123   EQUATION FOR SWITCHING STRAIGHT LINE SEGMENT....

R1124         SOGARATE = -(-SLOPE)(SOGAERROR) - SGN(SOGARATE) INTERCEP

R1125                  WHERE  INTERCEP = DB(-SLOPE) - LMCRATE
```

R1126 EQUATION FOR INTERSECTION, CONTROL PARABOLA AND STRAIGHT SWITCH LINE....

R1127 DOGADOT = NUM/DEN, WHERE

R1128 $$NUM = (-SLOPE)(OGARATE)^2\,(1/CONACC)$$

R1129 $$+SGN(DELOGA)(-SLOPE)(OGAERROR - SGN(DELOGA)(DB))$$

R1130 $$+LMCRATE$$

R1131

R1132 $$DEN = (-SLOPE)(LMCRATE)(1/CONACC) - SGN(DELOGA)$$

R1133 $$DELOGA = OGAERROR - (DB - OGARATE^2\,(1/CONACC)/2)\,SGN(OGARATE)$$

R1134

R1135 FOR REGIONS 6 AND 6-PRIME USE ACTUAL OPERATING POINT (OGA, OGARATE)

R1136 FOR OGAERROR AND OGARATE IN THE INTERSECTION EQUATIONS ABOVE.

R1137 FOR REGIONS 1 AND 1-PRIME USE DUMMY OPERATING POINT FOR OGAERROR

R1138 AND OGARATE, WHERE THE DUMMY POINT IS GIVEN BY....

R1139 OGAERROR= DELOGA + DB SGN(OGARATE)

R1140 OGARATE= -LMCRATE SGN(OGARATE)

R1141 NOTE, OGAERROR = OGA - OGAD USES DUMMY REGISTER OGA IN ROLL DAP CODING

R1142 ALSO, AT POINT WHERE DOGARATE IS COMPUTED, REGISTER DELOGA IS USED

R1143 AS A DUMMY REGISTER FOR THE OGAERROR IN THE NUM EQUATION ABOVE

P11432 ROLLDAP CODING....

```
 2000   REF   3  LAST  958   16,2000                        SETLOC DAPROLL
 2001                       16,3272                        BANK
 2002   REF   9  LAST  946   E6,1662                        EBANK= OGANOW
 2003   REF   1                                            COUNT* $$/ROLL
 2006   REF  10  LAST  989   16,3272  31'662 1  ROLLDAP     CAE    OGANOW        OGA RATE ESTIMATOR...SIMPLE FIRST-ORDER
 2007                       16,3273  0 0006 1              EXTEND                       DIFFERENCE (SAMPLE TIME = 1/2 SEC)
 2008   REF   3  LAST  946   16,3274  21'663 1              MSU    OGAPAST
 2009                       16,3275  0 0006 1              EXTEND
 2010   REF  29  LAST  935   16,3276  7 5013 1              MP     BIT5
 2011   REF 205  LAST  975   16,3277  22 000 1              LXCH   A
 2012   REF   1               16,3300  55'533 1              TS     OGARATE       SC.AT B-4 REV/SEC

R2017   COMPUTATIONS WHICH FOLLOW USE OGA FOR OGAERR  (SAME REGISTER)
R2018   EXAMINE DURATION OF LAST JET FIRING IF JETS NOW ON.

 2019   REF   2  LAST  105   16,3301  3 1571 0  DURATION   CA     ROLLFIRE      SAME SGN AS PRESENT TORQ,MAGN=POSMAX
 2020                       16,3302  0 0006 1              EXTEND
 2021                       16,3303  1 3305 0              BZF    +2            ROLL JETS ARE NOW OFF.
 2022   REF   1               16,3304  1 3313 1              TCF    ROLLOGIC      ENTER LOGIC,JETS NOW ON.

 2023   REF   2  LAST  105   16,3305  31'573 1              CAE    TEMREG        EXAMINE LAST FIRING INTERVAL
 2024                       16,3306  0 0006 1              EXTEND                 IF POSITIVE, DONT FIRE
 2025   REF   2  LAST  989   16,3307  1 3313 1              BZF    ROLLOGIC      ENTER LOGIC. JETS NOW OFF.

 2026   REF 176  LAST  976   16,3310  3 5021 1              CAF    ZERO          JETS HAVE NOT BEEN OFF FOR 1/2 SEC. WAIT
 2027   REF   3  LAST  989   16,3311  55'573 0              TS     TEMREG        RESET TEMREG
 2028   REF  47  LAST  949   16,3312  1 5324 0  WAIT1/2     TCF    TASKOVER      EXIT ROLL DAP

R2029   COMPUTE DB=(1/2 CONACC) (OGARATE)SQ  (1/2 IN THE SCALING)

 2030   REF   2  LAST  989   16,3313  4 1533 1  ROLLOGIC   CS     OGARATE       SCALED AT 2(-4) REV/SEC
 2031                       16,3314  0 0006 1              EXTEND
 2032   REF   3  LAST  943   16,3315  7 1640 0              MP     1/CONACC      SCALED AT 2(+9) SEC SQ /REV
 2033                       16,3316  0 0006 1              EXTEND
 2034   REF   3  LAST  989   16,3317  7 1533 1              MP     OGARATE
 2035   REF   1               16,3320  6 3706 0              AD     DB            SCALED AT 2(+0) REV
 2036   REF   4  LAST  989   16,3321  55'573 0              TS     TEMREG        QUANTITY SCALED AT 2(+0) REV.

R2037   GET SIGN OF OGARATE

 2038   REF   4  LAST  989   16,3322  3 1533 0              CA     OGARATE
 2039                       16,3323  0 0006 1              EXTEND
 2040                       16,3324  6 3327 1              BZMF   +3            LET SGN(0) BE NEGATIVE
 2041   REF  63  LAST  939   16,3325  3 5017 1              CA     BIT1
 2042                       16,3326  1 3330 0              TCF    +2
 2043   REF  64  LAST  989   16,3327  4 5017 0              CS     BIT1
 2044   REF   2  LAST  106   16,3330  55'666 1              TS     SGNRT         + OR -  2(-14)
```

```
R2045   CALCULATE DISTANCE FROM SWITCH PARABOLA (DELOGA)

 2046                                16,3331  0 0006 1           EXTEND
 2047   REF   5  LAST  989          16,3332  7 1573 0           MP      TEMREG      SGN(OGARATE) TEMREG NOW IN L
 2048   REF  81  LAST  971          16,3333  4 0001 1           CS      L
 2049   REF   3  LAST  106          16,3334  6 1664 1           AD      OGA         SCALED AT 2(+0) REV
 2050   REF   2  LAST  106          16,3335  55'667 0 DELOGAC   TS      DELOGA      SCALE B+0 REV, PLUS TO RIGHT OF C-PARAB

R2051   EXAMINE SGN(DELOGA) AND CREATE CA OR CS INSTR. DEPENDING UPON SIGN.

 2052                                16,3336  0 0006 1           EXTEND
 2053                                16,3337  6 3342 1           BZMF    +3
 2054   REF  11  LAST  732          16,3340  3 4371 0           CAF     PRIO30      =CA  (30000)
 2055                                16,3341  1 3343 1           TCF     +2
 2056   REF  38  LAST  941          16,3342  3 5001 0           CAF     BIT15       =CS  (40000)
 2057   REF   2  LAST  106          16,3343  55'670 0           TS      I

 2058   REF   3  LAST  990          16,3344  51'670 1           INDEX   I           TSET ON  I SGN(OGARATE)
 2059   REF   3  LAST  989          16,3345  0 1666 0           0       SGNRT       CA OR CS
 2060                                16,3346  4 0000 0           COM
 2061                                16,3347  0 0006 1           EXTEND
 2062   REF   1                      16,3350  6 3421 0 REGITST   BZMF    ROLLON      IF REGION 1 (DELOGA OGARATE SAME SIGN)

R2063   NO JET FIRE YET, TEST FOR MAX OGARATE

 2064   REF   4  LAST  990          16,3351  51'670 1           INDEX   I
 2065   REF   5  LAST  989          16,3352  0 1533 0           0       OGARATE     CA OR CS...BOTH MUST BE NEG. HERE
 2066   REF   2  LAST  106          16,3353  55'671 1           TS      IOGARATE    I.E. I OGARATE
 2067   REF   1                      16,3354  6 3714 0           AD      MAXLIM      SCALED AT 2(-4) REV/SEC
 2068                                16,3355  0 0006 1           EXTEND
 2069   REF   1                      16,3356  6 3500 1 REG3TST   BZMF    RATELIM     IF REGION 3 (RATES TOO HIGH, FIRE JETS)

R2070   COMPUTATION OF I((-SLOPE)OGA + OGARATE) - INTERCEPT..NOTE THAT STR. LINE
R2071   SWITCH SLOPE IS (SLOPE) DEG/SEC/DEG. A NEG QUANTITY

 2072   REF   6  LAST  990          16,3357  3 1533 0           CA      OGARATE
 2073                                16,3360  0 0006 1           EXTEND
 2074   REF  48  LAST  981          16,3361  7 5002 1           MP      BIT14
 2075   REF   6  LAST  990          16,3362  55'573 0           TS      TEMREG
 2076   REF   4  LAST  990          16,3363  3 1664 1           CA      OGA
 2077                                16,3364  0 0006 1           EXTEND
 2078   REF   1                      16,3365  7 3707 0           MP      -SLOPE
 2079                                16,3366  20 001 1           DDOUBL
 2080                                16,3367  20 001 1           DDOUBL
 2081                                16,3370  20 001 1           DDOUBL              (OGA ERROR MUST BE LESS THAN +-225 DEG)
 2082   REF   7  LAST  990          16,3371  6 1573 1           AD      TEMREG

 2083   REF   5  LAST  990          16,3372  51'670 1           INDEX   I
 2084   REF 206  LAST  989          16,3373  0 0000 1           0       A           I((-SLOPE)OGA+OGARATE) AT 2(-3)REV/SEC
 2085                                16,3374  4 0000 0           COM
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 2086   REF   1              16,3375  6 3711 0           AD      INTERCEP        SCALED AT 2(-3) REV.
 2087                        16,3376  4 0000 0           COM
 2088                        16,3377  0 0006 1           EXTEND
 2089   REF   1              16,3400  6 3611 1 REG2TST   BZMF    NOROLL          IF REGION 2 (COAST SIDE OF STRT LINE)

R2090   CHECK TO SEE IF OGARATE IS ABOVE MINLIM BOUNDARY

 2091   REF   3 LAST  990    16,3401  3 1671 0           CA      IOGARATE        ALWAYS NEGATIVE
 2092   REF   1              16,3402  6 3712 0           AD      MINLIM          SCALED AT 2(-4) REV/SEC
 2093                        16,3403  0 0006 1           EXTEND
 2094   REF   2 LAST  991    16,3404  6 3611 1 REG4TST   BZMF    NOROLL          IF REGION 4 (COAST SIDE OF MINLIM)

R2095   ALL AREAS CHECKED EXCEPT LAST AREA...NO FIRE IN THIS SMALL SEGMENT

 2096   REF   6 LAST  990    16,3405  51'670 1           INDEX   I
 2097   REF   5 LAST  990    16,3406  0 1664 1           0       OGA
 2098                        16,3407  4 0000 0           COM
 2099   REF   2 LAST  989    16,3410  6 3706 0           AD      DB
 2100                        16,3411  4 0000 0           COM
 2101                        16,3412  0 0006 1           EXTEND
 2102   REF   3 LAST  991    16,3413  6 3611 1 REG5TST   BZMF    NOROLL          IF REGION 5 (COAST SIDE OF DB)


R2103   JETS MUST FIRE NOW.OGARATE IS NEG.(OR VISA VERSA).USE DIRECT STR. LINE.
R2104   DELOGA AND DELOGART ARE USED AS DUMMY VARIABLES IN THE SOLUTION OF A
R2105   STRAIGHT LINE APPROXIMATION TO A QUADRATIC SOLUTION OF THE INTERSECTION
R2106   OF THE CONTROL PARABOLA AND THE STRAIGHT-LINE SWITCH LINE. THE STRAIGHT
R2107   LINE IS THE TANGENT TO THE CONTROL PARABOLA AT THE OPERATING POINT. (FOR
R2108   OPERATING POINTS IN REGIONS 6 OR 6')

 2109   REF   6 LAST  991    16,3414  31'664 1 REGION6   CAE     OGA             USE ACTUAL OPERATING POINT FOR TANGENT
 2110   REF   3 LAST  990    16,3415  55'667 0           TS      DELOGA          ACTUAL STATE
 2111   REF   7 LAST  990    16,3416  3 1533 0           CA      OGARATE
 2112   REF   2 LAST  106    16,3417  55'665 1           TS      DELOGART        ACTUAL STATE,I.E. DEL OGARATE
 2113   REF   1              16,3420  1 3430 1           TCF     ONROLL

R2114   JETS ALSO FIRE FROM HERE EXCEPT OGARATE IS POS(VISA VERSA),USE INDIRECT
R2115   STRAIGHT LINE ESTABLISHED BY TANGENT TO A CONTROL PARABOLA AT   ((DELOGA
R2116   + DB SGN(DELOGA) ), -LMCRATE SGN(DELOGA) )          (THIS IS THE DUMMY
R2117   OPERATING POINT FOR OPERATING POINTS IN REGIONS 1 AND  1' )

 2118   REF   7 LAST  991    16,3421  51'670 1 ROLLON    INDEX   I
 2119   REF   3 LAST  991    16,3422  0 3706 0           0       DB
 2120   REF   4 LAST  991    16,3423  27'667 0           ADS     DELOGA          DELOGA WAS DIST. FROM SWITCH PARABOLA

 2121   REF   1              16,3424  4 3710 0           CS      LMCRATE         LIMIT CYCLE RATE AT 2(-4) REV/SEC
 2122   REF   8 LAST  991    16,3425  51'670 1           INDEX   I
 2123   REF 207 LAST  990    16,3426  0 0000 1           0       A
 2124   REF   3 LAST  991    16,3427  55'665 1           TS      DELOGART        EVALUATE STATE FOR INDIRECT LINE.
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R2125 SOLVE STRAIGHT LINES SIMULTANEOUSLY TO OBTAIN DESIRED OGARATE.

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2126                                16,3430  0 0006 1  ONROLL   EXTEND                DELOGART IN ACC. ON ARRIVAL
2127  REF   4  LAST  989           16,3431  7 1640 0            MP       1/CONACC
2128                                16,3432  6 0000 1            DOUBLE
2129                                16,3433  0 0006 1            EXTEND
2130  REF   2  LAST  990           16,3434  7 3707 0            MP       -SLOPE
2131  REF   8  LAST  990           16,3435  55'573 0            TS       TEMREG       2(-SLOPE)RATE /CONACC
2132                                16,3436  0 0006 1            EXTEND
2133  REF   4  LAST  991           16,3437  7 1665 1            MP       DELOGART
2134  REF   5  LAST  992           16,3440  55'665 1            TS       DELOGART     2(-SLOPE)(RATESQ)/CONACC
2135  REF  26  LAST  982           16,3441  4 5005 0            CS       BIT11
2136  REF   9  LAST  991           16,3442  51'670 1            INDEX    I
2137  REF 208  LAST  991           16,3443  0 0000 1            0        A
2138  REF   9  LAST  992           16,3444  27'573 0  RATEDEN   ADS      TEMREG       DENOMINATOR COMPLETED

2139  REF  10  LAST  992           16,3445  51'670 1            INDEX    I
2140  REF   5  LAST  991           16,3446  0 1667 1            0        DELOGA
2141                                16,3447  4 0000 0            COM
2142  REF   4  LAST  991           16,3450  6 3706 0            AD       DB
2143                                16,3451  4 0000 0            COM
2144                                16,3452  0 0006 1            EXTEND
2145  REF   3  LAST  992           16,3453  7 3707 0            MP       -SLOPE
2146  REF   6  LAST  992           16,3454  27'665 1            ADS      DELOGART
2147  REF   2  LAST  991           16,3455  3 3710 1            CA       LMCRATE
2148                                16,3456  0 0006 1            EXTEND
2149  REF  27  LAST  992           16,3457  7 5005 0            MP       BIT11
2150  REF   7  LAST  992           16,3460  6 1665 0  RATENUM   AD       DELOGART     NUMERATOR COMPLETED

2151  REF  82  LAST  990           16,3461  56 001 0            XCH      L            PLACE NUMERATOR IN L FOR OVERFL. CHECK
2152  REF 177  LAST  989           16,3462  3 5021 1            CA       ZERO
2153                                16,3463  0 0006 1            EXTEND
2154  REF  10  LAST  992           16,3464  11'573 0            DV       TEMREG       OVERFLOW, IF ANYTHING, NOW APPEARS IN A
2155                                16,3465  0 0006 1            EXTEND
2156  REF   1                      16,3466  1 3474 1            BZF      DVOK         NO OVERFLOW....(0,L)/TEMREG = 0,L

2157  REF 209  LAST  992           16,3467  10 000 0  MINLIMAP  CCS      A
2158  REF  19  LAST  938           16,3470  3 4777 1            CAF      POSMAX           POSITIVE OVERFLOW
2159  REF   1                      16,3471  1 3503 0            TCF      ROLLSET
2160  REF  20  LAST  992           16,3472  4 4777 0            CS       POSMAX           NEGATIVE OVERFLOW
2161  REF   2  LAST  992           16,3473  1 3503 0            TCF      ROLLSET

2162  REF 210  LAST  992           16,3474  22 000 1  DVOK      LXCH     A            PUT NUMERATOR BACK INTO A, 0 IN L
2163                                16,3475  0 0006 1            EXTEND
2164  REF  11  LAST  992           16,3476  11'573 0            DV       TEMREG       RESULT OF DIVISION IS DESIRED OGARATE
2165  REF   3  LAST  992           16,3477  1 3503 0            TCF      ROLLSET          ( SCALED AT B-4 REV/SEC )


2173  REF   2  LAST  990           16,3500  4 3714 1  RATELIM   CS       MAXLIM
2174  REF  11  LAST  992           16,3501  51'670 1            INDEX    I
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2175   REF 211  LAST  992   16,3502  0 0000 1          0      A          IF I = CA, DESIRED RATE IS   -MAXLIM

R2176  COMPUTE JET FIRE TIME, BASED ON DESIRED RATE MINUS PRESENT RATE

2177   REF  12  LAST  992   16,3503  55'573 0  ROLLSET  TS     TEMREG     STORE DESIRED OGARATE (SCALED B-4)
21771                       16,3504  0 0006 1           EXTEND
2178   REF   8  LAST  991   16,3505  61'533 0           SU     OGARATE    RATE DIFF. SCALED AT 2(-4) REV/SEC
21781  REF  13  LAST  993   16,3506  55'573 0           TS     TEMREG          OVERFLOW PROTECT
21782                       16,3507  1 3512 0           TCF    +3                   "       "
217821 REF 212  LAST  993   16,3510  50 000 1           INDEX  A                    "       "
217822 REF   2  LAST  889   16,3511  4 5000 0           CS     LIMITS               "       "
2179                        16,3512  0 0006 1           EXTEND
2180   REF   1              16,3513  7 7665 1           MP     T6SCALE    T6SCALE = 8/10.24
2181                        16,3514  0 0006 1           EXTEND
2182   REF   5  LAST  992   16,3515  7 1640 0           MP     1/CONACC   SCALED AT B+9 SECSQ/REV (MAX < .60)
2183                        16,3516  20 001 1           DDOUBL
21831                       16,3517  20 001 1           DDOUBL
2184   REF  14  LAST  993   16,3520  55'573 0           TS     TEMREG          OVERFLOW PROTECT
21841                       16,3521  1 3524 0           TCF    +3                   "       "
21842  REF 213  LAST  993   16,3522  50 000 1           INDEX  A                    "       "
21843  REF   3  LAST  993   16,3523  4 5000 0           CS     LIMITS               "       "
2185   REF  15  LAST  993   16,3524  55'573 0           TS     TEMREG     JET FIRE TIME AT 625 MICROSEC/BIT
2186                        16,3525  0 0006 1           EXTEND             POS MEANS POSITIVE ROLL TORQUE.
2187   REF   4  LAST  991   16,3526  1 3611 0           BZF    NOROLL

R2188  JET FIRE TIME IS NZ, TEST FOR JETS NOW ON.

21881  REF  16  LAST  993   16,3527  31'573 1           CAE    TEMREG     DESIRED CHANGE IN OGARATE
2189                        16,3530  0 0006 1           EXTEND
2190   REF   3  LAST  989   16,3531  7 1571 1           MP     ROLLFIRE   (SGN OF TORQUE..ZERO IF JETS NOW OFF)
2191   REF 214  LAST  993   16,3532  10 000 0           CCS    A
2192   REF   1              16,3533  1 3537 1           TCF    MOREROLL   CONTINUE FIRING WITH PRESENT POLARITY
2193   REF   1              16,3534  1 3542 0           TCF    NEWROLL    START NEW FIRING NOW, PLUS
2194   REF   5  LAST  993   16,3535  1 3611 0           TCF    NOROLL     TERMINATE OLD FIRING, NEW SIGN REQUESTED
2195   REF   2  LAST  993   16,3536  1 3542 0           TCF    NEWROLL    START NEW FIRING NOW, MINUS

R2196  CONTINUE PRESENT FIRING

2197   REF 178  LAST  992   16,3537  3 5021 1  MOREROLL CAF    ZERO
2198   REF  12  LAST  992   16,3540  55'670 0           TS     I          USE TEMP. AS MOREROLL SWITCH
2199   REF   1              16,3541  1 3553 0           TCF    MAXTFIRE

R2200  START NEW FIRING, BUT CHECK IF GREATER THAN MIN FIRE TIME.

2201   REF  17  LAST  993   16,3542  11'573 0  NEWROLL  CCS    TEMREG     CALL THIS T6FIRE
2202   REF 102  LAST  983   16,3543  6 5017 1           AD     ONE
2203                        16,3544  1 3546 1           TCF    +2
2204   REF 103  LAST  993   16,3545  6 5017 1           AD     ONE
2205                        16,3546  4 0000 0           COM                -MAG(T6FIRE)
2206   REF   1              16,3547  6 3715 1           AD     TMINFIRE   TMINFIRE-MAG(T6FIRE)
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2207                          16,3550  4 0000 0           COM
2208                          16,3551  0 0006 1           EXTEND
2209   REF   6  LAST  993     16,3552  6 3611 1  MINTST   BZMF   NOROLL        IF NOT GREATER THAN TMINFIRE (NEW FIRE)

R2210  PROCEED WITH NEW FIRING, BUT NOT LONGER THAN TMAXFIRE.

2211   REF  18  LAST  993     16,3553  3 1573 1  MAXTFIRE CA     TEMREG
2212                          16,3554  0 0006 1           EXTEND
2213   REF   1                16,3555  7 5015 1           MP     1/TMXFIR      I.E. 1/TMAXFIRE
2214                          16,3556  0 0006 1           EXTEND
2215   REF   1                16,3557  1 3565 0  MAXTST   BZF    NOMXFIRE      IF LESS THAN TMAXFIRE

2216   REF 215  LAST  993     16,3560  10 000 0           CCS    A
2217   REF   1                16,3561  3 3716 1           CAF    TMAXFIRE      USE MAXIMUM
2218                          16,3562  1 3564 1           TCF    +2
2219   REF   2  LAST  994     16,3563  4 3716 0           CS     TMAXFIRE      USE MAXIMUM
2220   REF  19  LAST  994     16,3564  55'573 0           TS     TEMREG

R2221  SET UP SIGN OF REQUIRED TORQUE.

2222   REF  20  LAST  994     16,3565  11'573 0  NOMXFIRE CCS    TEMREG        FOR TORQUE SIGN
2223   REF  21  LAST  992     16,3566  3 4777 1           CA     POSMAX        POSITIVE TORQUE REQUIRED
2224                          16,3567  1 3571 0           TCF    +2
2225   REF   4  LAST  971     16,3570  3 5001 0           CA     NEGMAX        NEGATIVE TORQUE REQUIRED
2226   REF   4  LAST  993     16,3571  55'571 1           TS     ROLLFIRE      SET ROLLFIRE FOR + OR - TORQUE

2227                          16,3572  4 0000 0           COM                  COMPLEMENT... POS. FOR NEG. TORQUE
2228                          16,3573  0 0006 1           EXTEND
2229                          16,3574  6 3577 1           BZMF   +3            POSITIVE TORQUE REQUIRED
2230   REF  21  LAST  994     16,3575  4 1573 0           CS     TEMREG
2231   REF  22  LAST  994     16,3576  55'573 0           TS     TEMREG

2232   REF  13  LAST  993     16,3577  3 1670 1  FIRELOOK CA     I             IS IT MOREROLL
2233                          16,3600  0 0006 1           EXTEND
2234   REF   1                16,3601  1 3603 0           BZF    FIREPLUG      YES
2235   REF   1                16,3602  1 3614 0           TCF    JETROLL       MAG(T6FIRE) NOW IN TEMREG

2236   REF   1                16,3603  30 031 0  FIREPLUG CAE    TIME6         CHECK FOR EXTENDED FIRING
2237                          16,3604  0 0006 1           EXTEND
2238   REF  23  LAST  994     16,3605  61'573 1           SU     TEMREG
2241                          16,3606  0 0006 1           EXTEND
2242   REF  48  LAST  989     16,3607  6 5324 1  EXTENTST BZMF   TASKOVER      IF EXTENSION WANTED, DONT, EXIT ROLL DAP
2243   REF   2  LAST  994     16,3610  1 3614 0           TCF    JETROLL

2244   REF 179  LAST  993     16,3611  4 5021 0  NOROLL   CS     ZERO          COAST....(NEG ZERO FOR TIME6)
2245   REF   5  LAST  994     16,3612  55'571 1           TS     ROLLFIRE      NOTE, JETS CAN FIRE NEXT PASS
2246   REF  24  LAST  994     16,3613  55'573 0           TS     TEMREG

2247                          16,3614  0 0006 1  JETROLL  EXTEND
2248   REF   1                16,3615  3 3705 0           DCA    NOROLLT6
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2249  REF   2 LAST 131  16,3616  53'311 1          DXCH  T6LOC
2250  REF  25 LAST 994  16,3617  3 1573 1          CA    TEMREG      ENTER JET FIRING TIME
2251  REF   2 LAST 994  16,3620  54 031 1          TS    TIME6

2252  REF  14 LAST 994  16,3621  3 1670 1          CA    I           I=0 IF MOREROLL.KEEP SAME JETS ON
2253                    16,3622  0 0006 1          EXTEND
2254  REF  49 LAST 994  16,3623  1 5324 0 SAMEJETS BZF   TASKOVER    IF JETS ON KEEP SAME JETS. EXIT ROLL DAP

2255  REF   6 LAST 994  16,3624  11'571 1          CCS   ROLLFIRE
2256  REF   1           16,3625  1 3631 1          TCF   +TORQUE
2257  REF   1           16,3626  1 3672 0          TCF   T6ENABL
2258  REF   1           16,3627  1 3652 1          TCF   -TORQUE
2259  REF   2 LAST 995  16,3630  1 3672 0          TCF   T6ENABL

R2260 PROCEED WITH PLUS TORQUE.

2261  REF   2 LAST 105  16,3631  3 1572 0 +TORQUE  CA    ROLLWORD     WHAT WAS THE LAST +TORQUE COMBINATION
2262  REF  65 LAST 989  16,3632  7 5017 0          MASK  BIT1        WAS IT NO.9-11
2263                    16,3633  0 0006 1          EXTEND
2264  REF   1           16,3634  1 3644 0          BZF   NO.9-11     NOT 9-11, SO USE IT THIS TIME

2265  REF  66 LAST 995  16,3635  4 5017 0 NO.13-15 CS    BIT1
2266  REF   3 LAST 995  16,3636  7 1572 1          MASK  ROLLWORD
2267  REF   4 LAST 995  16,3637  55'572 1          TS    ROLLWORD    CHANGE BIT 1 TO ZERO
2268  REF   1           16,3640  3 5037 0          CAF   +ROLL2
2269                    16,3641  0 0006 1          EXTEND
2270  REF   2 LAST 183  16,3642  01 006 0          WRITE CHAN6
2271  REF   3 LAST 995  16,3643  1 3672 0          TCF   T6ENABL

2272  REF  67 LAST 995  16,3644  3 5017 1 NO.9-11  CAF   BIT1        1ST + JETS TO FIRE (MRCLEAN OS ROLLWORD)
2273  REF   5 LAST 995  16,3645  27'572 1          ADS   ROLLWORD    CHANGE BIT 1 TO ONE
2274  REF   1           16,3646  3 5022 1          CAF   +ROLL1
2275                    16,3647  0 0006 1          EXTEND
2276  REF   3 LAST 995  16,3650  01 006 0          WRITE CHAN6
2277  REF   4 LAST 995  16,3651  1 3672 0          TCF   T6ENABL

2278  REF   6 LAST 995  16,3652  3 1572 0 -TORQUE  CA    ROLLWORD     WHAT WAS LAST -TORQUE COMBINATION
2279  REF  41 LAST 982  16,3653  7 5016 1          MASK  BIT2        WAS IT NO.12-10
2280                    16,3654  0 0006 1          EXTEND
2281  REF   1           16,3655  1 3665 0          BZF   NO.12-10    NOT 12-10, SO USE IT THIS TIME

2282  REF  42 LAST 995  16,3656  4 5016 1 NO.16-14 CS    BIT2
2283  REF   7 LAST 995  16,3657  7 1572 1          MASK  ROLLWORD
2284  REF   8 LAST 995  16,3660  55'572 1          TS    ROLLWORD    CHANGE BIT 2 TO ZERO
2285  REF   1           16,3661  3 3717 0          CAF   -ROLL2
2286                    16,3662  0 0006 1          EXTEND
2287  REF   4 LAST 995  16,3663  01 006 0          WRITE CHAN6
2288  REF   5 LAST 995  16,3664  1 3672 0          TCF   T6ENABL

2289  REF  43 LAST 995  16,3665  3 5016 0 NO.12-10 CAF   BIT2        1ST -JETS TO FIRE (MRCLEAN OS ROLLWORD)
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2290  REF   9  LAST  995   16,3666  27'572 1            ADS     ROLLWORD      CHANGE BIT 2 TO ONE
2291  REF   1              16,3667  3 4377 0            CAF     -ROLL1
2292                       16,3670  0 0006 1            EXTEND
2293  REF   5  LAST  995   16,3671  01 006 0            WRITE   CHAN6

2294  REF  39  LAST  990   16,3672  3 5001 0  T6ENABL    CAF     BIT15
2295                       16,3673  0 0006 1            EXTEND
2296  REF   8  LAST  587   16,3674  05 013 0            WOR     CHAN13
2297  REF  50  LAST  995   16,3675  1 5324 0  RDAPEND    TCF     TASKOVER      EXIT ROLL DAP
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L TVCROLLDAP USER'S PAGE NO. 14 E6 S3

P2298 THIS T6 TASK SHUTS OFF ALL ROLL JETS

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2299   REF  15  LAST  971   16,3676  22 016 0  NOROLL1  LXCH   BANKRUPT      SHUT OFF ALL (ROLL) JETS, (A T6 TASK
2300   REF 180  LAST  994   16,3677  3 5021 1           CAF    ZERO              CALLED BY ..JETROLL..)
2301   REF   7  LAST  995   16,3700  55'571 1           TS     ROLLFIRE     ZERO INDICATES JETS NOW OFF
2302                        16,3701  0 0006 1           EXTEND
2303   REF   6  LAST  996   16,3702  01 006 0 KILLJETS  WRITE  CHAN6
2304   REF   4  LAST  971   16,3703  1 5335 0           TCF    NOQRSM
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P2305   CONSTANTS FOR ROLL AUTOPILOT....

 2306   REF  11  LAST  962   E6,1702                        EBANK= BZERO
 2307   REF   1              16,3704   03676 0  NOROLL1T6 2CADR  NOROLL1
 2307   REF   1              16,3705   34066 0

 2309                        16,3706   00344 1  DB        DEC    .01388889       DEAD BAND (5 DEG), SC.AT B+0 REV

 2310                        16,3707   06315 0  -SLOPE    DEC    0.2             -SWITCHLINE SLOPE(0.2 PER SEC) SC.AT B+0
A2311                                                                                PER SEC
 2312                        16,3710   00111 0  LMCRATE   DEC    .00027778 B+4   LIMIT CYCLE RATE (0.1 DEG/SEC) SC.AT
A2313                                                                                B-4 REV/SEC
 2314                        16,3711   00510 0  INTERCEP  DEC    .0025 B+3       DB(-SLOPE) - LMCRATE,  SC.AT  B-3 REV/SC

 2315                        16,3712   01330 0  MINLIM    DEC    .00277778 B+4   RATELIM,MIN (1DEG/SEC), SC.AT B-4 REV/SC

 2316                        16,3713   00027 1  1/MINLIM  DEC    360 B-18        RECIPROCAL THEREOF, SHIFTED 14 RIGHT

 2317                        16,3714   07071 0  MAXLIM    DEC    .01388889 B+4   RATELIM,MAX (5DEG/SEC), SC.AT B-4 REV/SC

 2318                        16,3715   00030 1  TMINFIRE  DEC    1.5 B+4         15 MS  (14 MIN),  SC.AT 16 BITS/CS

 2319                        16,3716   07640 1  TMAXFIRE  DEC    250 B+4         2.5 SEC, SC.AT 16 BITS/CS

 2320   REF  28  LAST  978     5015              1/TMXFIR  =      BIT3            RECIPROCAL THEREOF, SHIFTED 14 RIGHT,
A23201                                                                               ROUNDS TO OCT00004, SO ALLOWS 2.56
A23202                                                                               SEC FIRINGS BEFORE APPLYING LIMIT
 23203  REF   4  LAST  833     7665              T6SCALE   =      PRIO31          (B+3) (16BITS/CS) (100CS/SEC)

 2321   REF  21  LAST  887     5022              +ROLL1    =      FIVE            ONBITS FOR JETS 9 AND 11
 2322   REF   2  LAST  201     5037              +ROLL2    =      OCT120          ONBITS FOR JETS 13 AND 15
 2323   REF   5  LAST  689     4377              -ROLL1    =      TEN             ONBITS FOR JETS 12 NAD 10
 2324                        16,3717   00240 1  -ROLL2    OCT    240             ONBITS FOR JETS 16 AND 14
```

L MYSUBS USER'S PAGE NO. 1 E0 S3

```
0001                          20,3612                        BANK   20
0002  REF   1                 21,2000                        SETLOC MYSUBS
0003                          21,2042                        BANK

0004  REF   3  LAST  208      E6,1510                        EBANK= KMPAC
0005  REF   1                   5074          SPCOS1         EQUALS SPCOS
0006  REF   1                   5075          SPSIN1         EQUALS SPSIN
0007  REF   2  LAST  999       5074          SPCOS2         EQUALS SPCOS
0008  REF   2  LAST  999       5075          SPSIN2         EQUALS SPSIN


0009  REF   1                                                COUNT  21/DAPMS

R0010 ONE AND ONE HALF PRECISION MULTIPLICATION ROUTINE

0011  REF   2  LAST  108      21,2042  55'512 1  SMALLMP     TS     KMPTEMP        A(X+Y)
0012                          21,2043  0 0006 1              EXTEND
0013  REF   4  LAST  999      21,2044  7 1511 1              MP     KMPAC +1
0014  REF   5  LAST  999      21,2045  55'511 1              TS     KMPAC +1       AY
0015  REF 181  LAST  997      21,2046  3 5021 1              CAF    ZERO
0016  REF   6  LAST  999      21,2047  57'510 1              XCH    KMPAC
0017                          21,2050  0 0006 1              EXTEND
0018  REF   3  LAST  999      21,2051  7 1512 1              MP     KMPTEMP        AX
0019  REF   7  LAST  999      21,2052  21'511 1              DAS    KMPAC          AX+AY
0020  REF 193  LAST  981      21,2053  0 0002 0              TC     Q

R0021 SUBROUTINE FOR DOUBLE PRECISION ADDITIONS OF ANGLES
R0022 A AND L CONTAIN A DP(1S) ANGLE SCALED BY 180 DEGS TO BE ADDED TO KMPAC.
R0023 RESULT IS PLACED IN KMPAC.  TIMING = 6 MCT (22 MCT ON OVERFLOW)

0024  REF   8  LAST  999      21,2054  21'511 1  DPADD       DAS    KMPAC
0025                          21,2055  0 0006 1              EXTEND
0026  REF   1                 21,2056  1 2073 0              BZF    TSK +1         NO OVERFLOW
0027  REF   9  LAST  999      21,2057  11'510 0              CCS    KMPAC
0028  REF   1                 21,2060  1 2074 1              TCF    DPADD+         + OVERFLOW
0029                          21,2061  1 2063 1              TCF    +2
0030  REF   1                 21,2062  1 2076 0              TCF    DPADD-         - OVERFLOW
0031  REF  10  LAST  999      21,2063  11'511 1              CCS    KMPAC +1
0032  REF   1                 21,2064  1 2101 1              TCF    DPADD2+        UPPER = 0, LOWER +
0033                          21,2065  1 2067 0              TCF    +2
0034                          21,2066  4 0000 0              COM                   UPPER = 0, LOWER -
0035  REF  22  LAST  994      21,2067  6 4777 1              AD     POSMAX         LOWER = 0, A=0
0036  REF  11  LAST  999      21,2070  55'511 1              TS     KMPAC +1       CAN NOT OVERFLOW
0037  REF  23  LAST  999      21,2071  3 4777 1              CA     POSMAX         UPPER WAS = 0
0038  REF  12  LAST  999      21,2072  55'510 0  TSK         TS     KMPAC
0039  REF 194  LAST  999      21,2073  0 0002 0              TC     Q

0040  REF   5  LAST  994      21,2074  6 5001 0  DPADD+      AD     NEGMAX         KMPAC GREATER THAN 0
0041  REF   2  LAST  999      21,2075  1 2072 1              TCF    TSK
```

```
0042                                21,2076  4 0000 0  DPADD-   COM
0043   REF  24  LAST  999           21,2077  6 4777 1            AD      POSMAX          KMPAC LESS THAN 0
0044   REF   3  LAST  999           21,2100  1 2072 1            TCF     TSK

0045   REF   6  LAST  999           21,2101  6 5001 0  DPADD2+   AD      NEGMAX          CAN NOT OVERFLOW
0046   REF  13  LAST  999           21,2102  55'511 1            TS      KMPAC +1
0047   REF   7  LAST 1000           21,2103  3 5001 0            CA      NEGMAX          UPPER WAS = 0
0048   REF   4  LAST 1000           21,2104  1 2072 1            TCF     TSK
```

L MYSUBS USER'S PAGE NO. 3 E6 S3

L RCS-CSM DIGITAL AUTOPILOT USER'S PAGE NO. 1 E0 S3

```
P0001   T5 INTERRUPT PROGRAM FOR THE RCS-CSM AUTOPILOT
R0002        START OF T5 INTERRUPT PROGRAM


 0003                              20,3612                    BANK    20
 0004   REF   2  LAST  735        21,2000                    SETLOC  DAPS3
 0005                              21,2105                    BANK

 0006   REF   1                                               COUNT   21/DAPRC

 0007   REF  14  LAST 1000        E6,1510                    EBANK=  KMPAC
 0008   REF  16  LAST  997        21,2105   22 016 0  REDORCS  LXCH    BANKRUPT      RESTART OF AUTOPILOT COMES HERE
 0009   REF   2  LAST  736        21,2106   3 1465 1          CA      T5PHASE       ON A T5 RUPT.
 0010                              21,2107   0 0006 1          EXTEND
 00101                             21,2110   6 2112 1          BZMF    +2            IF T5PHASE +0, -0, OR -, RESET TO -
 00102                             21,2111   1 2114 0          TCF     +3            IF T5PHASE +, LEAVE IT +.  DO A FRESHDAP
 00103  REF 104  LAST  993        21,2112   4 5017 0          CS      ONE
 00104  REF   3  LAST 1002        21,2113   55'465 0          TS      T5PHASE
 0011                              21,2114   0 0006 1          EXTEND
 0012   REF   1                   21,2115   3 2121 1          DCA     RCSLOC
 0013   REF  19  LAST  971        21,2116   53'313 0          DXCH    T5LOC         HOOK UP T5RUPT TO AUTOPILOT
 0014   REF   3  LAST  736        21,2117   1 2123 1          TCF     RCSATT +1
 0015   REF  15  LAST 1002        E6,1510                    EBANK=  KMPAC
 0016   REF   4  LAST 1002        21,2120    02122 1  RCSLOC  2CADR   RCSATT
 0016                              21,2121    42066 1


 0017   REF  17  LAST 1002        21,2122   22 016 0  RCSATT  LXCH    BANKRUPT      SAVE BB
 0018                              21,2123   0 0006 1          EXTEND                SAVE Q
 0019   REF  13  LAST  967        21,2124   22 012 1          QXCH    QRUPT
 0020   REF  40  LAST  996        21,2125   3 5001 0          CAF     BIT15         BIT15 CHAN31 = 0 IF IMU POWER IS ON AND
 0021                              21,2126   0 0006 1          EXTEND                S/C CONT SW IS IN CMC (I.E. IF G/C AUTO
 0022   REF   5  LAST  726        21,2127   02 031 1          RAND    CHAN31        PILOT IS FULLY ENABLED)
 0023                              21,2130   0 0006 1          EXTEND
 0024   REF   1                   21,2131   1 2160 0          BZF     SETT5         IF G/C AUTOPILOT IS FULLY ENABLED,
A0025                                                                               GO TO SETT5

 0026   REF  16  LAST  940        21,2132   4 1501 0          CS      RCSFLAGS      IF G/C AUTOPILOT IS NOT FULLY ENABLED,
 0027   REF  49  LAST  990        21,2133   7 5002 1          MASK    BIT14
 0028   REF  17  LAST 1002        21,2134   27'501 0          ADS     RCSFLAGS      SET NORATE FLAG,
 0029   REF  25  LAST 1000        21,2135   3 4777 1          CAF     POSMAX
 0030   REF   7  LAST  734        21,2136   55'332 0          TS      HOLDFLAG      SET HOLDFLAG +,
 00301  REF 182  LAST  999        21,2137   3 5021 1          CAF     ZERO          ZERO ERRORX, ERRORY, AND ERRORZ,
 00302  REF   5  LAST  177        21,2140   55'567 0          TS      ERRORX
 00303  REF   4  LAST  696        21,2141   55'570 0          TS      ERRORY
 00304  REF   2  LAST  109        21,2142   55'571 1          TS      ERRORZ
 0031   REF  50  LAST 1002        21,2143   3 5002 0          CAF     BIT14
 0032                              21,2144   0 0006 1          EXTEND
 0033   REF   6  LAST 1002        21,2145   02 031 1          RAND    CHAN31        AND CHECK FREE FUNCTION (BIT14 CHAN31).
 003309                            21,2146   0 0006 1          EXTEND
```

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00331  REF   2  LAST 1002   21,2147  1 2160 0          BZF     SETT5          IF IN FREE MODE, GO TO SETT5.

00332  REF   4  LAST 1002   21,2150  55'465 0          TS      T5PHASE        IF NOT IN FREE MODE,
00333  REF   1               21,2151  3 7676 1          CAF     OCT37766       SCHEDULE REINITIALIZATION (FRESHDAP)
00334  REF  15  LAST  971    21,2152  54 030 0          TS      TIME5          IN 100 MS VIA T5RUPT

00335  REF   3  LAST  734    21,2153  0 2632 1          TCR     ZEROJET        ZERO JET CHANNELS IN 14 MS VIA ZEROJET

0034   REF   1               21,2154  1 2350 1          TCF     KMATRIX
0035                         21,2155   37770 0  DELTATT  OCT     37770          80MS (TIME5)
0036                         21,2156   37776 0  DELTATT2 OCT     37776          20MS (TIME5)
0037                         21,2157   37634 1  ONESEK   DEC     16284          1 SEC(TIME5)
0038                            0005           CHAN5    EQUALS 5
0039                            0006           CHAN6    EQUALS 6
0043   REF   4  LAST  233       7671           PRIO34A  =       PRIO34
R0044             CHECK PHASE OF T5 PROGRAM

R0045        BECAUSE OF THE LENGTH OF THE T5 PROGRAM, IT HAS BEEN DIVIDED INTO
R0046   THREE PARTS, T5PHASE1, T5PHASE2, AND THE JET SELECTION LOGIC,
R0047   TO ALLOW FOR THE EXECUTION OF OTHER
R0048   INTERRUPTS.  T5PHASE IS ALSO USED IN THE INITIALIZATION OF THE AUTOPILOT
R0049   VARIABLES AT TURN ON.
R0050   THE CODING OF T5PHASE IS...
R0051             + = INITIALIZE T5 RCS-CSM AUTOPILOT
R0052   T5PHASE = +0 = PHASE2 OF THE T5 PROGRAM
R0053             -  = RESTART DAP
R0054             -0 = PHASE1 OF THE T5 PROGRAM

0055   REF   5  LAST 1003   21,2160  11'465 0  SETT5    CCS     T5PHASE
0056   REF   1               21,2161  1 2544 1          TCF     FRESHDAP       TURN ON AUTOPILOT
0057   REF   1               21,2162  1 2661 0          TCF     T5PHASE2       BRANCH TO PHASE2 OF PROGRAM
0058   REF   1               21,2163  1 2546 0          TCF     REDAP          RESTART AUTOPILOT


0059   REF   6  LAST 1003   21,2164  55'465 0          TS      T5PHASE        PHASE 1  RESET  FOR PHASE 2
0060   REF  16  LAST 1003   21,2165  3 0030 1          CA      TIME5
0061   REF   2  LAST  109   21,2166  55'634 0          TS      T5TIME         USED IN COMPENSATING FOR DELAYS IN T5
0062   REF   1               21,2167  3 2156 1          CAF     DELTATT2       RESET FOR T5RUPT IN 20MS FOR PHASE2
0063   REF  17  LAST 1003   21,2170  54 030 0          TS      TIME5          OF PROGRAM
```

```
P0064   IMU STATUS CHECK

 0065   REF  26  LAST  388   21,2171  4 1321 1           CS      IMODES33    CHECK IMU STATUS
 0066   REF  34  LAST  823   21,2172  7 5012 0           MASK    BIT6        BIT6 = 0  IMU OK
 0067   REF 216  LAST  994   21,2173  10 000 0           CCS     A           BIT6 = 1 NO IMU
 0068   REF   1              21,2174  1 2210 1           TCF     RATEFILT
 0069   REF  18  LAST 1002   21,2175  4 1501 0 FREECHK   CS      RCSFLAGS    BIT14 INDICATES THAT RATES HAVE NOT BEEN
 0070   REF  51  LAST 1002   21,2176  7 5002 1           MASK    BIT14       INITIALIZED
 0071   REF  19  LAST 1004   21,2177  27'501 0           ADS     RCSFLAGS
 0072   REF  52  LAST 1004   21,2200  3 5002 0           CAF     BIT14       NO ATTITUDE REFERENCE
 0073   REF   8  LAST 1002   21,2201  55'332 0           TS      HOLDFLAG    STOP ANY AUTOMATIC STEERING AND PREPARE
A0074                                                                       TO PICK UP CDU ANGLES UPON RESUMPTION OF
A0075                                                                       ATTITUDE HOLD
 0076                        21,2202  0 0006 1           EXTEND
 0077   REF   7  LAST 1002   21,2203  02 031 1           RAND    CHAN31      CHECK FOR FREE MODE
 0078                        21,2204  0 0006 1           EXTEND
 0079   REF   1              21,2205  1 2417 0           BZF     KRESUME1    IN FREE MODE PROVIDE FREE CONTROL ONLY
 0080   REF   1              21,2206  1 2534 0           TCF     REINIT      .....TILT.....
 0081                        21,2207   00030 1 BITS4,5   OCT     30

 0082   REF  20  LAST 1004   21,2210  3 1501 1 RATEFILT  CA      RCSFLAGS    SEE IF RATEFILTER HAS BEEN INITIALIZED
 0083   REF  53  LAST 1004   21,2211  7 5002 1           MASK    BIT14
 0084                        21,2212  0 0006 1           EXTEND                IF SO, PROCEED WITH RATE DERIVATION
 0085                        21,2213  1 2215 1           BZF     +2
 0086   REF   2  LAST 1003   21,2214  1 2350 1           TCF     KMATRIX       IF NOT, SKIP RATE DERIVATION

R0087           RATE FILTER     TIMING = 7.72MS

R0088   RATE FILTER EQUATIONS
R0089   DRHO = DELRHO - (.1)ADOT + (1 - GAIN1)DRHO
R0090                                              -1
R0091   ADOT = ADOT   + GAIN2 DRHO + KMJ DFT
R0092             -1
R0093        -       *    -    -
R0094   WHERE DELRHO = AMGB (CDU - CDU  )
R0095                              -1

 0096   REF  40  LAST  946   21,2215  3 5016 0           CAF     TWO
 0097   REF   3  LAST  112   21,2216  55'506 1 DRHOLOOP  TS      SPNDX
 0098                        21,2217  6 0000 1           DOUBLE
 0099   REF   2  LAST  108   21,2220  55'507 0           TS      DPNDX
 0100   REF   3  LAST 1004   21,2221  51'507 1           INDEX   DPNDX
 0101   REF   2  LAST  108   21,2222  4 1552 0           CS      DRHO          DRHO SCALED 180 DEGS
 0102                        21,2223  0 0006 1           EXTEND
 0103   REF   2  LAST  109   21,2224  5 1617 0           INDEX   ATTKALMN      PICK UP DESIRED FILTER GAIN
 0104   REF   1              21,2225  7 3077 0           MP      GAIN1
 0105   REF   4  LAST 1004   21,2226  51'507 1           INDEX   DPNDX
 0106   REF   3  LAST 1004   21,2227  21'553 1           DAS     DRHO          (1 -.064)DRHO
 0107                        21,2230  0 0006 1           EXTEND
```

```
0108   REF   5  LAST 1004   21,2231  5 1507 1        INDEX  DPNDX
0109   REF   6  LAST  172   21,2232  4 1534 0        DCS    ADOT
0110   REF  16  LAST 1002   21,2233  53'511 1        DXCH   KMPAC      -(.1)ADOT
0111   REF   2  LAST  285   21,2234  3 5003 1        CA     QUARTER
0112   REF   1              21,2235  0 2042 0        TC     SMALLMP
0113   REF  17  LAST 1005   21,2236  53'511 1        DXCH   KMPAC
0114   REF   6  LAST 1005   21,2237  51'507 1        INDEX  DPNDX
0115   REF   4  LAST 1004   21,2240  21'553 1        DAS    DRHO
0116   REF   4  LAST 1004   21,2241  11'506 1        CCS    SPNDX
0117   REF   1              21,2242  1 2216 1        TCF    DRHOLOOP

0118   REF  20  LAST  946   21,2243  3 0032 0        CA     CDUX       MEASURED BODY RATES--
0119   REF   2  LAST  109   21,2244  57'635 0        XCH    RHO
0120                        21,2245  0 0006 1        EXTEND
0121   REF   3  LAST 1005   21,2246  21'635 1        MSU    RHO        -       *     -     -
0122                        21,2247  4 0000 0        COM                DELRHO = AMGB (CDU - CDU  )
A0123                                                                                    -1
0124                        21,2250  22 007 0        ZL
01241  REF   2  LAST  108   21,2251  53'516 0        DXCH   DELTEMPX
0125   REF  11  LAST  971   21,2252  3 0033 1        CA     CDUY
0126   REF   2  LAST  109   21,2253  57'636 0        XCH    RHO1
0127                        21,2254  0 0006 1        EXTEND
0128   REF   3  LAST 1005   21,2255  21'636 1        MSU    RHO1
0129                        21,2256  4 0000 0        COM
0130   REF   1              21,2257  55'502 0        TS     T5TEMP     (CDUY - RHO1)    SCALED 90 DEGS
0131                        21,2260  0 0006 1        EXTEND
0132   REF   2  LAST  109   21,2261  7 1640 0        MP     AMGB1
0133   REF   3  LAST 1005   21,2262  21'516 0        DAS    DELTEMPX   DELTEMPX = (CDUX-RHO) + AMGB1(CDUY-RHO1)
A0134                                                           MUST BE DOUBLE PRECISION OR WILL LOSE
A0135                                                           PULSES
0136   REF   2  LAST  110   21,2263  3 1641 0        CA     AMGB4
0137                        21,2264  0 0006 1        EXTEND
0138   REF   2  LAST 1005   21,2265  7 1502 0        MP     T5TEMP
0139   REF   2  LAST  108   21,2266  53'520 0        DXCH   DELTEMPY
0140   REF   2  LAST  110   21,2267  3 1643 1        CA     AMGB7
0141                        21,2270  0 0006 1        EXTEND
0142   REF   3  LAST 1005   21,2271  7 1502 0        MP     T5TEMP
0143   REF   1              21,2272  53'522 1        DXCH   DELTEMPZ
0144   REF  14  LAST  971   21,2273  3 0034 0        CA     CDUZ
0145   REF   2  LAST  109   21,2274  57'637 1        XCH    RHO2
0146                        21,2275  0 0006 1        EXTEND
0147   REF   3  LAST 1005   21,2276  21'637 0        MSU    RHO2
0148                        21,2277  4 0000 0        COM
0149   REF   4  LAST 1005   21,2300  55'502 0        TS     T5TEMP     (CDUZ - RHO2)    SCALED 90 DEGS
0150                        21,2301  0 0006 1        EXTEND
0151   REF   2  LAST  110   21,2302  7 1642 1        MP     AMGB5
0152   REF   3  LAST 1005   21,2303  21'520 0        DAS    DELTEMPY   DELTEMPY =AMGB4(CDUY-RHO1)
A01521                                                                          + AMGB5(CDUZ-RHO2)
0153   REF   2  LAST  110   21,2304  3 1644 0        CA     AMGB8
0154                        21,2305  0 0006 1        EXTEND
```

```
 0155   REF   5  LAST 1005   21,2306  7 1502 0            MP      T5TEMP
 0156   REF   2  LAST 1005   21,2307  21'522 1            DAS     DELTEMPZ      DELTEMPZ =AMGB7(CDUY-RHO1)
A01561                                                                                + AMGB8(CDUZ-RHO2)
 0157   REF  41  LAST 1004   21,2310  3 5016 0            CAF     TWO
 0158   REF   5  LAST 1005   21,2311  55'506 1  ADOTLOOP  TS      SPNDX
 0159                        21,2312  6 0000 1            DOUBLE
 0160   REF   7  LAST 1005   21,2313  55'507 0            TS      DPNDX
 01601                       21,2314  0 0006 1            EXTEND
 01602  REF   8  LAST 1006   21,2315  5 1507 1            INDEX   DPNDX
 01603  REF   4  LAST 1005   21,2316  3 1516 1            DCA     DELTEMPX
 01604  REF   9  LAST 1006   21,2317  51'507 1            INDEX   DPNDX
 01605  REF   5  LAST 1005   21,2320  21'553 1            DAS     DRHO
 01606                       21,2321  0 0006 1            EXTEND
 01607  REF  10  LAST 1006   21,2322  5 1507 1            INDEX   DPNDX
 01608  REF   5  LAST 1006   21,2323  3 1516 1            DCA     DELTEMPX
 01609  REF  11  LAST 1006   21,2324  51'507 1            INDEX   DPNDX
 016091 REF   2  LAST  108   21,2325  21'542 1            DAS     MERRORX
 0161   REF  12  LAST 1006   21,2326  51'507 1            INDEX   DPNDX
 0162   REF   6  LAST 1006   21,2327  3 1552 1            CA      DRHO
 0163                        21,2330  6 0000 1            DOUBLE                N.B.
 0164                        21,2331  6 0000 1            DOUBLE                N.B.
 0165                        21,2332  0 0006 1            EXTEND
 0166   REF   3  LAST 1004   21,2333  5 1617 0            INDEX   ATTKALMN      PICK UP DESIRED FILTER GAINS
 0167   REF   1              21,2334  7 3115 0            MP      GAIN2
 0168   REF  13  LAST 1006   21,2335  51'507 1            INDEX   DPNDX         ADOT  + (.16)(.1)DRHO
 0169   REF   7  LAST 1005   21,2336  21'534 0            DAS     ADOT                -1
 0170   REF   6  LAST 1006   21,2337  51'506 0            INDEX   SPNDX         S/C TORQUE TO INERTIA RATIO
 0171   REF   3  LAST  735   21,2340  3 1620 1            CA      KMJ           SCALED (450)(1600)/(57.3)(16384)=1/1.3
 0172                        21,2341  0 0006 1            EXTEND
 0173   REF   7  LAST 1006   21,2342  5 1506 0            INDEX   SPNDX
 0174   REF   2  LAST  108   21,2343  7 1547 1            MP      DFT
 0175   REF  14  LAST 1006   21,2344  51'507 1            INDEX   DPNDX
 0176   REF   8  LAST 1006   21,2345  21'534 0            DAS     ADOT          KMJ(DFT)
 0177   REF   8  LAST 1006   21,2346  11'506 1            CCS     SPNDX
 0178   REF   1              21,2347  1 2311 1            TCF     ADOTLOOP      END CALCULATION OF VEHICLE RATES
 0179   REF   2  LAST  109   21,2350  3 1560 0  KMATRIX   CA      ATTSEC
 0180   REF   2  LAST  879   21,2351  7 5026 1            MASK    LOW4
 0181   REF 217  LAST 1004   21,2352  10 000 0            CCS     A
 0182   REF   1              21,2353  1 2361 0            TCF     TENTHSEK
 0183   REF   5  LAST 1003   21,2354  3 7671 0            CAF     PRIO34        CALL FOR 1 SEC UPDATE OF TRANSFORMATION
 0184   REF  28  LAST  875   21,2355  0 5134 1            TC      NOVAC         MATRIX FROM GIMBAL AXES TO BODY AXES
 0185   REF  18  LAST 1005   E6,1510                      EBANK=  KMPAC
 0186   REF   1              21,2356   03447 0           2CADR   AMBGUPDT
 0186   REF   1              21,2357   44066 1
 0187   REF   4  LAST  958   21,2360  3 4334 1            CAF     NINE

 0188   REF   3  LAST 1006   21,2361  55'560 1  TENTHSEK  TS      ATTSEC
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```
P0189   WHEN AUTOMATIC MANEUVERS ARE BEING PERFORMED, THE FOLLOWING ANGLE ADDITION MUST BE MADE TO PROVIDE A SMOOTH
R0191   SEQUENCE OF ANGULAR COMMANDS TO THE AUTOPILOT--

R0192           CDUXD = CDUXD + DELCDUX    (DOUBLE PRECISION)
R0193           CDUYD = CDUYD + DELCDUY    (DOUBLE PRECISION)
R0194           CDUZD = CDUZD + DELCDUZ    (DOUBLE PRECISION)

R0195   THE STEERING PROGRAMS-
R0196           1) ATTITUDE MANEUVER ROUTINE
R0198           2) LEM TRACKING

R0199   SHOULD GENERATE THE DESIRED ANGLES (CDUXD, CDUYD, CDUZD) AS WELL AS THE INCREMENTAL ANGLES (DELCDUX, DELCDUY,
R0201   DELCDUZ) SO THAT THE GIMBAL ANGLE COMMANDS CAN BE INTERPOLATED BETWEEN UPDATES.

R0203   HOLDFLAG CODING-

R0204       +  = GRAB PRESENT CDU ANGLES AND STORE IN THETADX, THETADY, THETADZ
R0205          AND PERFORM ATTITUDE HOLD ABOUT THESE ANGLES
R0206          ALSO IGNORE AUTOMATIC STEERING
R0207          SET = + BY
R0208                1) INITIALIZATION PHASE OF AUTOPILOT
R0209                2) OCCURANCE OF RHC COMMANDS
R0210                3) FREE MODE
R0211                4) SWITCH OVER TO ATTITUDE HOLD FROM AUTO
R0212                   WHILE DOING AUTOMATIC STEERING (IN THIS CASE
R021203                 HOLDFLAG IS NOT ACTUALLY SET TO +, BUT THE LOGIC
R021205                 FUNCTIONS AS IF IT WERE.)
R02121               5) S/C CONTROL SWITCH IN SCS
R02122               6) IMU POWER OFF
R0213       +0 = IN ATTITUDE HOLD ABOUT A PREVIOUSLY ESTABLISHED REFERENCE
R0214       -  = PERFORMING AUTOMATIC MANEUVER
R0215       -0 = NOT USED AT PRESENT


R0216          NOTE THAT THIS FLAG MUST BE  SET = -  BY THE STEERING PROGRAM IF IT IS TO COMMAND THE AUTOPILOT.
R0218   SINCE ASTRONAUT ACTION MAY CHANGE THE HOLDFLAG SETTING, IT SHOULD BE MONITORED BY THE STEERING PROGRAM TO
R0220   DETERMINE IF THE AUTOMATIC SEQUENCE HAS BEEN INTERRUPTED AND IF SO, TAKE APPROPRIATE ACTION.


 0222   REF   9  LAST 1004   21,2362  4 1332 0           CS      HOLDFLAG
 0223                        21,2363  0 0006 1           EXTEND
 0224   REF   1              21,2364  6 2411 1           BZMF    DACNDLS        IF HOLDFLAG +0,-0,+, BYPASS AUTOMATIC
A0225                                                                          COMMANDS
 0226   REF  42  LAST 1006   21,2365  3 5016 0  DCDUINCR CAF     TWO
 0227   REF   9  LAST 1006   21,2366  55'506 1  DELOOP   TS      SPNDX
 0228                        21,2367  6 0000 1           DOUBLE
 0229   REF  15  LAST 1006   21,2370  55'507 0           TS      DPNDX
 0230                        21,2371  0 0006 1           EXTEND
 0231   REF 218  LAST 1006   21,2372  5 0000 1           INDEX   A
 0232   REF   9  LAST  595   21,2373  3 1647 0           DCA     CDUXD
```

```
0233   REF  19  LAST 1006   21,2374  53'511 1        DXCH   KMPAC
0234                        21,2375  0 0006 1        EXTEND
0235   REF  16  LAST 1007   21,2376  5 1507 1        INDEX  DPNDX
0236   REF   6  LAST  595   21,2377  3 1576 1        DCA    DELCDUX
0237   REF   1              21,2400  0 2054 1        TC     DPADD
0238                        21,2401  0 0006 1        EXTEND
0239   REF  20  LAST 1008   21,2402  3 1511 0        DCA    KMPAC
0240   REF  10  LAST 1007   21,2403  51'506 0        INDEX  SPNDX
0241   REF   5  LAST  687   21,2404  55'572 1        TS     THETADX
0242   REF  17  LAST 1008   21,2405  51'507 1        INDEX  DPNDX
0243   REF  10  LAST 1007   21,2406  53'647 1        DXCH   CDUXD
0244   REF  11  LAST 1008   21,2407  11'506 1        CCS    SPNDX
0245   REF   1              21,2410  1 2366 1        TCF    DELODP
```

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P0246 RCS-CSM AUTOPILOT ATTITUDE ERROR DISPLAY

R0247 THREE TYPES OF ATTITUDE ERRORS MAY BE DISPLAYED ON THE FDAI-

R0248 MODE 1) AUTOPILOT FOLLOWING ERRORS SELECTED BY V61E
R0250 GENERATED INTERNALLY BY THE AUTOPILOT

R0251 MODE 2) TOTAL ATTITUDE ERRORS SELECTED BY V62E
R0253 WITH RESPECT TO THE CONTENTS OF N22

R02531 MODE 3) TOTAL ASTRONAUT ATTITUDE ERRORS SELECTED BY V63E
R02533 WITH RESPECT TO THE CONTENTS OF N17

R0254 MODE 1 IS PROVIDED AS A MONITOR OF THE RCS DAP AND ITS ABILITY TO TRACK AUTOMATIC STEERING COMMANDS. IN THIS
R0256 MODE THE ATTITUDE ERRORS WILL BE ZEROED WHEN THE CMC MODE SWITCH IS IN FREE

R0259 MODE 2 IS PROVIDED TO ASSIST THE CREW IN MANUALLY MANEUVERING THE S/C TO THE ATTITUDE (GIMBAL ANGLES) SPECIFIED
R0261 IN N22. THE ATTITUDE ERRORS WRT THESE ANGLES AND THE CURRENT CDU ANGLES ARE RESOLVED INTO S/C CONTROL AXES
R0263 AS A FLY-TO INDICATOR.

R02631 MODE 3 IS PROVIDED TO ASSIST THE CREW IN MANUALLY MANEUVERING THE S/C TO THE ATTITUDE (GIMBAL ANGLES) SPECIFIED
R02633 IN N17. THE ATTITUDE ERRORS WRT THESE ANGLES AND THE CURRENT CDU ANGLES ARE RESOLVED INTO S/C CONTROL AXES
R02635 AS A FLY-TO INDICATOR.

R0264 V60 IS PROVIDED TO LOAD N17 WITH A SNAPSHOT OF THE CURRENT CDU ANGLES. THUS SYNCHRONIZING THE MODE 3 DISPLAY
R0266 WITH THE CURRENT S/C ATTITUDE. THIS VERB MAY BE USED AT ANY TIME.

R0269 THESE DISPLAYS WILL BE AVAILIABLE IN ANY MODE (AUTO, HOLD, FREE, G+N, OR SCS) ONCE THE RCS DAP HAS BEEN
R0271 INITIATED VIA V46E. MODE 1, HOWEVER, WILL BE MEANINGFUL ONLY IN G+N AUTO OR HOLD. THE CREW MAY PRESET (VIA
R0273 V25N17) AN ATTITUDE REFERENCE (DESIRED GIMBAL ANGLES) INTO N17 AT ANY TIME.

```
 0278   REF  21  LAST 1004   21,2411  4 1501 0  DACNDLS  CS      RCSFLAGS        ALTERNATE  BETWEEN FDAIDSP1 AND FDAIDSP2
 0279   REF  29  LAST  745   21,2412  7 5014 0            MASK    BIT4
 0280                        21,2413  0 0006 1            EXTEND
 0281   REF   1              21,2414  1 3160 1            BZF     FDAIDSP2

 0282   REF  22  LAST 1009   21,2415  27'501 0  FDAIDSP1  ADS     RCSFLAGS
 0283   REF   8  LAST  946   21,2416  0 2420 0            TC      NEEDLER
 0284   REF  33  LAST  969   21,2417  1 5333 0  KRESUME1  TCF     RESUME          END PHASE 1
```

P0285 FDAI ATTITUDE ERROR DISPLAY SUBROUTINE

R0286 PROGRAM DESCRIPTION: D. KEENE 5/24/67

R0287 THIS SUBROUTINE IS USED TO DISPLAY ATTITUDE ERRORS ON THE FDAI VIA THE DIGITAL TO ANALOG CONVERTERS (DACS)
R0289 IN THE CDUS. CARE IS TAKEN TO METER OUT THE APPROPRIATE NUMBER OF PULSES TO THE IMU ERROR COUNTERS AND PREVENT
R0291 OVERFLOW, TO CONTROL THE RELAY SEQUENCING, AND TO AVOID INTERFERENCE WITH THE COARSE ALIGN LOOP WHICH ALSO USES
R0293 THE DACS.

R0294 CALLING SEQUENCE:

R0295 DURING THE INITIALIZATION SECTION OF THE USER'S PROGRAM, BIT3 OF RCSFLAGS SHOULD BE SET TO INITIATE THE
R0297 TURN-ON SEQUENCE WITHIN THE NEEDLES PROGRAM:

```
R0298           CS      RCSFLAGS        IN EBANK6
R0299           MASK    BIT3
R0300           ADS     RCSFLAGS
```

R0301 THEREAFTER, THE ATTITUDE ERRORS GENERATED BY THE USER SHOULD BE TRANSFERED TO THE FOLLOWING LOCATIONS IN EBANK6:

```
R0303           AK      SCALED 180 DEGREES  NOTE: THESE LOCATIONS ARE SUBJECT
R0304           AK1     SCALED 180 DEGREES        TO CHANGE
R0305           AK2     SCALED 180 DEGREES
```

R0306 FULL SCALED DEFLECTION CORRESPONDS TO 16 7/8 DEGREES OF ATTITUDE ERROR
R0307 (= 384 BITS IN IMU ERROR COUNTER)

R0308 A CALL TO NEEDLER WILL THEN UPDATE THE DISPLAY:

```
R0309           INHINT
R0310           TC      IBNKCALL        NOTE: EBANK SHOULD BE SET TO E6
R0311           CADR    NEEDLER
R0312           RELINT
```

R0313 THIS PROCESS SHOULD BE REPEATED EACH TIME THE ERRORS ARE UPDATED. AT LEAST 3 PASSES THRU THE PROGRAM ARE
R0315 REQUIRED BEFORE ANYTHING IS ACTUALLY DISPLAYED ON THE ERROR METERS.
R0316 NOTE: EACH CALL TO NEEDLER MUST BE SEPARATED BY AT LEAST 50MS TO ASSURE PROPER RELAY SEQUENCING.

R0318 ERASABLE USED:

```
R0319                           AK          CDUXCMD
R0320                           AK1         CDUYCMD
R0321                           AK2         CDUZCMD
R0322                           EDRIVEX     A,L,Q
R0323                           EDRIVEY     T5TEMP
R0324                           EDRIVEZ     SPNDX
```

R0325 SWITCHES: RCSFLAGS BITS 3,2

R0326 I/O CHANNELS: CHAN12 BIT 4 (COARSE ALIGN - READ ONLY)

```
R0327                          CHAN12     BIT 6 (IMU ERROR COUNTER ENABLE)
R0328                          CHAN14     BIT 13,14,15 (DAC ACTIVITY)

R0329   SIGN CONVENTION<      AK = THETAC - THETA
R0330                WHERE     THETAC = COMMAND ANGLE
R0331                          THETA  = PRESENT ANGLE

 0332   REF  30  LAST 1009    21,2420  3 5014 1  NEEDLER  CAF     BIT4          CHECK FOR COARSE ALIGN ENABLE
 0333                         21,2421  0 0006 1           EXTEND                IF IN COARSE ALIGN DO NOT USE IMU
 0334   REF  35  LAST  958    21,2422  02 012 0           RAND    CHAN12        ERROR COUNTERS. DONT USE NEEDLES
 0335                         21,2423  0 0006 1           EXTEND
 0336   REF   1               21,2424  1 2431 1           BZF     NEEDLER1
 0337   REF  23  LAST 1009    21,2425  4 1501 0           CS      RCSFLAGS      SET BIT3 FOR INITIALIZATION PASS
 0338   REF  29  LAST  998    21,2426  7 5015 1           MASK    BIT3
 0339   REF  24  LAST 1011    21,2427  27'501 0           ADS     RCSFLAGS
 0340   REF 195  LAST  999    21,2430  0 0002 0           TC      Q

 0341   REF  25  LAST 1011    21,2431  3 1501 1  NEEDLER1 CA      RCSFLAGS
 0342   REF  27  LAST  947    21,2432  7 6211 1           MASK    SIX
 0343                         21,2433  0 0006 1           EXTEND
 0344   REF   1               21,2434  1 2471 0           BZF     NEEDLES3
 0345   REF  30  LAST 1011    21,2435  7 5015 1           MASK    BIT3
 0346                         21,2436  0 0006 1           EXTEND
 0347   REF   2  LAST  249    21,2437  1 2462 1           BZF     NEEDLER2      BIT3 = 0, BIT2 = 1

 0348   REF  35  LAST 1004    21,2440  4 5012 0           CS      BIT6          FIRST PASS BIT3 = 1
 0349                         21,2441  0 0006 1           EXTEND                DISABLE IMU ERROR COUNTER TO ZERO DACS
 0350   REF  36  LAST 1011    21,2442  03 012 1           WAND    CHAN12        MUST WAIT AT LEAST 60 MS BEFORE
 0351   REF 183  LAST 1002    21,2443  4 5021 0  NEEDLE11 CS      ZERO          ENABLING COUNTERS.
 0352   REF  17  LAST  946    21,2444  55'476 1           TS      AK            ZERO THE INPUTS ON FIRST PASS
 0353   REF   6  LAST  966    21,2445  55'477 0           TS      AK1
 0354   REF   6  LAST  970    21,2446  55'500 1           TS      AK2
 0355   REF   2  LAST  115    21,2447  55'503 1           TS      EDRIVEX       ZERO THE DISPLAY REGISTERS
 0356   REF   2  LAST  115    21,2450  55'504 0           TS      EDRIVEY
 0357   REF   2  LAST  115    21,2451  55'505 1           TS      EDRIVEZ
 0358   REF   2  LAST  152    21,2452  54 050 0           TS      CDUXCMD       ZERO THE OUT COUNTERS
 0359   REF   2  LAST  152    21,2453  54 051 1           TS      CDUYCMD
 0360   REF   2  LAST  152    21,2454  54 052 1           TS      CDUZCMD
 0361   REF  28  LAST 1011    21,2455  4 6211 1           CS      SIX           RESET RCSFLAGS FOR PASS2
 0362   REF  26  LAST 1011    21,2456  7 1501 0           MASK    RCSFLAGS
 0363   REF  44  LAST  995    21,2457  6 5016 0           AD      BIT2
 0364   REF  27  LAST 1011    21,2460  55'501 0           TS      RCSFLAGS
 0365   REF 196  LAST 1011    21,2461  0 0002 0           TC      Q             END PASS1

 0366   REF  36  LAST 1011    21,2462  3 5012 1  NEEDLER2 CAF     BIT6          ENABLE IMU ERROR COUNTERS
 0367                         21,2463  0 0006 1           EXTEND
 0368   REF  37  LAST 1011    21,2464  05 012 1           WOR     CHAN12
 0369   REF  29  LAST 1011    21,2465  4 6211 1           CS      SIX           RESET RCSFLAGS TO DISPLAY ATTITUDE
```

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```
0370   REF  28  LAST 1011   21,2466  7 1501 0          MASK   RCSFLAGS      ERRORS    WAIT ATLEAST 4 MS FOR
0371   REF  29  LAST 1012   21,2467  55'501 0          TS     RCSFLAGS      RELAY CLOSURE
0372   REF 197  LAST 1011   21,2470  0 0002 0          TC     Q

0373   REF  37  LAST 1011   21,2471  3 5012 1  NEEDLES3 CAF    BIT6          CHECK TO SEE IF IMU ERROR COUNTER
0374                        21,2472  0 0006 1          EXTEND                 IS ENABLED
0375   REF  38  LAST 1011   21,2473  02 012 0          RAND   CHAN12
0376                        21,2474  0 0006 1          EXTEND                 IF NOT RECYCLE NEEDLES
0377   REF   9  LAST 1009   21,2475  1 2425 1          BZF    NEEDLER +5

0378   REF  43  LAST 1007   21,2476  3 5016 0  NEEDLES CAF    TWO
0379   REF  12  LAST 1008   21,2477  55'506 1  DACLOOP TS     SPNDX
0380   REF   3  LAST 1005   21,2500  4 5003 0          CS     QUARTER
0381                        21,2501  0 0006 1          EXTEND
0382   REF  13  LAST 1012   21,2502  5 1506 0          INDEX  SPNDX
0383   REF  18  LAST 1011   21,2503  7 1476 1          MP     AK
0384   REF  83  LAST  992   21,2504  54 001 1          TS     L
0385   REF 219  LAST 1007   21,2505  10 000 0          CCS    A
0386   REF   1              21,2506  3 2542 0          CA     DACLIMIT
0387                        21,2507  1 2511 1          TCF    +2
0388   REF   2  LAST 1012   21,2510  4 2542 1          CS     DACLIMIT
0389   REF  84  LAST 1012   21,2511  6 0001 0          AD     L
0390   REF   6  LAST 1006   21,2512  55'502 0          TS     TSTEMP         OVFLO CHK
0391                        21,2513  1 2517 1          TCF    +4
0392   REF 220  LAST 1012   21,2514  50 000 1          INDEX  A              ON OVERFLOW LIMIT OUTPUT TO +-384
0393   REF   3  LAST 1012   21,2515  3 2542 0          CAF    DACLIMIT
0394   REF  85  LAST 1012   21,2516  54 001 1          TS     L
0395   REF  14  LAST 1012   21,2517  51'506 0          INDEX  SPNDX
0396   REF   3  LAST 1011   21,2520  4 1503 1          CS     EDRIVEX        CURRENT VALUE OF DAC
0397   REF  86  LAST 1012   21,2521  6 0001 0          AD     L
0398   REF  15  LAST 1012   21,2522  51'506 0          INDEX  SPNDX
0399   REF   3  LAST 1011   21,2523  26 050 0          ADS    CDUXCMD
0400   REF  16  LAST 1012   21,2524  51'506 0          INDEX  SPNDX
0401   REF   4  LAST 1012   21,2525  23'503 0          LXCH   EDRIVEX
0402   REF  17  LAST 1012   21,2526  11'506 1          CCS    SPNDX
0403   REF   1              21,2527  1 2477 0          TCF    DACLOOP
0404   REF   5  LAST  597   21,2530  3 7707 0          CAF    13,14,15
0405                        21,2531  0 0006 1          EXTEND
0406   REF  11  LAST  982   21,2532  05 014 1          WOR    CHAN14         SET DAC ACTIVITY BITS
0407   REF 198  LAST 1012   21,2533  0 0002 0          TC     Q

0408   REF   1              21,2534  3 2540 1  REINIT  CAF    DELAY200       ........TILT LOGIC
0409   REF  18  LAST 1003   21,2535  54 030 0          TS     TIME5          REINITIALIZE DAP IN 200MS
0410   REF   7  LAST 1003   21,2536  55'465 0          TS     T5PHASE
0411   REF  34  LAST 1009   21,2537  1 5333 0          TCF    RESUME
0412                        21,2540   37754 0 DELAY200 DEC    16364          200MS

0413                        21,2541   77177 0          DEC    -384
```

```
0414                    21,2542   37200 1  DACLIMIT DEC    16000
0415                    21,2543   00600 1            DEC      384
```

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P0416 INITIALIZATION PROGRAM FOR RCS-CSM AUTOPILOT

R0417 THE FOLLOWING QUANTITIES WILL BE ZEROED AND SHOULD APPEAR IN CONSECUTIVE LOCATIONS IN MEMORY AFTER WBODY

R0419	WBODY	(+1)	DFT		TAU2
R0420	WBODY1	(+1)	DFT1		BIAS
R0421	WBODY2	(+1)	DFT2		BIAS1
R0422	ADOT	(+1)	DRHO	(+1)	BIAS2
R0423	ADOT1	(+1)	DRHO1	(+1)	ERRORX
R0424	ADOT2	(+1)	DRHO2	(+1)	ERRORY
R0425	MERRORX	(+1)	ATTSEC		ERRORZ
R0426	MERRORY	(+1)	TAU		
R0427	MERRORZ	(+1)	TAU1		

```
 0428   REF 105  LAST 1002   21,2544  3 5017 1  FRESHDAP CAF    ONE          RESET HOLDFLAG TO STOP AUTOMATIC
 0429   REF  10  LAST 1007   21,2545  55'332 0            TS     HOLDFLAG     STEERING AND PREPARE TO PICK UP AN
A0430                                                                       ATTITUDE HOLD REFERENCE

 0431   REF  37  LAST  959   21,2546  0 4740 0  REDAP     TC     IBNKCALL     DECODE DAPDATR1, DAPDATR2 FOR DEADBANDS
 0432   REF   2  LAST  253   21,2547   40347 0            CADR   S41.2        RATES, QUADFAILS, QUAD MANAGEMENT

 0433   REF  38  LAST 1014   21,2550  0 4740 0           TC     IBNKCALL     DECODE IXX, IAVG AND CONVERT
 0434   REF   2  LAST  254   21,2551   40500 0           CADR   S40.14       TO AUTOPILOT GAINS

 0436   REF   1              21,2552  3 2623 1           CAF    NO.T5VAR     NO. LOCATIONS TO BE ZEROED MINUS ONE
 0437   REF  18  LAST 1012   21,2553  55'506 1  ZEROT5   TS     SPNDX        ZERO ALL NECESSARY ERASABLE REGISTERS
 0438   REF 184  LAST 1011   21,2554  3 5021 1           CAF    ZERO
 0439   REF  19  LAST 1014   21,2555  51'506 0           INDEX  SPNDX
 0440   REF  10  LAST  595   21,2556  55'525 0           TS     WBODY
 0441   REF  20  LAST 1014   21,2557  11'506 1           CCS    SPNDX
 0442   REF   1              21,2560  1 2553 1           TCF    ZEROT5
 0443   REF   4  LAST 1003   21,2561  0 2632 1           TCR    ZEROJET

 0444   REF 185  LAST 1014   21,2562  4 5021 0           CS     ZERO
 0445   REF   2  LAST  109   21,2563  55'633 1           TS     CHANTEMP     INITIALIZE MINIMUM IMPULSE CONTROL

 04451  REF   2  LAST  109   21,2564  55'632 0           TS     CH3ITEMP     INITIALIZE RHC POSITION MEMORY FOR
A04452                                                                      MANUAL RATE MODES
 0446   REF   1              21,2565  3 2624 0           CAF    =.24
 0447   REF   2  LAST  110   21,2566  55'654 0           TS     SLOPE        INITIALIZE SWITCHING LOGIC SLOPE

 0448   REF  11  LAST  947   21,2567  3 5015 0           CAF    FOUR
 0449   REF   3  LAST 1003   21,2570  55'634 0           TS     T5TIME       PHASE 0 RESETS FOR PHASE 2 INTERRUPT IN
A0450                                                                       60MS. PHASE 2 RESETS FOR PHASE 1 RUPT
A04501                                                                      IN (80MS - T5TIME(40MS)). THEREFORE
A04502                                                                      PHASE 1 (RATEFILTER) BEGINS CYCLING 100
A04503                                                                      MS FROM NOW AND EVERY 100MS THEREAFTER

 0451   REF   6  LAST  830   21,2571  3 5024 1           CAF    ELEVEN
 0452   REF   4  LAST 1006   21,2572  55'617 1           TS     ATTKALMN     RESET TO PICK UP KALMAN FILTER GAINS
A0453                                                                       TO INITIALIZE THE S/C ANGULAR RATES
```

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```
 0473   REF  21  LAST 1005   21,2573  3 0032 0          CA      CDUX
 0474   REF   4  LAST 1005   21,2574  55'635 1          TS      RHO
 0475   REF  12  LAST 1005   21,2575  3 0033 1          CA      CDUY
 0476   REF   4  LAST 1005   21,2576  55'636 1          TS      RHO1
 0477   REF  15  LAST 1005   21,2577  3 0034 0          CA      CDUZ
 0478   REF   4  LAST 1005   21,2600  55'637 0          TS      RHO2
 0479   REF 186  LAST 1014   21,2601  3 5021 1          CAF     ZERO        RESET AUTOPILOT TO BEGIN EXECUTING
 0480   REF   8  LAST 1012   21,2602  55'465 0          TS      T5PHASE     PHASE2 OF PROGRAM

 0481   REF  27  LAST 1004   21,2603  4 1321 1          CS      IMODES33    CHECK IMU STATUS
 0482   REF  38  LAST 1012   21,2604  7 5012 0          MASK    BIT6        IF BIT6 = 0 IMU IN FINE ALIGN
 0483   REF 221  LAST 1012   21,2605  10 000 0          CCS     A           IF BIT6 = 1 IMU NOT READY
 0484   REF   1               21,2606  1 2612 1          TCF     IMUAOK
 0485   REF   5  LAST 1014   21,2607  55'617 1          TS      ATTKALMN    CANNOT USE IMU
 0486   REF   1               21,2610  3 2626 1          CAF     RCSINITB    PROVIDE FREE CONTROL ONLY
 0487   REF   1               21,2611  1 2617 1          TCF     RCSSWIT     DONT START UP RATE FILTER
A0488                                                                       SIGNAL NO RATE FILTER

 0489   REF   6  LAST 1006   21,2612  3 7671 0  IMUAOK  CAF     PRIO34      START MATRIX INITIALIZATION
 0490   REF  29  LAST 1006   21,2613  0 5134 1          TC      NOVAC       BYPASS IF IMU NOT IN FINE ALIGN
 0491   REF  21  LAST 1008   E6,1510                     EBANK=  KMPAC
 0492   REF   2  LAST 1006   21,2614    03447 0          2CADR   AMBGUPDT
 0492                        21,2615    44066 1
 0493   REF   1               21,2616  3 2625 1          CAF     RCSINIT     CLEAR BIT14 -ASSUME WE HAVE A GOOD IMU
 0494   REF  30  LAST 1012   21,2617  55'501 0  RCSSWIT  TS      RCSFLAGS    CLEAR BIT1  -INITIALIZE T6 PROGRAM
A0495                                                                         SET BIT3  -INITIALIZE NEEDLES
A0496                                                                       CLEAR BIT4  -RESET FOR FDAIDSPI
 0497   REF   1               21,2620  3 2627 0          CAF     T5WAIT60    NEXT T5RUPT 60 MS FROM NOW TO ALLOW IMU
A0498                                                                       ERROR COUNTER TO ZERO.
A0499                                                                       (MINIMUM DELAY = 15 MS)
 0500   REF  19  LAST 1012   21,2621  54 030 0          TS      TIME5       SINCE ATTKALMN IS +11, PROGRAM WILL THEN
 0501   REF  35  LAST 1012   21,2622  0 5333 1          TC      RESUME      PICK UP THE KALMAN FILTER GAINS. RATE
A0502                                                                       FILTER WILL BEGIN OPERATING ZOOMS FROM
A0503                                                                       NOW

R0504   CONSTANTS USED IN INITIALIZATION PROGRAM

 0505                        21,2623    00044 1  NO.T5VAR DEC     36
 0506                        21,2624    07534 1  =.24     DEC     .24         = SLOPE OF 0.6/SEC
 0507                        21,2625    00004 0  RCSINIT  OCT     00004
 0508                        21,2626    20004 1  RCSINITB OCT     20004
 0509                        21,2627    37772 1  T5WAIT60 DEC     16378       = 6 CS
 0510   REF  22  LAST 1015   E6,1510                     EBANK=  KMPAC
 0511   REF   1               21,2630    03617 1  T6ADDR   2CADR  T6START
 0511   REF   1               21,2631    36066 1

053001 REF   7  LAST 1014   21,2632  3 5024 1  ZEROJET  CAF     ELEVEN      ZERO  BLAST2, BLAST1, BLAST, YWORD2,
053002 REF  21  LAST 1014   21,2633  55'506 1            TS      SPNDX       YWORD1, PWORD2, PWORD1, RWORD2,
053003 REF 187  LAST 1015   21,2634  3 5021 1            CAF     ZERO        AND RWORD1.
```

```
053004 REF  22  LAST 1015   21,2635  51'506 0            INDEX   SPNDX
053005 REF   2  LAST  103   21,2636  55'451 1            TS      RWORD1
053006 REF  23  LAST 1016   21,2637  11'506 1            CCS     SPNDX
053007 REF   5  LAST 1014   21,2640  1 2633 1            TCF     ZEROJET +1

053008 REF  12  LAST 1014   21,2641  3 5015 0            CAF     FOUR
053009 REF   2  LAST  103   21,2642  55'462 1            TS      BLAST1 +1
05301  REF   8  LAST 1015   21,2643  3 5024 1            CAF     ELEVEN
0531   REF   2  LAST  103   21,2644  55'464 1            TS      BLAST2 +1

0532   REF  68  LAST  995   21,2645  4 5017 0            CS      BIT1
0533   REF  31  LAST 1015   21,2646  7 1501 0            MASK    RCSFLAGS
0534   REF  32  LAST 1016   21,2647  55'501 0            TS      RCSFLAGS        RESET BIT1 OF RCSFLAGS TO 0

0535                        21,2650  0 0006 1            EXTEND
0536   REF   1              21,2651  3 2631 1            DCA     T6ADDR
0537   REF   3  LAST  995   21,2652  53'311 1            DXCH    T6LOC
0538   REF   1              21,2653  3 3050 1            CAF     =+14MS          ENABLE T6RUPT TO SHUT OFF JETS IN 14 MS.
0539   REF   3  LAST  995   21,2654  54 031 1            TS      TIME6
0540   REF  41  LAST 1002   21,2655  3 5001 0            CAF     BIT15
0541                        21,2656  0 0006 1            EXTEND
0542   REF   9  LAST  996   21,2657  05 013 0            WOR     CHAN13

0543   REF 199  LAST 1012   21,2660  0 0002 0            TC      Q

0544   REF   6  LAST 1015   21,2661  11'617 1 T5PHASE2   CCS     ATTKALMN        IF (+) INITIALIZE RATE ESTIMATE
0545   REF   1              21,2662  1 3146 0            TCF     KALUPDT

0546                        21,2663  1 2665 1            TCF     +2              ONLY IF ATTKALMN POSITIVE
0547                        21,2664  1 2665 1            TCF     +1
0548   REF   2  LAST 1003   21,2665  3 2156 1            CA      DELTATT2        RESET FOR PHASE3 IN 20 MS
0549   REF  20  LAST 1015   21,2666  56 030 1            XCH     TIME5           (JET SELECTION LOGIC )
0550   REF   4  LAST 1014   21,2667  27'634 0            ADS     T5TIME          TO COMPENSATE FOR DELAYS IN T5RUPT

05501  REF  33  LAST 1016   21,2670  3 1501 1            CA      RCSFLAGS        IF A HIGH RATE AUTO MANEUVER IS IN
05502  REF  42  LAST 1016   21,2671  7 5001 1            MASK    BIT15           PROGRESS (BIT 15 OF RCSFLAGS SET), SET
05503                        21,2672  0 0006 1            EXTEND                  ATTKALMN TO -1
05504  REF   1              21,2673  1 2675 0            BZF     NOHIAUTO        OTHERWISE SET ATTKALMN TO 0.
05505  REF 106  LAST 1014   21,2674  4 5017 0            CS      ONE
05506  REF   7  LAST 1016   21,2675  55'617 1 NOHIAUTO   TS      ATTKALMN
```

L RCS-CSM DIGITAL AUTOPILOT USER'S PAGE NO. 16 E6 S3

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P0551                  MANUAL ROTATION COMMANDS
 0552   REF   1                  21,2676  4 3032 1          CS      OCT01760        RESET FORCED FIRING BITS (BITS 10 TO 5
 0553   REF  34  LAST 1016       21,2677  7 1501 0          MASK    RCSFLAGS        OF RCSFLAGS) TO ZERO
 0554   REF  35  LAST 1017       21,2700  55'501 0          TS      RCSFLAGS

 0555                            21,2701  0 0006 1          EXTEND
 0556   REF   8  LAST 1004       21,2702  00 031 0          READ    CHAN31
 0557   REF  87  LAST 1012       21,2703  54 001 1          TS      L
 0558   REF   3  LAST 1014       21,2704  3 1632 1          CA      CH31TEMP
 0559                            21,2705  0 0006 1          EXTEND
 0560   REF  10  LAST  188       21,2706  06 001 0          RXOR    LCHAN
 0561   REF   1                  21,2707  7 3036 0          MASK    MANROT          = OCT00077
 0562                            21,2710  0 0006 1          EXTEND
 0563   REF   1                  21,2711  6 2724 1          BZMF    NOCHANGE

 0564   REF 222  LAST 1015       21,2712  22 000 1          LXCH    A
 0565   REF   4  LAST 1017       21,2713  55'632 0          TS      CH31TEMP        SAVE CONTENTS OF CHANNEL 31 IN CH31TEMP

 0566   REF  88  LAST 1017       21,2714  3 0001 0          CA      L
 0567                            21,2715  0 0006 1          EXTEND
 0568   REF  30  LAST  989       21,2716  7 5013 1          MP      BIT5            PUT BITS 6-1 OF A IN BITS 10-5 OF L
 0569   REF  89  LAST 1017       21,2717  3 0001 0          CA      L
 0570   REF  36  LAST 1017       21,2720  27'501 0          ADS     RCSFLAGS        SET FORCED FIRING BITS FOR AXES WITH
A0571                                                                               WITH CHANGES IN COMMAND. BITS 10,9 FOR
A0572                                                                               ROLL, BITS 8,7 FOR YAW, BITS 6,5 FOR
A0573                                                                               PITCH

 0574   REF  37  LAST 1017       21,2721  4 1501 0          CS      RCSFLAGS        SET RATE DAMPING FLAGS (BITS 13,12,AND
 0575   REF   1                  21,2722  7 3037 1          MASK    OCT16000        11 OF RCSFLAGS)
 0576   REF  38  LAST 1017       21,2723  27'501 0          ADS     RCSFLAGS

 0577   REF   5  LAST 1017       21,2724  4 1632 0 NOCHANGE CS      CH31TEMP
 0578   REF   2  LAST 1017       21,2725  7 3036 0          MASK    MANROT
 0579                            21,2726  0 0006 1          EXTEND
 0580   REF   1                  21,2727  6 3250 0          BZMF    AHFNOROT        IF NO MANUAL COMMANDS, GO TO AHFNOROT

 0581   REF  11  LAST 1014       21,2730  55'332 0          TS      HOLDFLAG        SET HOLDFLAG +

 0582   REF   2  LAST  550       21,2731  0 3130 0          TC      STICKCHK        WHEN THE RHC IS OUT OF DETENT, PMANNDX,
A0583                                                                               YMANNDX, AND RMANNDX ARE ALL SET, BY
A0584                                                                               MEANS OF STICKCHK, TO 0, 1, OR 2 FOR NO,
A0585                                                                               +, OR - ROTATION RESPECTIVELY AS
A0586                                                                               COMMANDED BY THE RHC.

A0587                                                                               HOWEVER, IT IS WELL TO NOTE THAT AFTER
A0588                                                                               THE RHC IS RETURNED TO DETENT, THE
A0589                                                                               PROGRAM BRANCHES TO AHFNOROT AND AVOIDS
A0590                                                                               STICKCHK SO PMANNDX, YMANNDX, AND
A0591                                                                               RMANNDX ARE NOT RESET TO ZERO BUT RATHER
A0592                                                                               LEFT SET TO THEIR LAST OUT OF DETENT
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A0593                                                                   VALUES.

 0594   REF  26  LAST  825   21,2732  4 0075 1          CS      FLAGWRD1  SET STIKFLAG TO INFORM STEERING
 0595   REF  54  LAST 1004   21,2733  7 5002 1          MASK    BIT14     PROGRAMS (P20) THAT ASTRONAUT HAS
 0596   REF  27  LAST 1018   21,2734  26 075 1          ADS     FLAGWRD1  ASSUMED ROTATIONAL CONTROL OF SPACECRAFT

 0597   REF  55  LAST 1018   21,2735  3 5002 0          CAF     BIT14
 0598                        21,2736  0 0006 1          EXTEND
 0599   REF   9  LAST 1017   21,2737  02 031 1          RAND    CHAN31
 0600                        21,2740  0 0006 1          EXTEND
 0601   REF   1              21,2741  6 3051 0          BZMF    FREEFUNC

 0602   REF  39  LAST 1017   21,2742  3 1501 1          CA      RCSFLAGS  EXAMINE RCSFLAGS TO SEE IF RATE FILTER
 0603   REF  56  LAST 1018   21,2743  7 5002 1          MASK    BIT14     HAS BEEN INITIALIZED
 0604   REF 223  LAST 1017   21,2744  10 000 0          CCS     A         IF SO, PROCEED WITH MANUAL RATE COMMANDS
 0605   REF   2  LAST 1004   21,2745  1 2534 0          TCF     REINIT    .....TILT, RECYCLE TO INITIALIZE FILTER

 0606   REF  22  LAST  998   21,2746  4 5022 0          CS      FIVE      IF MANUAL MANEUVER IS AT HIGH RATE, SET
 0607   REF   5  LAST  732   21,2747  6 1130 1          AD      RATEINDX  ATTKALMN TO -1.
 0608                        21,2750  0 0006 1          EXTEND            OTHERWISE, LEAVE ATTKALMN ALONE.
 0609                        21,2751  6 2754 0          BZMF    +3
 0610   REF 107  LAST 1016   21,2752  4 5017 0          CS      ONE
 0611   REF   8  LAST 1016   21,2753  55'617 1          TS      ATTKALMN

 0614   REF  44  LAST 1012   21,2754  3 5016 0          CAF     TWO       AUTO-HOLD MANUAL ROTATION
 0615   REF  24  LAST 1016   21,2755  55'506 1 SETWBODY TS      SPNDX
 0616                        21,2756  6 0000 1          DOUBLE
 0617   REF  18  LAST 1008   21,2757  55'507 0          TS      DPNDX
 0618   REF  25  LAST 1018   21,2760  51'506 0          INDEX   SPNDX     RMANNDX = 0 NO ROTATION
 0619   REF   3  LAST  550   21,2761  3 1656 0          CA      RMANNDX           = 1  + ROTATION
 0620                        21,2762  0 0006 1          EXTEND            = 2  - ROTATION
 0621   REF   1              21,2763  1 3005 0          BZF     NORATE    IF NO ROTATION COMMAND ON THIS AXIS,
A0622                                                                   GO TO NORATE.

 0623   REF   6  LAST 1018   21,2764  6 1130 1          AD      RATEINDX  RATEINDX = 0  0.05 DEG/SEC
 0624   REF 200  LAST 1016   21,2765  54 002 1          TS      Q                  = 2  0.2 DEG/SEC
 0625   REF 201  LAST 1018   21,2766  50 002 0          INDEX   Q                  = 4  0.5 DEG/SEC
 0626   REF   1              21,2767  3 3037 0          CA      MANTABLE -1        = 6  2.0 DEG/SEC
 0627                        21,2770  0 0006 1          EXTEND
 0628   REF  29  LAST  829   21,2771  7 5007 1          MP      BIT9      MULTIPLY MANTABLE BY 2 TO THE -6
 0629   REF  19  LAST 1018   21,2772  51'507 1          INDEX   DPNDX     TO GET COMMANDED RATE.
 0630   REF  11  LAST 1014   21,2773  53'526 0          DXCH    WBODY     SET WBODY TO COMMANDED RATE.

 0631   REF  40  LAST 1018   21,2774  3 1501 1          CA      RCSFLAGS
 0632   REF   2  LAST 1017   21,2775  7 3037 1          MASK    OCT16000  IS RATE DAMPING COMPLETED (BITS 13,12AND
 0633                        21,2776  0 0006 1          EXTEND            11 OF RCSFLAGS ALL ZERO.) IF SO, GO TO
 0634   REF   1              21,2777  1 3015 1          BZF     MERUPDAT  MERUPDAT TO UPDATE CUMULATIVE ATTITUDE
A0635                                                                   ERROR.
```

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0636   REF 188  LAST 1015   21,3000  3 5021 1  ZERODER  CA      ZERO       ZERODER ZEROS MERRORS
0637                        21,3001  22 007 0           ZL
0638   REF  20  LAST 1018   21,3002  51'507 1           INDEX   DPNDX
0639   REF   3  LAST 1006   21,3003  53'542 1           DXCH    MERRORX
0640   REF   1              21,3004  1 3023 1           TCF     SPNDXCHK

0641                        21,3005  22 007 0  NORATE   ZL
0642   REF  21  LAST 1019   21,3006  51'507 1           INDEX   DPNDX
0643   REF  12  LAST 1018   21,3007  53'526 0           DXCH    WBODY      ZERO WBODY FOR THIS AXIS
0644   REF  41  LAST 1018   21,3010  3 1501 1           CA      RCSFLAGS
0645   REF   3  LAST 1018   21,3011  7 3037 1           MASK    OCT16000
0646                        21,3012  0 0006 1           EXTEND             IS RATE DAMPING COMPLETED
0647   REF   2  LAST 1019   21,3013  1 3023 1           BZF     SPNDXCHK   YES, KEEP CURRENT MERRORX GO TO SPNDXCHK
0648   REF   1              21,3014  1 3000 0           TCF     ZERODER    NO,GO TO ZERODER

0649   REF 202  LAST 1018   21,3015  50 002 0  MERUPDAT INDEX   Q          MERRORX=MERRORX+MEASURED CHANGE IN ANGLE
0650   REF   2  LAST 1018   21,3016  4 3037 1           CS      MANTABLE -1  -COMMANDED CHANGE IN ANGLE
0651                        21,3017  0 0006 1           EXTEND             THE ADDITION OF MEASURED CHANGE IN ANGLE
0652   REF  35  LAST  830   21,3020  7 5011 0           MP      BIT7       HAS ALREADY BEEN DONE IN THE RATE FILTER
0653   REF  22  LAST 1019   21,3021  51'507 1           INDEX   DPNDX      COMMANDED CHANGE IN ANGLE = WBODY TIMES
0654   REF   4  LAST 1019   21,3022  21'542 1           DAS     MERRORX    .1SEC = MANTABLE ENTRY TIMES 2 TO THE -8

0655   REF  23  LAST 1019   21,3023  51'507 1  SPNDXCHK INDEX   DPNDX
0656   REF   5  LAST 1019   21,3024  3 1541 0           CA      MERRORX
0657   REF  26  LAST 1018   21,3025  51'506 0           INDEX   SPNDX
0658   REF   6  LAST 1002   21,3026  55'567 0           TS      ERRORX     ERRORX = HIGH ORDER WORD OF MERRORX
0659   REF  27  LAST 1019   21,3027  11'506 1           CCS     SPNDX
0660   REF   1              21,3030  1 2755 0           TCF     SETWBODY
0661   REF   1              21,3031  1 3441 1           TCF     JETS


0662                        21,3032  01760 1   OCT01760 OCT     01760      FORCED FIRING BITS MASK

0663                        21,3033  01400 1   OCT01400 OCT     01400      ROLL FORCED FIRING MASK      ORDER OF
0664                        21,3034  00060 1   OCT00060 OCT     00060      PITCH FORCED FIRING MASK     DEFINITION
0665                        21,3035  00300 1   OCT00300 OCT     00300      YAW FORCED FIRING MASK       MUST BE
A0666                                                                                                  PRESERVED
A0667                                                                                                FOR INDEXING
0668                        21,3036  00077 1   MANROT   OCT     77
0669                        21,3037  16000 0   OCT16000 OCT     16000      RATE DAMPING FLAGS MASK
0670                        21,3040  00165 0   MANTABLE DEC     .0071111
0671                        21,3041  77612 1            DEC     -.0071111
0672                        21,3042  00722 0            DEC     .028444
0673                        21,3043  77055 1            DEC     -.028444
0674                        21,3044  02215 0            DEC     .071111
0675                        21,3045  75562 1            DEC     -.071111
0676                        21,3046  11064 0            DEC     .284444
0677                        21,3047  66713 1            DEC     -.284444
0678                        21,3050  00027 1   =+14MS   DEC     23
0679   REF   4  LAST 1018   21,3051  51'656 0  FREEFUNC INDEX   RMANNDX     ACCELERATION
```

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0680  REF   1              21,3052  3 3063 1          CA     FREETAU     COMMANDS
0681  REF   2  LAST  109   21,3053  55'561 0          TS     TAU
0682  REF   3  LAST  550   21,3054  51'657 1          INDEX  PMANNDX
0683  REF   2  LAST 1020   21,3055  3 3063 1          CA     FREETAU     FREETAU    0 SEC
0684  REF   2  LAST  109   21,3056  55'562 0          TS     TAU1        +1         +0.10 SEC
0685  REF   3  LAST  550   21,3057  51'660 0          INDEX  YMANNDX     +2         -0.10 SEC
0686  REF   3  LAST 1020   21,3060  3 3063 1          CA     FREETAU     (+3)       0 SEC
0687  REF   2  LAST  109   21,3061  55'563 1          TS     TAU2
0688  REF   1              21,3062  1 3067 1          TCF    T6PROGM

0689                       21,3063   00000 1  FREETAU  DEC    0
0690                       21,3064   00740 1           DEC    480
0691                       21,3065   77037 0           DEC    -480
0692                       21,3066   00000 1           DEC    0

0693  REF 189  LAST 1019   21,3067  3 5021 1  T6PROGM  CAF    ZERO        FOR MANUAL ROTATIONS
0694  REF   7  LAST 1019   21,3070  55'567 0          TS     ERRORX
0695  REF   5  LAST 1002   21,3071  55'570 0          TS     ERRORY
0696  REF   3  LAST 1002   21,3072  55'571 1          TS     ERRORZ
0697  REF   1              21,3073  1 3757 0          TCF    T6PROG
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06975                          21,3074   06604 0            DEC    .2112     FILTER GAIN FOR TRANSLATION. LEM ON
0698                           21,3075   32703 1            DEC    .8400     FILTER GAIN FOR TRANSLATION 2(ZETA)WN DT
0699                           21,3076   06604 0            DEC    .2112     FILTER GAIN FOR 2 DEGREES/SEC MANEUVERS
0700                           21,3077   02031 1  GAIN1     DEC    .0640     KALMAN FILTER GAINS FOR INITIALIZATION
0701                           21,3100   12132 1            DEC    .3180     OF ATTITUDE RATES
0702                           21,3101   13030 0            DEC    .3452
0703                           21,3102   14047 1            DEC    .3774
0704                           21,3103   15241 1            DEC    .4161
0705                           21,3104   16650 0            DEC    .4634
0706                           21,3105   20555 0            DEC    .5223
0707                           21,3106   23065 0            DEC    .5970
0708                           21,3107   26137 0            DEC    .6933
0709                           21,3110   32053 0            DEC    .8151
0710                           21,3111   35712 0            DEC    .9342

07105                          21,3112   00435 0            DEC    .0174     FILTER GAIN FOR TRANSLATION, LEM ON
0711                           21,3113   13412 1            DEC    .3600     FILTER GAIN FOR TRANSLATION (WN)(WN)DT
0712                           21,3114   00435 0            DEC    .0174     FILTER GAIN FOR 2 DEGREES/SEC MANEUVERS
0713                           21,3115   00032 0  GAIN2     DEC    .0016     SCALED 10
0714                           21,3116   01350 0            DEC    .0454
0715                           21,3117   01575 1            DEC    .0545
0716                           21,3120   02103 1            DEC    .0666
0717                           21,3121   02523 1            DEC    .0832
0718                           21,3122   03327 1            DEC    .1069
0719                           21,3123   04432 0            DEC    .1422
0720                           21,3124   06264 1            DEC    .1985
0721                           21,3125   11351 0            DEC    .2955
0722                           21,3126   17324 1            DEC    .4817
0723                           21,3127   33622 1            DEC    .8683
0724   REF   7  LAST 1012     21,3130   55'502 0 STICKCHK  TS     T5TEMP
0725   REF  30  LAST  946     21,3131   7 6214 1           MASK   THREE      INDECES FOR MANUAL ROTATION
0726   REF   4  LAST 1020     21,3132   55'657 0           TS     PMANNDX
0727   REF   8  LAST 1021     21,3133   3 1502 1           CA     T5TEMP
0728                           21,3134   0 0006 1           EXTEND            MAN RATE 0   0 RATE (DP)
0729   REF   4  LAST 1012     21,3135   7 5003 0           MP     QUARTER                +1   +RATE (DP)
0730   REF   9  LAST 1021     21,3136   55'502 0           TS     T5TEMP                 +2   -RATE (DP)
0731   REF  31  LAST 1021     21,3137   7 6214 1           MASK   THREE                (+3)  0 RATE (DP)
0732   REF   4  LAST 1020     21,3140   55'660 1           TS     YMANNDX
0733   REF  10  LAST 1021     21,3141   3 1502 1           CA     T5TEMP
0734                           21,3142   0 0006 1           EXTEND
0735   REF   5  LAST 1021     21,3143   7 5003 0           MP     QUARTER
0736   REF   5  LAST 1019     21,3144   55'656 1           TS     RMANNDX
0737   REF 203  LAST 1019     21,3145   0 0002 0           TC     Q

0738   REF   9  LAST 1018     21,3146   55'617 1 KALUPDT   TS     ATTKALMN   INITIALIZATION OF ATTITUDE RATES USING
A0739                                                                       KALMAN FILTER TAKES 1.1 SEC

0740   REF   1                21,3147   3 2155 1           CA     DELTATT    =1SEC - 80MS
0741   REF   5  LAST 1016     21,3150   6 1634 1           AD     T5TIME     + DELAYS
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0742   REF  21  LAST 1016   21,3151  54 030 0            TS      TIME5
0743                        21,3152  1 3155 1            TCF     +3
0744   REF   3  LAST 1016   21,3153  3 2156 1            CAF     DELTATT2      SAFETY PLAY TO ASSURE
0745   REF  22  LAST 1022   21,3154  54 030 0            TS      TIME5         A T5RUPT

0752   REF 190  LAST 1020   21,3155  4 5021 0  KRESUME2  CS      ZERO          RESET FOR PHASE1
0753   REF   9  LAST 1015   21,3156  55'465 0            TS      T5PHASE       RESUME INTERRUPTED PROGRAM
0754   REF  36  LAST 1015   21,3157  1 5333 0            TCF     RESUME

0755   REF  31  LAST 1011   21,3160  4 5014 0  FDAIDSP2  CS      BIT4          RESET FOR FDAIDSP1
0756   REF  42  LAST 1019   21,3161  7 1501 0            MASK    RCSFLAGS
0757   REF  43  LAST 1022   21,3162  55'501 0            TS      RCSFLAGS

0758   REF  11  LAST  830   21,3163  4 0074 0            CS      FLAGWRD0      ON - DISPLAY ONE OF THE TOTAL ATTITUDE
0759   REF  30  LAST 1018   21,3164  7 5007 1            MASK    BIT9          ERRORS
0760                        21,3165  0 0006 1            EXTEND
0761   REF   1              21,3166  1 3175 0            BZF     FDAITOTL
0762                        21,3167  0 0006 1            EXTEND
0763   REF   8  LAST 1020   21,3170  4 1570 0            DCS     ERRORX        OFF -DISPLAY AUTOPILOT FOLLOWING ERROR
0764   REF  19  LAST 1012   21,3171  53'477 0            DXCH    AK
0765   REF   4  LAST 1020   21,3172  4 1571 1            CS      ERRORZ
0766   REF   7  LAST 1011   21,3173  55'500 1            TS      AK2
0767   REF  37  LAST 1022   21,3174  1 5333 0            TCF     RESUME        END PHASE 1

0768   REF  13  LAST  941   21,3175  3 0105 0  FDAITOTL  CA      FLAGWRD9
07691  REF  39  LAST 1015   21,3176  7 5012 0            MASK    BIT6
07692                       21,3177  0 0006 1            EXTEND
07693  REF   1              21,3200  1 3243 0            BZF     WRTN17        IS N22ORN17 (BIT6 OF FLAGWRD9) = 0
A07694                                                                        IF SO, GO TO WRTN17
07695                       21,3201  0 0006 1  WRTN22    EXTEND                OTHERWISE, CONTINUE ON TO WRTN22 AND
0769   REF   2  LAST  419   21,3202  3 1157 0            DCA     CTHETA        GET SET TO COMPUTE TOTAL ATTITUDE
0770   REF   2  LAST  108   21,3203  53'514 1            DXCH    WTEMP         ERROR WRT N22 BY PICKING UP THE THREE
0771   REF   9  LAST  596   21,3204  3 1155 1            CA      CPHI          COMPONENTS OF N22

0772                        21,3205  0 0006 1  GETAKS    EXTEND                COMPUTE TOTAL ATTITUDE ERROR FOR
0773   REF  22  LAST 1015   21,3206  20 032 1            MSU     CDUX          DISPLAY ON FDAI ERROR NEEDLES
0774   REF  20  LAST 1022   21,3207  55'476 1            TS      AK
0775   REF   3  LAST 1022   21,3210  3 1513 1            CA      WTEMP
0776                        21,3211  0 0006 1            EXTEND
0777   REF  13  LAST 1015   21,3212  20 033 0            MSU     CDUY
0778   REF  11  LAST 1021   21,3213  55'502 0            TS      T5TEMP
0779                        21,3214  0 0006 1            EXTEND
0780   REF   3  LAST 1005   21,3215  7 1640 0            MP      AMGB1
0781   REF  21  LAST 1022   21,3216  27'476 1            ADS     AK
0782   REF  12  LAST 1022   21,3217  3 1502 1            CA      T5TEMP
0783                        21,3220  0 0006 1            EXTEND
0784   REF   3  LAST 1005   21,3221  7 1641 1            MP      AMGB4
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0785  REF   7  LAST 1011   21,3222  55'477 0          TS      AK1
0786  REF  13  LAST 1022   21,3223  3 1502 1          CA      T5TEMP
0787                       21,3224  0 0006 1          EXTEND
0788  REF   3  LAST 1005   21,3225  7 1643 0          MP      AMGB7
0789  REF   8  LAST 1022   21,3226  55'500 1          TS      AK2
0790  REF   4  LAST 1022   21,3227  3 1514 0          CA      WTEMP +1
0791                       21,3230  0 0006 1          EXTEND
0792  REF  16  LAST 1015   21,3231  20 034 1          MSU     CDUZ
0793  REF  14  LAST 1023   21,3232  55'502 0          TS      T5TEMP
0794                       21,3233  0 0006 1          EXTEND
0795  REF   3  LAST 1005   21,3234  7 1642 1          MP      AMGB5
0796  REF   8  LAST 1023   21,3235  27'477 0          ADS     AK1
0797  REF  15  LAST 1023   21,3236  3 1502 1          CA      T5TEMP
0798                       21,3237  0 0006 1          EXTEND
0799  REF   3  LAST 1005   21,3240  7 1644 1          MP      AMGB8
0800  REF   9  LAST 1023   21,3241  27'500 1          ADS     AK2
0801  REF  38  LAST 1022   21,3242  1 5333 0          TCF     RESUME      END PHASE1 OF RCS DAP

0802                       21,3243  0 0006 1 WRTN17   EXTEND              GET SET TO COMPUTE TOTAL ASTRONAUT
0803  REF   9  LAST  597   21,3244  3 1335 0          DCA     CPHIX +1    ATTITUDE ERROR WRT N17 BY PICKING UP
0804  REF   5  LAST 1023   21,3245  53'514 1          DXCH    WTEMP       THE THREE COMPONENTS OF N17
0805  REF  10  LAST 1023   21,3246  3 1333 0          CA      CPHIX
0806  REF   1              21,3247  1 3205 1          TCF     GETAKS
```

L RCS-CSM DIGITAL AUTOPILOT

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```
0001                          21,3250                        BANK    21
0002  REF   3  LAST 1002     21,2000                        SETLOC  DAPS3
0003                          21,3250                        BANK

0004  REF   1                                                COUNT   21/DAPAM

0005  REF  23  LAST 1015     E6,1510                        EBANK=  KMPAC
0006                          21,3250   0 0006 1  AHFNOROT  EXTEND
0007  REF  10  LAST 1018     21,3251   00 031 0              READ    CHAN31
0008  REF  57  LAST 1018     21,3252   7 5002 1              MASK    BIT14
0009                          21,3253   0 0006 1              EXTEND
0010  REF   1                21,3254   6 3272 0              BZMF    FREECONT
0011  REF  44  LAST 1022     21,3255   3 1501 1              CA      RCSFLAGS      SEE IF RATE FILTER HAS BEEN INITIALIZED
0012  REF  58  LAST 1025     21,3256   7 5002 1              MASK    BIT14
0013  REF 224  LAST 1018     21,3257   10 000 0              CCS     A             IF SO, PROCEED WITH ATTITUDE CONTROL
0014  REF   3  LAST 1018     21,3260   1 2534 0              TCF     REINIT        IF NOT, RECYCLE TO INITIALIZE FILTER
A0015                                                                             AUTOMATIC CONTROL YET
0016                          21,3261   0 0006 1              EXTEND
0017  REF  11  LAST 1025     21,3262   00 031 0              READ    CHAN31
0018  REF  43  LAST  978     21,3263   7 5003 0              MASK    BIT13
0019                          21,3264   0 0006 1              EXTEND
0020  REF   1                21,3265   6 3372 1              BZMF    HOLDFUNC

0021  REF  12  LAST 1017     21,3266   3 1332 1  AUTOCONT    CA      HOLDFLAG      IF HOLDFLAG IS +, GO TO GRABANG.
0022                          21,3267   0 0006 1              EXTEND                OTHERWISE, GO TO ATTHOLD.
0023  REF   1                21,3270   6 3322 1              BZMF    ATTHOLD
0024  REF   1                21,3271   1 3376 1              TCF     GRABANG

R0026          MINIMUM IMPULSE CONTROL

0027  REF 108  LAST 1018     21,3272   3 5017 1  FREECONT    CAF     ONE
0028  REF  13  LAST 1025     21,3273   55'332 0              TS      HOLDFLAG      RESET HOLDFLAG
A0029                                                                             INHIBIT AUTOMATIC STEERING
0030                          21,3274   0 0006 1              EXTEND
0031  REF   2  LAST  136     21,3275   00 032 0              READ    CHAN32
0032  REF  90  LAST 1017     21,3276   54 001 1              TS      L
0033                          21,3277   4 0000 0              COM
0034  REF   3  LAST 1017     21,3300   7 3036 0              MASK    MANROT
0035  REF   3  LAST 1014     21,3301   7 1633 1              MASK    CHANTEMP
0036  REF   4  LAST 1025     21,3302   23'633 0              LXCH    CHANTEMP
0037  REF   3  LAST 1017     21,3303   0 3130 0              TC      STICKCHK
0038  REF   6  LAST 1021     21,3304   51'656 0              INDEX   RMANNDX
0039  REF   1                21,3305   3 3316 0              CA      MINTAU        MINTAU  +0
0040  REF   3  LAST 1020     21,3306   55'561 0              TS      TAU                   +1    +14MS MINIMUM IMPULSE
0041  REF   5  LAST 1021     21,3307   51'657 1              INDEX   PMANNDX               +2    -14MS TIME
0042  REF   2  LAST 1025     21,3310   3 3316 0              CA      MINTAU                +3    +0
0043  REF   3  LAST 1020     21,3311   55'562 0              TS      TAU1
0044  REF   5  LAST 1021     21,3312   51'660 0              INDEX   YMANNDX
0045  REF   3  LAST 1025     21,3313   3 3316 0              CA      MINTAU
```

```
0046  REF  3  LAST 1020   21,3314  55'563 1          TS      TAU2
0047  REF  2  LAST 1020   21,3315  1 3067 1          TCF     T6PROGM

0048                       21,3316  00000 1  MINTAU   DEC     0
0049                       21,3317  00027 1           DEC     23          = 14MS
0050                       21,3320  77750 0           DEC     -23         = -14MS
0051                       21,3321  00000 1           DEC     0
```

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P0052 CALCULATION OF ATTITUDE ERRORS-

R0053 - * - - -
R0054 AK = AMGB (COUX - THETADX) + BIAS

R0055 IE *AK * * 1 SIN(PSI) 0 ** COUX - THETADX * *BIAS *
R0057 * * * ** * * *
R0059 *AK1* = * 0 COS(PSI)COS(PHI) SIN(PHI)** COUY - THETADY * + *BIAS1*
R0061 * * * ** * * *
R0063 *AK2* * 0 -COS(PSI)SIN(PHI) COS(PHI)** COUZ - THETADZ * *BIAS2*

R0065 THE BIASES ARE ADDED ONLY WHILE PERFORMING AUTOMATIC MANEUVERS (ESP KALCMANU) TO PROVIDE ADDITIONAL LEAD
R0067 AND PREVENT OVERSHOOT WHEN STARTING AN AUTOMATIC MANEUVER. NORMALLY THE REQUIRED LEAD IS ONLY 1-2 DEGREES.
R0069 BUT DURING HIGH RATE MANEUVERS IT CAN BE AS MUCH AS 7 DEGREES. THE BIASES ARE COMPUTED BY KALCMANU AND REMAIN
R0071 FIXED UNTIL THE MANEUVER IS COMPLETED AT WHICH TIME THEY ARE RESET TO ZERO.

```
0075  REF  23  LAST 1022   21,3322  3 0032 0  ATTHOLD  CA      CDUX
0076                      21,3323  0 0006 1           EXTEND
0077  REF   6  LAST 1008   21,3324  21'572 1           MSU     THETADX
0078  REF   9  LAST 1022   21,3325  55'567 0           TS      ERRORX
0079  REF  14  LAST 1022   21,3326  3 0033 1           CA      CDUY
0080                      21,3327  0 0006 1           EXTEND
0081  REF   3  LAST  687   21,3330  21'573 0           MSU     THETADY
0082  REF  16  LAST 1023   21,3331  55'502 0           TS      T5TEMP
0083                      21,3332  0 0006 1           EXTEND
0084  REF   4  LAST 1022   21,3333  7 1640 0           MP      AMGB1
0085  REF  10  LAST 1027   21,3334  27'567 0           ADS     ERRORX
0086  REF  17  LAST 1027   21,3335  3 1502 1           CA      T5TEMP
0087                      21,3336  0 0006 1           EXTEND
0088  REF   4  LAST 1022   21,3337  7 1641 1           MP      AMGB4
0089  REF   6  LAST 1020   21,3340  55'570 0           TS      ERRORY
0090  REF  18  LAST 1027   21,3341  3 1502 1           CA      T5TEMP
0091                      21,3342  0 0006 1           EXTEND
0092  REF   4  LAST 1023   21,3343  7 1643 0           MP      AMGB7
0093  REF   5  LAST 1022   21,3344  55'571 1           TS      ERRORZ
0094  REF  17  LAST 1023   21,3345  3 0034 0           CA      COUZ
0095                      21,3346  0 0006 1           EXTEND
0096  REF   3  LAST  116   21,3347  21'574 1           MSU     THETADZ
0097  REF  19  LAST 1027   21,3350  55'502 0           TS      T5TEMP
0098                      21,3351  0 0006 1           EXTEND
0099  REF   4  LAST 1023   21,3352  7 1642 1           MP      AMGB5
0100  REF   7  LAST 1027   21,3353  27'570 0           ADS     ERRORY
0101  REF  20  LAST 1027   21,3354  3 1502 1           CA      T5TEMP
0102                      21,3355  0 0006 1           EXTEND
0103  REF   4  LAST 1023   21,3356  7 1644 1           MP      AMGB8
0104  REF   6  LAST 1027   21,3357  27'571 1           ADS     ERRORZ
0105  REF  14  LAST 1025   21,3360  4 1332 0           CS      HOLDFLAG
0106                      21,3361  0 0006 1           EXTEND
```

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```
0107   REF   2  LAST 1019   21,3362  6 3441 0          BZMF    JETS
0108   REF   4  LAST  418   21,3363  3 1564 1          CA      BIAS        AD BIASES ONLY IF PERFORMING AUTOMATIC
0109   REF  11  LAST 1027   21,3364  27'567 0          ADS     ERRORX
0110   REF   4  LAST  418   21,3365  3 1565 0          CA      BIAS1
0111   REF   8  LAST 1027   21,3366  27'570 0          ADS     ERRORY
0112   REF   4  LAST  418   21,3367  3 1566 0          CA      BIAS2
0113   REF   7  LAST 1027   21,3370  27'571 1          ADS     ERRORZ
0114   REF   3  LAST 1028   21,3371  1 3441 1          TCF     JETS

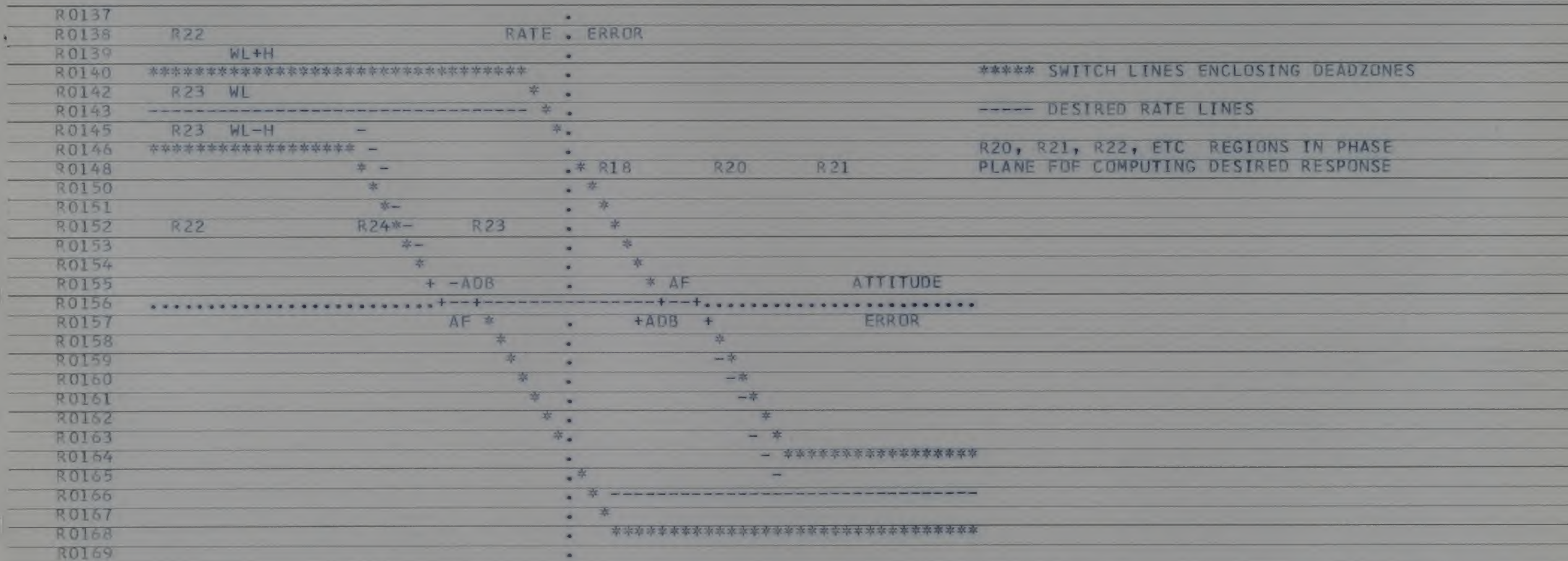
0115   REF  15  LAST 1027   21,3372  11'332 0 HOLDFUNC CCS     HOLDFLAG
0116                        21,3373  1 3376 1          TCF     +3
0117   REF   2  LAST 1025   21,3374  1 3322 0          TCF     ATTHOLD
0118                        21,3375  1 3376 1          TCF     +1
0119   REF 191  LAST 1022   21,3376  3 5021 1 GRABANG  CAF     ZERO        ZERO WBODYS AND BIASES
01191  REF  13  LAST 1019   21,3377  55'525 0          TS      WBODY
01192  REF  14  LAST 1028   21,3400  55'526 0          TS      WBODY +1
01193  REF   5  LAST  595   21,3401  55'527 1          TS      WBODY1
01194  REF   6  LAST 1028   21,3402  55'530 1          TS      WBODY1 +1
01195  REF   6  LAST  595   21,3403  55'531 0          TS      WBODY2
01196  REF   7  LAST 1028   21,3404  55'532 0          TS      WBODY2 +1
01197  REF   5  LAST 1028   21,3405  55'564 0          TS      BIAS
01198  REF   5  LAST 1028   21,3406  55'565 1          TS      BIAS1
01199  REF   5  LAST 1028   21,3407  55'566 1          TS      BIAS2

0120   REF  45  LAST 1025   21,3410  3 1501 1          CA      RCSFLAGS
01201  REF   4  LAST 1019   21,3411  7 3037 1          MASK    OCT16000
012011                      21,3412  0 0006 1          EXTEND              IS RATE DAMPING COMPLETED
01202  REF   1              21,3413  1 3421 1          BZF     ENDDAMP     IF SO, GO TO ENDDAMP
01203  REF 192  LAST 1028   21,3414  3 5021 1          CAF     ZERO        OTHERWISE, ZERO ERRORS
01204  REF  12  LAST 1028   21,3415  55'567 0          TS      ERRORX
01205  REF   9  LAST 1028   21,3416  55'570 0          TS      ERRORY
01206  REF   8  LAST 1028   21,3417  55'571 1          TS      ERRORZ
01207  REF   4  LAST 1028   21,3420  1 3441 1          TCF     JETS

01208  REF  16  LAST 1028   21,3421  55'332 0 ENDDAMP  TS      HOLDFLAG    SET HOLDFLAG +0
01209                       21,3422  0 0006 1          EXTEND
0121   REF  24  LAST 1027   21,3423  3 0033 1          DCA     CDUX        PICK UP CDU ANGLES FOR ATTITUDE HOLD
01211  REF   7  LAST 1027   21,3424  53'573 0          DXCH    THETADX     REFERENCES
01212  REF  18  LAST 1027   21,3425  3 0034 0          CA      CDUZ
01213  REF   4  LAST 1027   21,3426  55'574 1          TS      THETADZ
01214  REF   3  LAST 1028   21,3427  1 3322 0          TCF     ATTHOLD
```

P0130 JET SWITCHING LOGIC AND CALCULATION OF REQUIRED ROTATION COMMANDS

R0131 DETERMINE THE LOCATION OF THE RATE ERROR AND THE ATTITUDE ERROR RELATIVE TO THE SWITCHING LOGIC IN THE PHASE
R0133 PLANE.
R0134 COMPUTE THE CHANGE IN RATE CORRESPONDING TO THE ATTITUDE ERROR NECESSARY TO DRIVE THE THE S/C INTO THE
R0136 APPROPRIATE DEADZONE.



R0170 FIG. 1 PHASE PLANE SWITCHING LOGIC

R0171 CONSTANTS FOR JET SWITCHING LOGIC

```
0172   21,3430  00114 0  WLH/SLOP DEC    .00463          = WL+H/SLOPE = .83333 DEG     $180
0173   21,3431  00055 1  WL-H/SLP DEC    .00277          = WL-H/SLOPE = .5 DEG         $180
0174   21,3432  00022 1  WLH      2DEC   .0011111111     = WL+H = 0.5 DEG/SEC          $450
0174   21,3433  06426 1
0175   21,3434  00012 1  WLMH     2DEC   .0006666666     = WL-H = 0.3 DEG/SEC          $450
0175   21,3435  35415 1
0176   21,3436  00016 0  WL       2DEC   .0008888888     = WL   = 0.4 DEG/SEC          $450
0176   21,3437  22021 1
```

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```
0177                                21,3440   12173 1  SLOPE2   DEC     .32          = 0.8 DEG/SEC/DEG                    $450/180
0178  REF   5  LAST  732   21,3441  3 1655 0  JETS     CA      ADB
0179  REF  13  LAST 1016   21,3442  6 5015 0           AD      FOUR         AF = FLAT REGION = .044 DEG
0180  REF  21  LAST 1027   21,3443  55'502 0           TS      TSTEMP       ADB+AF
0181  REF  45  LAST 1018   21,3444  3 5016 0           CAF     TWO
0182  REF  28  LAST 1019   21,3445  55'506 1  JLOOP    TS      SPNDX
0183                        21,3446  6 0000 1           DOUBLE
0184  REF  24  LAST 1019   21,3447  55'507 0           TS      DPNDX
0185                        21,3450  0 0006 1           EXTEND
0186  REF 225  LAST 1025   21,3451  5 0000 1           INDEX   A
0187  REF   9  LAST 1006   21,3452  3 1534 1           DCA     ADOT
0188  REF   2  LAST  108   21,3453  53'516 0           DXCH    EDOT
0189  REF  17  LAST 1028   21,3454  3 1332 1           CA      HOLDFLAG     HOLDFLAG = +0 MEANS THAT DAP IS IN
0190                        21,3455  0 0006 1           EXTEND               ATTITUDE HOLD AND RATE DAMPING IS OVER.
0191  REF   1               21,3456  1 3463 1           BZF     INHOLD       IF THIS IS THE CASE, BYPASS ADDITION
A01911                                                                       OF WBODY AND GO TO INHOLD
0192                        21,3457  0 0006 1           EXTEND
0193  REF  25  LAST 1030   21,3460  5 1507 1           INDEX   DPNDX
0194  REF  15  LAST 1028   21,3461  4 1526 0           DCS     WBODY
0195  REF   3  LAST 1030   21,3462  21'516 0           DAS     EDOT         = ADOT-WBODY
0196  REF  29  LAST 1030   21,3463  51'506 0  INHOLD   INDEX   SPNDX
0197  REF  13  LAST 1028   21,3464  3 1567 1           CA      ERRORX
0198  REF   2  LAST  108   21,3465  55'517 1           TS      AERR         AERR = BIAS + AK
0199  REF   4  LAST 1030   21,3466  11'515 0           CCS     EDOT
0200  REF   1               21,3467  1 3477 1           TCF     POSVEL
0201  REF   1               21,3470  1 3472 1           TCF     SIGNCK1
0202  REF   1               21,3471  1 3507 1           TCF     NEGVEL
0203  REF   5  LAST 1030   21,3472  11'516 0  SIGNCK1  CCS     EDOT +1
0204  REF   2  LAST 1030   21,3473  1 3477 1           TCF     POSVEL
0205  REF   3  LAST 1030   21,3474  1 3477 1           TCF     POSVEL
0206  REF   2  LAST 1030   21,3475  1 3507 1           TCF     NEGVEL
0207  REF   3  LAST 1030   21,3476  1 3507 1           TCF     NEGVEL
0208                        21,3477  0 0006 1  POSVEL   EXTEND
0209  REF   6  LAST 1030   21,3500  3 1516 1           DCA     EDOT
0210  REF   2  LAST  108   21,3501  53'521 1           DXCH    EDOTVEL
0211  REF  22  LAST 1030   21,3502  3 1502 1           CA      T5TEMP
0212  REF   1               21,3503  55'523 0           TS      ADBVEL       +(ADB+AF)
0213  REF   3  LAST 1030   21,3504  3 1517 0           CA      AERR
0214  REF   2  LAST  108   21,3505  55'522 1           TS      AERRVEL
0215  REF   1               21,3506  0 3516 0           TC      J6.
0216                        21,3507  0 0006 1  NEGVEL   EXTEND
0217  REF   7  LAST 1030   21,3510  4 1516 0           DCS     EDOT
0218  REF   3  LAST 1030   21,3511  53'521 1           DXCH    EDOTVEL
0219  REF  23  LAST 1030   21,3512  4 1502 0           CS      T5TEMP
0220  REF   2  LAST 1030   21,3513  55'523 0           TS      ADBVEL       -(ADB+AF)
0221  REF   4  LAST 1030   21,3514  4 1517 1           CS      AERR
0222  REF   3  LAST 1030   21,3515  55'522 1           TS      AERRVEL

0223                        21,3516  0 0006 1  J6.      EXTEND
```

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```
0224   REF   6  LAST 1030   21,3517  61'655 0          SU     ADB
0225   REF   1              21,3520  6 3430 0          AD     WLH/SLOP
0226                        21,3521  0 0006 1          EXTEND
0227   REF   1              21,3522  6 3551 0          BZMF   J8

0228   REF  24  LAST 1030   21,3523  4 1502 0          CS     T5TEMP        (ADB+AF)
0229   REF   4  LAST 1030   21,3524  6 1522 0          AD     AERRVEL
0230                        21,3525  0 0006 1          EXTEND
0231                        21,3526  6 3530 1          BZMF   +2
0232   REF   1              21,3527  1 3542 0          TCF    J7
0233                        21,3530  0 0006 1          EXTEND
0234   REF   4  LAST 1030   21,3531  4 1521 1          DCS    EDOTVEL
0235                        21,3532  0 0006 1          EXTEND
0236   REF   3  LAST 1014   21,3533  11'654 0          DV     SLOPE
0237                        21,3534  0 0006 1          EXTEND
0238   REF   5  LAST 1031   21,3535  61'522 0          SU     AERRVEL
0239   REF   7  LAST 1031   21,3536  6 1655 0          AD     ADB
0240                        21,3537  0 0006 1          EXTEND
0241   REF   1              21,3540  6 3630 1          BZMF   J18
0242   REF   1              21,3541  1 3704 0          TCF    J23

0243   REF   1              21,3542  4 3431 0  J7      CS     WL-H/SLP
0244                        21,3543  0 0006 1          EXTEND
0245   REF  25  LAST 1031   21,3544  61'502 1          SU     T5TEMP        (ADB+AF)
0246   REF   6  LAST 1031   21,3545  6 1522 0          AD     AERRVEL
0247                        21,3546  0 0006 1          EXTEND
0248   REF   1              21,3547  6 3634 0          BZMF   J20
0249   REF   1              21,3550  1 3645 1          TCF    J21

0250                        21,3551  0 0006 1  J8      EXTEND
0251   REF   1              21,3552  4 3433 1          DCS    WLH
0252   REF   6  LAST 1023   21,3553  53'514 1          DXCH   WTEMP
0253                        21,3554  0 0006 1          EXTEND
0254   REF   5  LAST 1031   21,3555  3 1521 0          DCA    EDOTVEL
0255   REF   7  LAST 1031   21,3556  21'514 1          DAS    WTEMP
0256   REF   8  LAST 1031   21,3557  11'513 0          CCS    WTEMP
0257   REF   1              21,3560  1 3673 1          TCF    J22
0258   REF   1              21,3561  1 3563 0          TCF    SIGNCK2
0259   REF   1              21,3562  1 3567 1          TCF    NJ22
0260   REF   9  LAST 1031   21,3563  11'514 1  SIGNCK2 CCS    WTEMP +1
0261   REF   2  LAST 1031   21,3564  1 3673 1          TCF    J22
0262   REF   3  LAST 1031   21,3565  1 3673 1          TCF    J22
0263   REF   2  LAST 1031   21,3566  1 3567 1          TCF    NJ22

0264                        21,3567  0 0006 1  NJ22    EXTEND
0265   REF   6  LAST 1031   21,3570  3 1521 0          DCA    EDOTVEL
0266                        21,3571  0 0006 1          EXTEND
0267   REF   4  LAST 1031   21,3572  11'654 0          DV     SLOPE
0268   REF  26  LAST 1031   21,3573  6 1502 1          AD     T5TEMP        (ADB+AF)
0269   REF   7  LAST 1031   21,3574  6 1522 0          AD     AERRVEL
```

```
0270   REF 226  LAST 1030   21,3575  10 000 0          CCS    A
0271   REF   2  LAST 1031   21,3576  1 3704 0          TCF    J23
0272   REF   3  LAST 1032   21,3577  1 3704 0          TCF    J23
0273                        21,3600  1 3602 1          TCF    +2
0274   REF   4  LAST 1032   21,3601  1 3704 0          TCF    J23

0275                        21,3602  0 0006 1          EXTEND
0276   REF   1              21,3603  4 3435 1          DCS    WLMH          WL - H
0277   REF  10  LAST 1031   21,3604  53'514 1          DXCH   WTEMP
0278                        21,3605  0 0006 1          EXTEND
0279   REF   7  LAST 1031   21,3606  3 1521 0          DCA    EDOTVEL
0280   REF  11  LAST 1032   21,3607  21'514 1          DAS    WTEMP
0281   REF  12  LAST 1032   21,3610  11'513 0          CCS    WTEMP
0282   REF   5  LAST 1032   21,3611  1 3704 0          TCF    J23
0283   REF   1              21,3612  1 3614 0          TCF    SIGNCK3
0284   REF   1              21,3613  1 3620 1          TCF    NJ23
0285   REF  13  LAST 1032   21,3614  11'514 1 SIGNCK3  CCS    WTEMP +1
0286   REF   6  LAST 1032   21,3615  1 3704 0          TCF    J23
0287   REF   7  LAST 1032   21,3616  1 3704 0          TCF    J23
0288   REF   2  LAST 1032   21,3617  1 3620 1          TCF    NJ23

0289   REF   8  LAST 1031   21,3620  3 1522 0 NJ23     CA     AERRVEL
0290   REF  27  LAST 1031   21,3621  6 1502 1          AD     T5TEMP        (ADB+AF)
0291   REF   2  LAST 1031   21,3622  6 3431 1          AD     WL-H/SLP
0292   REF 227  LAST 1032   21,3623  10 000 0          CCS    A
0293   REF   1              21,3624  1 3716 0          TCF    J24
0294   REF   2  LAST 1032   21,3625  1 3716 0          TCF    J24
0295   REF   4  LAST 1031   21,3626  1 3673 1          TCF    J22
0296   REF   5  LAST 1032   21,3627  1 3673 1          TCF    J22

0297                        21,3630  0 0006 1 J18      EXTEND
0298   REF   8  LAST 1030   21,3631  4 1516 0          DCS    EDOT
0299   REF  24  LAST 1025   21,3632  53'511 1          DXCH   KMPAC
0300   REF   1              21,3633  1 3727 1          TCF    JTIME

0301   REF   5  LAST 1030   21,3634  4 1517 1 J20      CS     AERR
0302   REF   3  LAST 1030   21,3635  6 1523 1          AD     ADBVEL
0303                        21,3636  0 0006 1          EXTEND
0304   REF   1              21,3637  7 3440 0          MP     SLOPE2        (HYSTERESIS SLOPE)
0305   REF  25  LAST 1032   21,3640  53'511 1          DXCH   KMPAC
0306                        21,3641  0 0006 1          EXTEND
0307   REF   9  LAST 1032   21,3642  4 1516 0          DCS    EDOT
0308   REF  26  LAST 1032   21,3643  21'511 1          DAS    KMPAC
0309   REF   2  LAST 1032   21,3644  1 3727 1          TCF    JTIME

0310   REF  10  LAST 1032   21,3645  11'515 0 J21      CCS    EDOT
0311   REF   1              21,3646  1 3664 1          TCF    JP
0312   REF   1              21,3647  1 3651 1          TCF    SIGNCK4
0313   REF   1              21,3650  1 3655 0          TCF    JN
0314   REF  11  LAST 1032   21,3651  11'516 0 SIGNCK4  CCS    EDOT +1
```

```
0315   REF   2  LAST 1032   21,3652  1 3664 1          TCF     JP
0316   REF   3  LAST 1033   21,3653  1 3664 1          TCF     JP
0317   REF   2  LAST 1032   21,3654  1 3655 0          TCF     JN
0318                        21,3655  0 0006 1  JN      EXTEND
0319   REF  12  LAST 1032   21,3656  4 1516 0          DCS     EDOT
0320   REF  27  LAST 1032   21,3657  53'511 1          DXCH    KMPAC
0321                        21,3660  0 0006 1          EXTEND
0322   REF   1              21,3661  3 3437 1          DCA     WL
0323   REF  28  LAST 1033   21,3662  21'511 1          DAS     KMPAC
0324   REF   3  LAST 1032   21,3663  1 3727 1          TCF     JTIME

0325                        21,3664  0 0006 1  JP      EXTEND
0326   REF  13  LAST 1033   21,3665  4 1516 0          DCS     EDOT
0327   REF  29  LAST 1033   21,3666  53'511 1          DXCH    KMPAC
0328                        21,3667  0 0006 1          EXTEND
0329   REF   2  LAST 1033   21,3670  4 3437 0          DCS     WL
0330   REF  30  LAST 1033   21,3671  21'511 1          DAS     KMPAC
0331   REF   4  LAST 1033   21,3672  1 3727 1          TCF     JTIME

0332   REF  14  LAST 1033   21,3673  11'515 0  J22     CCS     EDOT
0333   REF   3  LAST 1033   21,3674  1 3655 0          TCF     JN
0334   REF   1              21,3675  1 3677 0          TCF     SIGNCK5
0335   REF   4  LAST 1033   21,3676  1 3664 1          TCF     JP
0336   REF  15  LAST 1033   21,3677  11'516 0  SIGNCK5 CCS     EDOT +1
0337   REF   4  LAST 1033   21,3700  1 3655 0          TCF     JN
0338   REF   5  LAST 1033   21,3701  1 3655 0          TCF     JN
0339   REF   5  LAST 1033   21,3702  1 3664 1          TCF     JP
0340   REF   6  LAST 1033   21,3703  1 3664 1          TCF     JP

0341   REF  30  LAST 1030   21,3704  51'506 0  J23     INDEX   SPNDX
034151 REF  44  LAST 1025   21,3705  4 5003 0          CS      BIT13           RESET RATE DAMPING FLAG
034152 REF  46  LAST 1028   21,3706  7 1501 0          MASK    RCSFLAGS        BIT13 FOR ROLL  (SPNDX = 0)
034153 REF  47  LAST 1033   21,3707  55'501 0          TS      RCSFLAGS        BIT12 FOR PITCH (SPNDX = 1)
A034154                                                                       BIT11 FOR YAW   (SPNDX = 2)

034155 REF  31  LAST 1033   21,3710  51'506 0          INDEX   SPNDX
034156 REF   1              21,3711  3 3033 1          CAF     DCT01400        IS THERE TO BE A FORCED FIRING ON THIS
034157 REF  48  LAST 1033   21,3712  7 1501 0          MASK    RCSFLAGS        AXIS
034158                      21,3713  0 0006 1          EXTEND
034159 REF   1              21,3714  1 3750 1          BZF     DOJET +2        NO, GO TO DOJET +2 AND DO NOTHING

03416  REF   2  LAST 1031   21,3715  1 3630 0          TCF     J18             YES, GO TO J18 AND FORCE A FIRING

0342   REF   6  LAST 1032   21,3716  4 1517 1  J24     CS      AERR
0343                        21,3717  0 0006 1          EXTEND
0344   REF   4  LAST 1032   21,3720  61'523 1          SU      ADBVEL
0345                        21,3721  0 0006 1          EXTEND
0346   REF   2  LAST 1032   21,3722  7 3440 0          MP      SLOPE2          (HYSTERESIS SLOPE)
0347   REF  31  LAST 1033   21,3723  53'511 1          DXCH    KMPAC
0348                        21,3724  0 0006 1          EXTEND
```

```
0349   REF  16  LAST 1033   21,3725  4 1516 0          DCS    EOOT
0350   REF  32  LAST 1033   21,3726  21'511 1          DAS    KMPAC
```

```
P0351        COMPUTE THE JET ON TIME NECESSARY TO ACCOMPLISH THE DESIRED CHANGE IN RATE, IE

R0353             T  = J/M(DELTA W)
R0354              J

R0355       DELTA W = DESIRED CHANGE IN S/C ANGULAR RATE AS DETERMINED BY THE
R0356                 SWITCHING LOGIC.  AT THIS POINT STORED IN KMPAC.

R0357         J/M   = S/C INERTIA TO TORQUE RATIO  SCALED BY
R0358                   (57.3/450)(824/1600)(1/.8)
R0359                 FOR 1 JET OPERATION  (M = 700 FT-LB).
R0360                 IE  J/M = J(SLUG-FTFT) X 0.00000085601606

R0361                 THE CORRESPONDING COMPUTER VARIABLES ESTABLISHED BY
R0362                 KEYBOARD ENTRY ARE
R0363                    J/M (ROLL)
R0364                    J/M1 (PITCH)
R0365                    J/M2 (YAW)

R0366          T   = JET ON-TIME      SCALED 16384/1600 SEC
R0367           J

R0368                 THE COMPUTER VARIABLES ARE
R0369                    TAU  (ROLL)
R0370                    TAU1 (PITCH)
R0371                    TAU2 (YAW)

0372  REF  32  LAST 1033   21,3727  51'506 0  JTIME    INDEX  SPNDX     PICK UP S/C INERTIA/TORQUE RATIO
0373  REF   3  LAST  735   21,3730  3 1623 1           CA     J/M       SCALED (57.3/450)(824/1600)
0374  REF   2  LAST 1005   21,3731  0 2042 0           TC     SMALLMP   FOR 1-JET OPERATION
0375  REF  28  LAST  992   21,3732  3 5005 1           CA     BIT11
0376  REF   3  LAST 1035   21,3733  0 2042 0           TC     SMALLMP
0377  REF  33  LAST 1034   21,3734  11'510 0           CCS    KMPAC
0378                       21,3735  1 3741 1           TCF    +4
0379  REF   1               21,3736  1 3745 0           TCF    TAUNORM
0380                       21,3737  1 3743 0           TCF    +4
0381  REF   2  LAST 1035   21,3740  1 3745 0           TCF    TAUNORM
0382  REF  26  LAST 1002   21,3741  3 4777 1           CA     POSMAX
0383  REF   2  LAST 1033   21,3742  1 3746 0           TCF    DOJET
0384  REF   8  LAST 1000   21,3743  3 5001 0           CA     NEGMAX
0385  REF   3  LAST 1035   21,3744  1 3746 0           TCF    DOJET

0386  REF  34  LAST 1035   21,3745  3 1511 0  TAUNORM  CA     KMPAC +1
0387  REF  33  LAST 1035   21,3746  51'506 0  DOJET    INDEX  SPNDX
0388  REF   4  LAST 1025   21,3747  55'561 0           TS     TAU
0389  REF  34  LAST 1035   21,3750  11'506 1           CCS    SPNDX
0390  REF   1               21,3751  1 3445 0           TCF    JLOOP
0391  REF   2  LAST 1020   21,3752  1 3757 0           TCF    T6PROG
```

```
0392   REF 193  LAST 1028   21,3753  3 5021 1  ZEROCMDS CAF     ZERO
0393   REF   5  LAST 1035   21,3754  55'561 0           TS      TAU
0394   REF   4  LAST 1025   21,3755  55'562 0           TS      TAU1
0395   REF   4  LAST 1026   21,3756  55'563 1           TS      TAU2
0396                        21,3757  0 0006 1  T6PROG   EXTEND                 WHEN THE ROTATION COMMANDS (TAUS)
0397   REF   1              21,3760  3 3764 1           DCA     JETADDR        HAVE BEEN DETERMINED
0398   REF  20  LAST 1002   21,3761  53'313 0           DXCH    T5LOC          RESET T5LOC FOR PHASE3
0399   REF  39  LAST 1023   21,3762  1 5333 0           TCF     RESUME

0400   REF  35  LAST 1035   E6,1510                     EBANK=  KMPAC
0401   REF   1              21,3763    02552 1  JETADDR 2CADR   JETSLECT
0401   REF   1              21,3764    36066 1
```

L RCS-CSM DAP EXECUTIVE PROGRAMS USER'S PAGE NO. 1 E0 S3

R0001 CALCULATION OF AMGB, AMBG ONCE EVERY SECOND

R0002 AMGB = 1 SIN(PSI) 0
R0003 0 COS(PSI)COS(PHI) SIN(PHI)
R0004 0 -COS(PSI)SIN(PHI) COS(PHI)
R0005
R0006 AMBG = 1 -TAN(PSI)COS(PHI) TAN(PSI)SIN(PHI)
R0007 0 COS(PHI)/COS(PSI) -SIN(PHI)/COS(PSI)
R0008 0 SIN(PHI) COS(PHI)
R0009
R0010 WHERE PHI AND PSI ARE CDU ANGLES
R0011
R0012

```
0013                          20,3612                          BANK    20
0014  REF   1                 22,2000                          SETLOC  DAPS8
0015                          22,3447                          BANK

0016  REF   1                                                  COUNT*  $$/DAPEX
0017  REF  36  LAST 1036      E6,1510                          EBANK=  KMPAC
0018  REF  27  LAST  946      22,3447  3 0102 1  AMBGUPDT CA     FLAGWRD6        CHECK FOR RCS AUTOPILOT
0019                          22,3450  0 0006 1          EXTEND
0020  REF  99  LAST  981      22,3451  6 5217 0          BZMF    ENDOFJOB        BIT15 = 0, BIT14 = 1
0021  REF  59  LAST 1025      22,3452  7 5002 1          MASK    BIT14           IF NOT RCS, EXIT
0022                          22,3453  0 0006 1          EXTEND
0023  REF 100  LAST 1037      22,3454  1 5217 1          BZF     ENDOFJOB        TO PROTECT TVC DAP ON SWITCHOVER

0024  REF  19  LAST 1028      22,3455  3 0034 0          CA      CDUZ
0025  REF   1                 22,3456  0 5075 0          TC      SPSIN2
0026  REF   5  LAST 1027      22,3457  55'640 0          TS      AMGB1           CALCULATE AMGB
0027  REF  20  LAST 1037      22,3460  3 0034 0          CA      CDUZ
0028  REF   1                 22,3461  0 5074 1          TC      SPCOS2
0029  REF   2  LAST  110      22,3462  55'645 0          TS      CAPSI           MUST CHECK FOR GIMBAL LOCK
0030  REF   1                 22,3463  3 3507 0          CAF     QUADANGL        = 7.25  DEGREES JET QUAD ANGULAR OFFSET
0031                          22,3464  0 0006 1          EXTEND
0032  REF  25  LAST 1028      22,3465  20 032 1          MSU     CDUX
0033                          22,3466  4 0000 0          COM                     CDUX - 7.25 DEG
0034  REF   1                 22,3467  0 5074 1          TC      SPCOS1
0035  REF   5  LAST 1027      22,3470  55'644 1          TS      AMGB8
0036                          22,3471  0 0006 1          EXTEND
0037  REF   3  LAST 1037      22,3472  7 1645 0          MP      CAPSI
0038  REF   5  LAST 1027      22,3473  55'641 1          TS      AMGB4
0039  REF   2  LAST 1037      22,3474  3 3507 0          CAF     QUADANGL
0040                          22,3475  0 0006 1          EXTEND
0041  REF  26  LAST 1037      22,3476  20 032 1          MSU     CDUX
0042                          22,3477  4 0000 0          COM                     CDUX - 7.25 DEG
0043  REF   1                 22,3500  0 5075 0          TC      SPSIN1
0044  REF   5  LAST 1027      22,3501  55'642 1          TS      AMGB5
0045                          22,3502  0 0006 1          EXTEND
0046  REF   4  LAST 1037      22,3503  7 1645 0          MP      CAPSI
0047                          22,3504  4 0000 0          COM
```

```
0048   REF   5  LAST 1027   22,3505  55'643 0            TS      AMGB7
0049   REF 101  LAST 1037   22,3506  1 5217 1            TCF     ENDOFJOB
0050                        22,3507   01224 1  QUADANGL  DEC     660             = 7.25 DEGREES
```

L JET SELECTION LOGIC USER'S PAGE NO. 1 E0 S3

```
0001                          21,3765                    BANK    21
0002  REF   1                 17,2000                    SETLOC  DAPS4
0003                          17,2552                    BANK

0004  REF   1                                            COUNT   17/DAPJS

0005  REF  37  LAST 1037      E6,1510                    EBANK=  KMPAC
R0006 EXAMINE CHANNEL 31 FOR TRANSLATION COMMANDS

0007  REF  18  LAST 1002      17,2552  22 016 0  JETSLECT LXCH    BANKRUPT
0008  REF   1                 17,2553  3 2634 1          CAF     DELTATT3      = 60 MS   RESET TO EXECUTE PHASE1
0009  REF   6  LAST 1021      17,2554  6 1634 1          AD      T5TIME
0010  REF  23  LAST 1022      17,2555  54 030 0          TS      TIME5
0011                          17,2556  1 2561 0          TCF     +3
0012  REF   1                 17,2557  3 2635 0          CAF     DELATT20      = 20 MS   TO ASSURE A T5RUPT
0013  REF  24  LAST 1039      17,2560  54 030 0          TS      TIME5
0014  REF   1                 17,2561  3 3313 0          CAF     =14MS         RESET T6 TO INITIALIZE THE JET CHANNELS
0015  REF   4  LAST 1016      17,2562  54 031 1          TS      TIME6         IN 14 MS
0016  REF   9  LAST 1035      17,2563  3 5001 0          CAF     NEGMAX
0017                          17,2564  0 0006 1          EXTEND
0018  REF  10  LAST 1016      17,2565  05 013 0          WOR     CHAN13
0019                          17,2566  0 0006 1          EXTEND
0020  REF  14  LAST 1002      17,2567  22 012 1          QXCH    QRUPT
0021  REF   1                 17,2570  3 2633 0          CAF     XLNMASK       = 7700 OCT
0022                          17,2571  0 0006 1          EXTEND                EXAMINE THE TRANSLATION
0023  REF  12  LAST 1025      17,2572  06 031 0          RXOR    CHAN31        HAND CONTROLLER
0024  REF   2  LAST 1039      17,2573  7 2633 1          MASK    XLNMASK
0025                          17,2574  0 0006 1          EXTEND
0026  REF   1                 17,2575  1 2636 1          BZF     NOXLNCMD
0027  REF  28  LAST 1032      17,2576  55'502 0          TS      T5TEMP
0028                          17,2577  0 0006 1          EXTEND
0029  REF  31  LAST 1022      17,2600  7 5007 1          MP      BIT9
0030  REF  32  LAST 1021      17,2601  7 6214 1          MASK    THREE
0031  REF   3  LAST  108      17,2602  55'513 0          TS      XNDX1         AC QUAD  X-TRANSLATION INDEX
0032  REF   2  LAST  108      17,2603  55'514 1          TS      XNDX2         BD QUAD  X-TRANSLATION INDEX
0033  REF  29  LAST 1039      17,2604  3 1502 1          CA      T5TEMP
0034                          17,2605  0 0006 1          EXTEND                1 = + XLN
0035  REF  36  LAST 1019      17,2606  7 5011 0          MP      BIT7          2 = - XLN
0036  REF  33  LAST 1039      17,2607  7 6214 1          MASK    THREE         3 = NO XLN
0037  REF   3  LAST  108      17,2610  55'515 0          TS      YNDX          Y-TRANSLATION INDEX

0038  REF  30  LAST 1039      17,2611  3 1502 1          CA      T5TEMP
0039                          17,2612  0 0006 1          EXTEND
0040  REF  31  LAST 1017      17,2613  7 5013 1          MP      BIT5
0041  REF  34  LAST 1039      17,2614  7 6214 1          MASK    THREE
0042  REF   2  LAST  108      17,2615  55'516 0          TS      ZNDX          Z-TRANSLATION INDEX

0043  REF  72  LAST  981      17,2616  3 1466 1          CA      DAPDATR1      SET ATTKALMN TO PICK UP FILTER GAINS FOR
00432 REF  60  LAST 1037      17,2617  7 5002 1          MASK    BIT14         TRANSLATIONS.
00434                         17,2620  0 0006 1          EXTEND                CHECK DAPDATR1 BIT 14 FOR LEM ATTACHED.
```

L JET SELECTION LOGIC USER'S PAGE NO. 2 E6 S3

```
00436  REF   1                 17,2621  1 2624 1            BZF     NOLEM
00438  REF  35  LAST 1039      17,2622  4 6214 1            CS      THREE       IF LEM IS ON, SET ATTKALMN = -3
0044                           17,2623  1 2625 0            TCF     +2
00442  REF  46  LAST 1030      17,2624  4 5016 1  NOLEM     CS      TWO         IF LEM IS OFF, SET ATTKALMN = -2.
00444  REF  10  LAST 1021      17,2625  55'617 1            TS      ATTKALMN
0045   REF   4  LAST  732      17,2626  11'631 0            CCS     XTRANS      (+, -1, 0)
0046   REF   4  LAST 1039      17,2627  55'513 0            TS      XNDX1       USING BD-X  ZERO XNDX1
0047   REF   1                 17,2630  1 2642 1            TCF     PWORD
0048   REF   3  LAST 1039      17,2631  55'514 1            TS      XNDX2       USING AC-X  ZERO XNDX2
0049   REF   2  LAST 1040      17,2632  1 2642 1            TCF     PWORD
0050                           17,2633   07700 1  XLNMASK   OCT     7700

0051                           17,2634   37772 1  DELTATT3  DEC     16378       = 60 MS
0052                           17,2635   37776 0  DELATT20  DEC     16382       = 20 MS

0053   REF   5  LAST 1040      17,2636  55'513 0  NOXLNCMD  TS      XNDX1       ZERO ALL REQUESTS FOR TRANSLATION
0054   REF   4  LAST 1040      17,2637  55'514 1            TS      XNDX2
0055   REF   4  LAST 1039      17,2640  55'515 0            TS      YNDX
0056   REF   3  LAST 1039      17,2641  55'516 0            TS      ZNDX

R0057  PITCH COMMANDS  TIMING(NO X-TRANS, NO QUAD FAILS) 32MCT

0058   REF   5  LAST 1036      17,2642  11'562 0  PWORD     CCS     TAU1        CHECK FOR PITCH COMMANDS
0059   REF 109  LAST 1025      17,2643  3 5017 1            CAF     ONE
0060                           17,2644  1 2646 0            TCF     +2           0 = NO PITCH
0061   REF  47  LAST 1040      17,2645  3 5016 0            CAF     TWO         +1 =  + PITCH
0062   REF   2  LAST  108      17,2646  55'520 0            TS      PINDEX      +2 =  - PITCH

0063   REF   5  LAST  733      17,2647  11'626 0            CCS     RACFAIL     FLAG FOR REAL AC QUAD FAILURES
0064   REF   1                 17,2650  1 2654 0            TCF     AFAILP
0065   REF   1                 17,2651  1 2664 0            TCF     TABPCOM     0 = NO REAL AC FAILURES
0066   REF   1                 17,2652  1 2656 1            TCF     CFAILP      + = A QUAD FAILED
0067   REF   2  LAST 1040      17,2653  1 2664 0            TCF     TABPCOM     - = C QUAD FAILED
A0068                                                                           IF FAILURES ARE PRESENT IGNORE
A0069                                                                           X-TRANSLATIONS ON THIS AXIS

0070   REF   5  LAST 1006      17,2654  3 4334 1  AFAILP    CAF     NINE        IF FAILURE IS PRESENT 1JET OPERATION
0071   REF   3  LAST 1040      17,2655  1 2666 1            TCF     TABPCOM +2  IS ASSUMED. IGNORE X-TRANSLATION
0072   REF   3  LAST  870      17,2656  3 5771 0  CFAILP    CAF     TWELVE
0073   REF   4  LAST 1040      17,2657  1 2666 1            TCF     TABPCOM +2

0074                           17,2660   00000 1  XLNNDX    DEC     0           INDECES FOR TRANSLATION COMMANDS
0075                           17,2661   00003 1            DEC     3           FOR USE IN TABLE LOOK UP
0076                           17,2662   00006 1            DEC     6
0077                           17,2663   00000 1            DEC     0

0078   REF   3  LAST  757       5771              TWELVE    =       OCT14
R0079  TABLE LOOK UP FOR PITCH COMMANDS WITH AND WITHOUT X-TRANSLATION AND AC QUAD FAILURES PRESENT.
R0081  BITS 9, 10 CONTAIN THE NUMBER OF PITCH JETS USED TO PERFORM THE PITCH ROTATION
```

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```
0083  REF   6  LAST 1040   17,2664  51'513 1  TABPCOM  INDEX  XNDX1
0084  REF   1               17,2665  3 2660 0          CA     XLNNDX
0085  REF   3  LAST 1040   17,2666  6 1520 1          AD     PINDEX
0086  REF 228  LAST 1032   17,2667  50 000 1          INDEX  A
0087  REF   1               17,2670  3 2714 1          CA     PYTABLE
0088  REF   1               17,2671  7 2733 0          MASK   PJETS      =1417 OCT
0089  REF   2  LAST  103   17,2672  55'453 0          TS     PWORD1
0090                        17,2673  0 0006 1          EXTEND
0091  REF  37  LAST 1039   17,2674  7 5011 0          MP     BIT7
0092  REF   2  LAST  108   17,2675  55'523 0          TS     NPJETS     = NO. OF PITCH JETS

R0093 YAW JET COMMANDS  TIMING(NO X-TRANS, NO QUAD FAILURES)  32MCT

0094  REF   5  LAST 1036   17,2676  11'563 1  YWORD    CCS    TAU2       CHECK FOR YAW COMMANDS
0095  REF 110  LAST 1040   17,2677  3 5017 1          CAF    ONE
0096                        17,2700  1 2702 1          TCF    +2
0097  REF  48  LAST 1040   17,2701  3 5016 0          CAF    TWO
0098  REF   2  LAST  108   17,2702  55'521 1          TS     YINDEX     YAW ROTATION INDEX

0099  REF   5  LAST  733   17,2703  11'627 1          CCS    RBDFAIL    FLAG FOR B OR D QUAD FAILURES
0100  REF   1               17,2704  1 2710 1          TCF    BFAILY     0  = NO BD FAILURE
0101  REF   1               17,2705  1 2735 0          TCF    TABYCOM    +  = B QUAD FAILED
0102  REF   1               17,2706  1 2712 0          TCF    DFAILY     -  = D QUAD FAILED
0103  REF   2  LAST 1041   17,2707  1 2735 0          TCF    TABYCOM

0104  REF   6  LAST 1040   17,2710  3 4334 1  BFAILY   CAF    NINE
0105  REF   3  LAST 1041   17,2711  1 2737 1          TCF    TABYCOM +2
0106  REF   4  LAST 1040   17,2712  3 5771 0  DFAILY   CAF    TWELVE
0107  REF   4  LAST 1041   17,2713  1 2737 1          TCF    TABYCOM +2
```

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P0108   TABLE FOR PITCH(YAW) COMMANDS
R0109   BITS 4,3,2,1 = PITCH, X-TRANSLATION JETS SELECTED
R0110   BITS     10,9 = NO. PITCH JETS USED TO PERFORM ROTATION
R0111   BITS 8,7,6,5 = YAW, X-TRANSLATION JETS SELECTED
R0112   BITS 12,11 : NO. YAW JETS USED TO PERFORM ROTATION

A0113                                                          ROT  TRANS  QUAD  BIAS
 0114                    17,2714   00000 1  PYTABLE  OCT   0    0    0           0
 0115                    17,2715   05125 1           OCT   5125 +    0           0
 0116                    17,2716   05252 1           OCT   5252 -    0           0
 0117                    17,2717   00231 1           OCT   0231 0    +           3
 0118                    17,2720   02421 1           OCT   2421 +    +           3
 0119                    17,2721   02610 1           OCT   2610 -    +           3
 0120                    17,2722   00146 1           OCT   0146 0    -           6
 0121                    17,2723   02504 1           OCT   2504 +    -           6
 0122                    17,2724   02442 1           OCT   2442 -    -           6
 0123                    17,2725   00000 1           OCT   0    0         A(B)   9
 0124                    17,2726   02421 1           OCT   2421 +         A(B)   9
 0125                    17,2727   02442 1           OCT   2442 -         A(B)   9
 0126                    17,2730   00000 1           OCT   0    0         C(D)   12
 0127                    17,2731   02504 1           OCT   2504 +         C(D)   12
 0128                    17,2732   02610 1           OCT   2610 -         C(D)   12

R0129   MASKS FOR PITCH AND YAW COMMANDS

 0130                    17,2733   01417 1  PJETS    OCT   1417
 0131                    17,2734   06360 1  YJETS    OCT   6360

R0132   TABLE LOOK UP FOR YAW COMMANDS WITH AND WITHOUT X-TRANSLATION AND AC QUAD FAILURES PRESENT
R0134   BITS 11, 12 CONTAIN THE NUMBER OF YAW JETS USED TO PERFORM THE YAW ROTATION

 0136   REF   5  LAST 1040   17,2735  51'514 0  TABYCOM  INDEX  XNOX2
 0137   REF   2  LAST 1041   17,2736  3 2660 0           CA     XLNNDX
 0138   REF   3  LAST 1041   17,2737  6 1521 0           AD     YINDEX
 0139   REF 229  LAST 1041   17,2740  50 000 1           INDEX  A
 0140   REF   2  LAST 1041   17,2741  3 2714 1           CA     PYTABLE
 0141   REF   1              17,2742  7 2734 1           MASK   YJETS          = 6360 OCT
 0142   REF   2  LAST  103   17,2743  55'455 0           TS     YWORD1
 0143                        17,2744  0 0006 1           EXTEND
 0144   REF  32  LAST 1039   17,2745  7 5013 1           MP     BIT5
 0145   REF   1              17,2746  55'524 1           TS     NYJETS         NO. OF YAW JETS USED TO PERFORM ROTATION
```

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```
P0146   ROLL COMMANDS  TIMING(NO Y,Z TRANS, NO QUAD FAILS)   45MCT

 0147   REF   6  LAST 1036   17,2747   11'561 0  RWORD    CCS     TAU        CHECK FOR ROLL COMMANDS
 0148   REF 111  LAST 1041   17,2750   3 5017 1           CAF     ONE
 0149                       17,2751   1 2753 0           TCF     +2
 0150   REF  49  LAST 1041   17,2752   3 5016 0           CAF     TWO
 0151   REF   2  LAST  108   17,2753   55'517 1           TS      RINDEX

 0152   REF   3  LAST  733   17,2754   11'630 1           CCS     ACORBD     FLAG FOR AC OR BD QUAD SELECTION FOR
 0153   REF   1              17,2755   1 3046 1           TCF     BDROLL     ROLL COMMANDS
 0154   REF   2  LAST 1043   17,2756   1 3046 1           TCF     BDROLL     +, +0 = BD ROLL
 0155                       17,2757   1 2760 0           TCF     +1         -, -0 = AC ROLL

 0156   REF   6  LAST 1040   17,2760   11'626 0  ACROLL   CCS     RACFAIL    CHECK FOR REAL FAILURES
 0157   REF   1              17,2761   1 2765 0           TCF     RAFAIL     ON AC QUADS
 0158   REF   1              17,2762   1 2775 1           TCF     RXLNS
 0159   REF   1              17,2763   1 2767 1           TCF     RCFAIL
 0160   REF   2  LAST 1043   17,2764   1 2775 1           TCF     RXLNS

 0161   REF   7  LAST 1041   17,2765   3 4334 1  RAFAIL   CAF     NINE       QUAD FAILURE  WILL GET
 0162   REF   1              17,2766   1 2777 0           TCF     TABRCOM    1-JET OPERATION
 0163   REF   5  LAST 1041   17,2767   3 5771 0  RCFAIL   CAF     TWELVE
 0164   REF   2  LAST 1043   17,2770   1 2777 0           TCF     TABRCOM

 0165                       17,2771   00000 1   XLNINDX  DEC     0
 0166                       17,2772   00001 0            DEC     1          INDECES FOR TRANSLATION
 0167                       17,2773   00002 0            DEC     2
 0168                       17,2774   00000 1            DEC     0

R0169   TABLE LOOK UP FOR AC-ROLL COMMANDS WITH AND WITHOUT Y-TRANSLATION AND ACQUAD FAILURES PRESENT
R0171   BITS 9,10,11 CONTAIN THE MAGNITUDE AND DIRECTION OF THE ROLL

 0172   REF   5  LAST 1040   17,2775   51'515 1  RXLNS    INDEX   YNDX       NO AC QUAD FAILURES
 0173   REF   3  LAST 1042   17,2776   3 2660 0           CA      XLNNDX     INCLUDE +,-,0, Y-TRANSLATION
 0174   REF   3  LAST 1043   17,2777   6 1517 0  TABRCOM  AD      RINDEX
 0175   REF 230  LAST 1042   17,3000   50 000 1           INDEX   A
 0176   REF   1              17,3001   3 3130 0           CA      RTABLE
 0177   REF   1              17,3002   7 3147 1           MASK    ACRJETS    = 3760 OCT
 0178   REF   3  LAST 1016   17,3003   55'451 1           TS      RWORD1

R0179   CHECK FOR Z-TRANSLATIONS ON BD

 0180   REF   4  LAST 1040   17,3004   3 1516 1  BDZCHECK CA      ZNDX
 0181                       17,3005   0 0006 1           EXTEND
 0182   REF   1              17,3006   6 3040 0           BZMF    NOBDZ      NO Z-TRANSLATION
```

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```
P0183            TABLE LOOK UP FOR BD Z-TRANSLATION WITH AND WITHOUT REAL BD QUAD FAILURES.  Z-TRANSLATION WILL BE POSS-
R0185   IBLE AS LONG AS ROLL COMMANDS CAN BE SATISFIED WITH THE AC ROLL JETS.   CRITERION.. IF THE RESULTANT NET ROLL
R0187   COMMANDS = 0 (WITH Z-TRANSLATION) AND IF TAU = 0, THEN INCLUDE THE BD Z-TRANSLATION COMMANDS. IF THE RESULTANT
R0189   ROLL COMMAND = 0, AND IF TAU NZ, THEN IGNORE THE BD Z-TRANSLATION

0190   REF   6  LAST 1041   17,3007  11'627 1          CCS     RBDFAIL
0191   REF  36  LAST 1040   17,3010  3 6214 0          CAF     THREE
0192                        17,3011  1 3013 1          TCF     +2
0193   REF  30  LAST 1011   17,3012  3 6211 0          CAF     SIX
0194   REF   5  LAST 1043   17,3013  51'516 1          INDEX   ZNDX
0195   REF   1              17,3014  6 2771 1          AD      XLN1NDX
0196   REF 231  LAST 1043   17,3015  50 000 1          INDEX   A
0197   REF   1              17,3016  3 3151 1          CA      YZTABLE
0198   REF   1              17,3017  7 3162 0          MASK    BDZJETS       = 3417 OCT
0199   REF   4  LAST 1043   17,3020  6 1451 0          AD      RWORD1        ADD TO ROLL COMMANDS
0200   REF  31  LAST 1039   17,3021  55'502 0          TS      T5TEMP        IF POSSIBLE.  MUST CHECK TAU FIRST

0201                        17,3022  0 0006 1          EXTEND
0202   REF  38  LAST 1041   17,3023  7 5011 0          MP      BIT7          DETERMINE THE NET ROLL COMMAND WITH
0203   REF   1              17,3024  6 6061 0          AD      =-4           Z-TRANSLATION ADDED ON
0204   REF   2  LAST  108   17,3025  55'522 1          TS      NRJETS        NET NO. OF +,- ROLL JETS ON
0205                        17,3026  0 0006 1          EXTEND
0206   REF   1              17,3027  1 3033 0          BZF     TAUCHECK

0207   REF  32  LAST 1044   17,3030  3 1502 1  ACRBDZ  CA      T5TEMP        Z-TRANSLATION ACCEPTED EVEN THO WE MAY
0208   REF   5  LAST 1044   17,3031  55'451 1          TS      RWORD1        HAVE INTRODUCED AN UNDESIREABLE ROLL
0209   REF   1              17,3032  1 3274 1          TCF     ROLLTIME      BRANCH TO JET ON-TIME CALCULATIONS

0210   REF   7  LAST 1043   17,3033  11'561 0  TAUCHECK CCS     TAU
0211   REF   2  LAST 1043   17,3034  1 3040 1          TCF     NOBDZ
0212   REF   1              17,3035  1 3030 0          TCF     ACRBDZ
0213   REF   3  LAST 1044   17,3036  1 3040 1          TCF     NOBDZ
0214   REF   2  LAST 1044   17,3037  1 3030 0          TCF     ACRBDZ

0215   REF   6  LAST 1044   17,3040  3 1451 0  NOBDZ   CA      RWORD1        Z-TRANSLATION NOT ACCEPTED
0216                        17,3041  0 0006 1          EXTEND
0217   REF  39  LAST 1044   17,3042  7 5011 0          MP      BIT7
0218   REF   1              17,3043  6 7715 0          AD      =-2
0219   REF   3  LAST 1044   17,3044  55'522 1          TS      NRJETS
0220   REF   2  LAST 1044   17,3045  1 3274 1          TCF     ROLLTIME      BRANCH TO JET ON-TIME CALCULATION
```

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P0221 BD QUAD SELECTION FOR ROLL COMMANDS

```
0222   REF   7  LAST 1044   17,3046  11'627 1  BDROLL   CCS     RBDFAIL
0223   REF   1              17,3047  1 3053 0           TCF     RBFAIL
0224   REF   1              17,3050  1 3057 1           TCF     RZXLNS
0225   REF   1              17,3051  1 3055 0           TCF     RDFAIL
0226   REF   2  LAST 1045   17,3052  1 3057 1           TCF     RZXLNS
0227   REF   8  LAST 1043   17,3053  3 4334 1  RBFAIL   CAF     NINE
0228   REF   1              17,3054  1 3061 1           TCF     TABRZCMD
0229   REF   6  LAST 1043   17,3055  3 5771 0  RDFAIL   CAF     TWELVE
0230   REF   2  LAST 1045   17,3056  1 3061 1           TCF     TABRZCMD

0231   REF   6  LAST 1044   17,3057  51'516 1  RZXLNS   INDEX   ZNDX      NO BD FAILURES
0232   REF   4  LAST 1043   17,3060  3 2660 0           CA      XLNNDX    +,-,0 Z-TRANSLATION PRESENT
0233   REF   4  LAST 1043   17,3061  6 1517 0  TABRZCMD AD      RINDEX
0234   REF 232  LAST 1044   17,3062  50 000 1           INDEX   A
0235   REF   2  LAST 1043   17,3063  3 3130 0           CA      RTABLE
0236   REF   1              17,3064  7 3150 1           MASK    BDRJETS   = 34017 OCT
0237   REF   7  LAST 1044   17,3065  55'451 1           TS      RWORD1

0238   REF   6  LAST 1043   17,3066  3 1515 1  ACYCHECK CA      YNDX      ANY Y-TRANSLATION
0239                        17,3067  0 0006 1           EXTEND
0240   REF   1              17,3070  1 3122 1           BZF     NOACY     NO Y-TRANSLATION
0241   REF   7  LAST 1043   17,3071  11'626 0           CCS     RACFAIL
0242   REF  37  LAST 1044   17,3072  3 6214 0           CAF     THREE
0243                        17,3073  1 3075 1           TCF     +2
0244   REF  31  LAST 1044   17,3074  3 6211 0           CAF     SIX
0245   REF   7  LAST 1045   17,3075  51'515 1           INDEX   YNDX
0246   REF   2  LAST 1044   17,3076  6 2771 1           AD      XLNINDX
0247   REF 233  LAST 1045   17,3077  50 000 1           INDEX   A
0248   REF   2  LAST 1044   17,3100  3 3151 1           CA      YZTABLE
0249   REF   1              17,3101  7 3163 1           MASK    ACYJETS   = 34360 OCT
0250   REF   8  LAST 1045   17,3102  6 1451 0           AD      RWORD1
0251   REF  33  LAST 1044   17,3103  55'502 0           TS      T5TEMP
0252                        17,3104  0 0006 1           EXTEND    FOR EXPLANATION SEE CODING ON RTABLE
0253   REF  32  LAST 1022   17,3105  7 5014 0           MP      BIT4
0254   REF   2  LAST 1044   17,3106  6 6061 0           AD      =-4
0255   REF   4  LAST 1044   17,3107  55'522 1           TS      NRJETS    NO. OF NET ROLL JETS
0256                        17,3110  0 0006 1           EXTEND
0257   REF   1              17,3111  1 3115 0           BZF     TAUCHCK   IF NRJETS = 0

0258   REF  34  LAST 1045   17,3112  3 1502 1  BDRACZ   CA      T5TEMP    Y-TRANSLATION ACCEPTED
0259   REF   9  LAST 1045   17,3113  55'451 1           TS      RWORD1
0260   REF   3  LAST 1044   17,3114  1 3274 1           TCF     ROLLTIME  BRANCH TO JET ON-TIME CALCULATIONS

0261   REF   8  LAST 1044   17,3115  11'561 0  TAUCHCK  CCS     TAU
0262   REF   2  LAST 1045   17,3116  1 3122 1           TCF     NOACY
0263   REF   1              17,3117  1 3112 1           TCF     BDRACZ
0264   REF   3  LAST 1045   17,3120  1 3122 1           TCF     NOACY
0265   REF   2  LAST 1045   17,3121  1 3112 1           TCF     BDRACZ
```

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```
0266   REF  10  LAST 1045   17,3122  3 1451 0  NOADV    CA      RWORD1        Y-TRANSLATION NOT ACCEPTED
0267                        17,3123  0 0006 1           EXTEND
0268   REF  33  LAST 1045   17,3124  7 5014 0           MP      BIT4
0269   REF   2  LAST 1044   17,3125  6 7715 0           AD      =-2
0270   REF   5  LAST 1045   17,3126  55'522 1           TS      NRJETS
0271   REF   4  LAST 1045   17,3127  1 3274 1           TCF     ROLLTIME
```

```
R0272              TABLE FOR ROLL, Y AND Z-TRANSLATION COMMANDS

R0273        EITHER AC OR BD ROLL MAY BE SELECTED. IF AC ROLL IS SELECTED, Y-TRANSLATIONS MAY BE SATISFIED SIMULTANEOUSLY
R0275    PROVIDED THAT THERE ARE NO AC QUAD FAILURES. IF THERE ARE AC FAILURES, Y-TRANSLATION COMMANDS WILL BE IGNORED,
R0277    IN WHICH CASE THE ASTRONAUT SHOULD SWITCH TO BD ROLL.
R0278        IF BDROLL IS SELECTED, Z-TRANSLATIONS MAY BE SATISFIED SIMULTANEOUSLY PROVIDED THAT THERE ARE NO BD QUAD
R0280    FAILURES. IF THERE ARE BD FAILURES, Z-TRANSLATION COMMANDS WILL BE IGNORED, IN WHICH CASE THE ASTRONAUT SHOULD
R0282    SWITCH TO AC ROLL.
R0283        NOTE THAT IF ONE QUAD FAILS (E.G. B FAILED), Z-TRANSLATION IS STILL POSSIBLE AND THAT THE UNDESIREABLE ROLL
R0285    INTRODUCED BY THIS TRANSLATION WILL BE COMPENSATED BY THE TWO AC ROLL JETS ACTUATED BY THE AUTOPILOT LOGIC.

R0287              WORD MAKE UP....RTABLE

R0268        TWO WORDS, CORRESPONDING TO AC OR BD ROLL SELECTION, HAVE BEEN COMBINED INTO ONE TABLE.  THE WORD CORRESPOND-
R0290    ING TO AC ROLL HAS THE FOLLOWING INTERPRETATION..
R0291        BITS 9,10,11 ARE CODED TO GIVE THE NET ROLL TORQUE FOR THE WORD SELECTED. THE CODING IS..
R0293                        BIT NO.  11 10 9   NO. OF ROLL JETS

R0294                                 0 0 0          -2
R0295                                 0 0 1          -1
R0296                                 0 1 0           0
R0297                                 0 1 1          +1
R0298                                 1 0 0          +2

R0299        THIS WORD MAY THEN BE ADDED TO THE WORD SELECTED FROM THE YZ-TRANSLATION TABLE, WHICH HAS THE SAME TYPE OF
R0301    CODING AS ABOVE, AND THE NET ROLL DETERMINED BY SHIFTING THE RESULTANT WORD RIGHT 8 PLACES AND SUBTRACTING FOUR.

R0303        THE WORD CORRESPONDING TO BD ROLL HAS A SIMILIAR INTERPRETATION, EXCEPT THAT BITS 12, 13, 14 ARE CODED
R0305    (AS ABOVE) TO GIVE THE NET ROLL TORQUE.

A0306                                                                          ROLL   TRANS    QUADFAIL   BIAS

 0307                17,3130   11000 1  RTABLE   OCT    11000                 0                           0
 0308                17,3131   22125 1           OCT    22125                 +                           0
 0309                17,3132   00252 1           OCT    00252                 -                           0
 0310                17,3133   11231 1           OCT    11231                 0      +Y(+Z)               3
 0311                17,3134   15421 1           OCT    15421                 +      +Y(+Z)               3
 0312                17,3135   04610 1           OCT    04610                 -      +Y(+Z)               3
 0313                17,3136   11146 1           OCT    11146                 0      -Y(-Z)               6
 0314                17,3137   15504 1           OCT    15504                 +      -Y(-Z)               6
 0315                17,3140   04442 1           OCT    04442                 -      -Y(-Z)               6
 0316                17,3141   11000 1           OCT    11000                 0             A(B)          9
 0317                17,3142   15504 1           OCT    15504                 +             A(B)          9
 0318                17,3143   04610 1           OCT    04610                 -             A(B)          9
 0319                17,3144   11000 1           OCT    11000                 0             C(D)         12
 0320                17,3145   15421 1           OCT    15421                 +             C(D)         12
 0321                17,3146   04442 1           OCT    04442                 -             C(D)         12
```

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```
R0322           RTABLE MASKS -

0323                    17,3147   03760 0  ACRJETS  OCT    03760
0324                    17,3150   34017 0  BDRJETS  OCT    34017
```

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R0325 Y, Z TRANSLATION TABLE

R0326 ONCE AC OR BD ROLL IS SELECTED THE QUAD PAIR WHICH IS NOT BEING USED TO SATISFY THE ROLL COMMANDS MAY BE
R0328 USED TO SATISFY THE REMAINING TRANSLATION COMMANDS. HOWEVER, WE MUST MAKE SURE THAT ROLL COMMANDS ARE SATISFIED
R0330 WHEN THEY OCCUR. THEREFORE, THE Y-Z TRANSLATIONS FROM THIS TABLE WILL BE IGNORED IF THE NET ROLL TORQUE OF THE
R0332 COMBINED WORD IS ZERO AND THE ROLL COMMANDS ARE NON-ZERO. THIS SITUATION WOULD OCCUR, FOR EXAMPLE, IF WE EN-
R0334 COUNTER SIMULTANEOUS +R +Y -Z COMMANDS AND A QUAD D FAILURE WHILE USING AC FOR ROLL.
R0336 TO FACILITATE THE LOGIC, THE Y-Z TRANSLATION TABLE HAS BEEN CODED IN A MANNER SIMILIAR TO THE ROLL TABLE
R0338 ABOVE.
R0339 BITS 9,10,11 ARE CODED TO GIVE THE NET ROLL TORQUE INCURRED BY Z-TRANSLATIONS. THE WORD SELECTED CAN THEN BE
R0341 ADDED TO THE AC-ROLL WORD AND THE RESULTANT ROLL TORQUE DETERMINED FROM THE COMBINED WORD. SIMILIARLY BITS
R0343 12,13,14 ARE CODED TO GIVE THE NET ROLL TORQUE INCURRED BY Y-TRANSLATIONS WHEN BD-ROLL IS SELECTED.

```
A0345                                                          TRANSLATION    QUADFAIL    BIAS

0346                17,3151   11000 1  YZTABLE  OCT   11000      0                        0
0347                17,3152   11231 1           OCT   11231      +Z(+Y)                   0
0348                17,3153   11146 1           OCT   11146      -Z(-Y)                   0
0349                17,3154   11000 1           OCT   11000      0           B(A)         3
0350                17,3155   04610 1           OCT   04610      +Z(+Y)      B(A)         3
0351                17,3156   15504 1           OCT   15504      -Z(-Y)      B(A)         3
0352                17,3157   11000 1           OCT   11000      0           D(C)         6
0353                17,3160   15421 1           OCT   15421      +Z(+Y)      D(C)         6
0354                17,3161   04442 1           OCT   04442      -Z(-Y)      D(C)         6
```

R0355 YZ-TABLE MASKS-

```
0356                17,3162   03417 0  BDZJETS  OCT   03417
0357                17,3163   34360 0  ACYJETS  OCT   34360
```

R0358 ADDITIONAL CONSTANTS

```
0359  REF  4  LAST  954      7715          =-2     =     NEG2
0360  REF  1                 6061          =-4     =     NEG4
```

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P0361            CALCULATION OF JET ON-TIMES

R0362       THE ROTATION COMMANDS (TAU:S), WHICH WERE DETERMINED FROM THE JET SWITCHING LOGIC ON THE BASIS OF SINGLE JET
R0364   OPERATION, MUST NOW BE UPDATED BY THE ACTUAL NUMBER OF JETS TO BE USED IN SATISFYING THESE COMMANDS.  TAU MUST
R0366   ALSO BE DECREMENTED ACCORDING TO THE EXPECTED TORQUE GENERATED BY THE NEW COMMANDS ACTING OVER THE NEXT T5 INT-
R0368   ERVAL.
R0369       IN ORDER TO MAINTAIN ACCURATE KNOWLEDGE OF VEHICLE ANGULAR RATES, WE MUST ALSO PROVIDE EXPECTED FIRING TIMES
R0371   (DFT:S, ALSO IN TERMS OF 1-JET OPERATION) FOR THE RATE FILTER.
R0372       NOTE THAT TRANSLATIONS CAN PRODUCE ROTATIONS EVEN THOUGH NO ROTATIONS WERE CALLED FOR.  NEVERTHELESS, WE MUST
R0374   UPDATE DFT.
R0375       WHEN THE ROTATIONS HAVE FINISHED, WE MUST PROVIDE CHANNEL INFORMATION TO THE T6 PROGRAM TO CONTINUE ON WITH
R0377   THE TRANSLATIONS.  THIS WILL BE DONE IN THE NEXT SECTION.  HOWEVER, TO INSURE THAT JETS ARE NOT FIRED FOR LESS
R0379   THAN A MINIMUM IMPULSE (14MS), ALL JET CHANNEL COMMANDS WILL BE HELD FIXED FROM THE START OF THE T5 PROGRAM FOR
R0381   ATLEAST 14MS UNTIL THE INITIALIZATION OF NEW COMMANDS.  MOREOVER, A 14MS ON-TIME WILL BE ADDED TO ANY ROTATIONAL
R0383   COMMANDS GENERATED BY THE MANUAL CONTROLS OR THE JET SWITCHING LOGIC, AND ALL TRANSLATION COMMANDS WILL BE
R0385   ACTIVE FOR ATLEAST ONE CYCLE OF THE T5 PROGRAM (.1SEC)

R0386            PITCH JET ON-TIME CALCULATION

 0387   REF   6  LAST 1040   17,3164  11'562 0  PITCHTIM CCS     TAU1
 0388   REF   1              17,3165  1 3174 1            TCF     PTAUPOS
 0389                        17,3166  1 3170 0            TCF     +2
 0390   REF   1              17,3167  1 3172 1            TCF     PTAUNEG
 0391   REF   2  LAST  108   17,3170  55'550 1            TS      DFT1            NO PITCH ROTATION
 0392   REF   1              17,3171  1 3372 0            TCF     PBYPASS         COMMANDS

 0393   REF   3  LAST 1041   17,3172  4 1523 0  PTAUNEG   CS      NPJETS
 0394   REF   4  LAST 1050   17,3173  55'523 0            TS      NPJETS
 0395   REF   7  LAST 1050   17,3174  3 1562 1  PTAUPOS   CA      TAU1
 0396                        17,3175  0 0006 1            EXTEND
 0397   REF   5  LAST 1050   17,3176  5 1523 1            INDEX   NPJETS
 0398   REF   1              17,3177  7 3353 0            MP      NJET
 0399   REF   3  LAST 1016   17,3200  55'461 1            TS      BLAST1
 0400   REF   1              17,3201  6 3306 1            AD      =-.1SEC
 0401                        17,3202  0 0006 1            EXTEND
 0402   REF   1              17,3203  6 3214 0            BZMF    ADI4MSP
 0403   REF   6  LAST 1050   17,3204  51'523 1            INDEX   NPJETS
 0404   REF   1              17,3205  3 3307 0            CA      DFTMAX          THE PITCH ON-TIME IS GREATER THAN .1 SEC
 0405   REF   3  LAST 1050   17,3206  55'550 1            TS      DFT1
 0406                        17,3207  4 0000 0            COM
 0407   REF   8  LAST 1050   17,3210  27'562 0            ADS     TAU1            UPDATE TAU1
 0408   REF   1              17,3211  3 3310 0            CAF     =+.1SEC         LIMIT THE LENGTH OF PITCH ROTATION
 0409   REF   4  LAST 1050   17,3212  55'461 1            TS      BLAST1          COMMANDS TO 0.1 SEC SO THAT ONLY
 0410   REF   1              17,3213  1 3357 1            TCF     ASMBLWP         X-TRANSLATIONS WILL CONTINUE ON SWITCH
A0411                                                                             OVER TO TVC
 0412   REF   5  LAST 1050   17,3214  4 1461 1  ADI4MSP   CS      BLAST1          SEE IF JET ON TIME LESS THAN
 0413   REF   2  LAST 1039   17,3215  6 3313 0            AD      =14MS           MINIMUM IMPULSE TIME
 0414                        17,3216  0 0006 1            EXTEND
 0415   REF   1              17,3217  6 3222 0            BZMF    PBLASTOK        IF SO LIMIT MINIMUM ON TIME TO 14 MS
 0416   REF   3  LAST 1050   17,3220  3 3313 0            CAF     =14MS
```

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```
0417   REF   6  LAST 1050   17,3221   55'461 1            TS      BLAST1
0418   REF   7  LAST 1051   17,3222   3 1461 0  PBLASTOK  CA      BLAST1
0419                        17,3223   0 0006 1            EXTEND                THE PITCH COMMANDS WILL BE COMPLETED
0420   REF   7  LAST 1050   17,3224   7 1523 0            MP      NPJETS        WITHIN THE TS-CYCLE TIME
0421   REF   4  LAST 1050   17,3225   23'550 0            LXCH    DFT1          FOR USE IN UPDATING RATE FILTER
0422   REF   9  LAST 1050   17,3226   55'562 0            TS      TAU1          ZERO TAU1 (ACC CONTAINS ZERO)
0423   REF   2  LAST 1050   17,3227   1 3357 1            TCF     ASMBLWP
```

P0424 YAW JET ON-TIME CALCULATION

```
0425  REF  6  LAST 1041   17,3230  11'563 1  YAWTIME  CCS    TAU2
0426  REF  1              17,3231  1 3240 0           TCF    YTAUPOS
0427                      17,3232  1 3234 0           TCF    +2
0428  REF  1              17,3233  1 3236 1           TCF    YTAUNEG
0429  REF  2  LAST  108   17,3234  55'551 0           TS     DFT2          NO YAW ROTATION COMMANDS
0430  REF  1              17,3235  1 3536 0           TCF    YBYPASS

0431  REF  2  LAST 1042   17,3236  4 1524 1  YTAUNEG  CS     NYJETS
0432  REF  3  LAST 1052   17,3237  55'524 1           TS     NYJETS
0433  REF  7  LAST 1052   17,3240  3 1563 0  YTAUPOS  CA     TAU2
0434                      17,3241  0 0006 1           EXTEND
0435  REF  4  LAST 1052   17,3242  5 1524 0           INDEX  NYJETS
0436  REF  2  LAST 1050   17,3243  7 3353 0           MP     NJET
0437  REF  3  LAST 1016   17,3244  55'463 0           TS     BLAST2
0438  REF  2  LAST 1050   17,3245  6 3306 1           AD     =-.1SEC
0439                      17,3246  0 0006 1           EXTEND
0440  REF  1              17,3247  6 3260 0           BZMF   AD14MSY
0441  REF  5  LAST 1052   17,3250  51'524 0           INDEX  NYJETS
0442  REF  2  LAST 1050   17,3251  3 3307 0           CA     DFTMAX        YAW COMMANDS WILL LAST LONGER THAN .1SEC
0443  REF  3  LAST 1052   17,3252  55'551 0           TS     DFT2
0444                      17,3253  4 0000 0           COM
0445  REF  8  LAST 1052   17,3254  27'563 1           ADS    TAU2          DECREMENT TAU2
0446  REF  2  LAST 1050   17,3255  3 3310 0           CAF    =+.1SEC       LIMIT THE LENGTH OF YAW ROTATION COMMAND
0447  REF  4  LAST 1052   17,3256  55'463 0           TS     BLAST2        TO 0.1 SEC SO THAT ONLY X-TRANSLATION
0448  REF  1              17,3257  1 3523 1           TCF    ASMBLWY       WILL CONTINUE ON SWITCH OVER TO TVC

0449  REF  5  LAST 1052   17,3260  4 1463 0  AD14MSY  CS     BLAST2        SEE IF JET ON-TIME LESS THAN
0450  REF  4  LAST 1050   17,3261  6 3313 0           AD     =14MS         MINIMUM IMPULSE TIME
0451                      17,3262  0 0006 1           EXTEND
0452  REF  1              17,3263  6 3266 0           BZMF   YBLASTOK      IF SO, LIMIT MINIMUM ON-TIME TO 14 MS
0453  REF  5  LAST 1052   17,3264  3 3313 0           CAF    =14MS
0454  REF  6  LAST 1052   17,3265  55'463 0           TS     BLAST2
0455  REF  7  LAST 1052   17,3266  3 1463 1  YBLASTOK CA     BLAST2        YAW COMMANDS WILL BE COMPLETED WITHIN
0456                      17,3267  0 0006 1           EXTEND                THE T5CYCLE TIME
0457  REF  6  LAST 1052   17,3270  7 1524 1           MP     NYJETS
0458  REF  4  LAST 1052   17,3271  23'551 1           LXCH   DFT2
0459  REF  9  LAST 1052   17,3272  55'563 1           TS     TAU2          ZERO TAU2
0460  REF  2  LAST 1052   17,3273  1 3523 1           TCF    ASMBLWY
```

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```
P0461            ROLL ON-TIME CALCULATION-

 0462  REF   9  LAST 1045   17,3274  11'561 0  ROLLTIME CCS    TAU
 0463  REF   1              17,3275  1 3314 0           TCF    RBLAST
 0464                       17,3276  1 3300 0           TCF    +2
 0465  REF   2  LAST 1053   17,3277  1 3314 0           TCF    RBLAST
 0466  REF   6  LAST 1046   17,3300  51'522 0           INDEX  NRJETS
 0467  REF   3  LAST 1052   17,3301  3 3307 0           CA     DFTMAX     UPDATE DFT EVEN THO NO ROLL COMMANDS ARE
 0468  REF   3  LAST 1006   17,3302  55'547 1           TS     DFT        PRESENT
 0469  REF   1              17,3303  1 3516 1           TCF    RBYPASS

 0470                       17,3304   77037 0           DEC    -480       = -.3SEC
 0471                       17,3305   77277 0           DEC    -320       = -.2SEC
 0472                       17,3306   77537 0  =-.1SEC  DEC    -160       = -.1SEC
 0473                       17,3307   00000 1  DFTMAX   DEC    0             0
 0474                       17,3310   00240 1  =+.1SEC  DEC    160        = +.1SEC
 0475                       17,3311   00500 1           DEC    320        = +.2SEC
 0476                       17,3312   00740 1           DEC    480        = +.3SEC
 0477                       17,3313   00027 1  =14MS    DEC    23         =14MS

 0478  REF  10  LAST 1053   17,3314  3 1561 1  RBLAST   CA     TAU
 0479                       17,3315  0 0006 1           EXTEND
 0480  REF   7  LAST 1053   17,3316  5 1522 0           INDEX  NRJETS
 0481  REF   3  LAST 1052   17,3317  7 3353 0           MP     NJET
 0482  REF   2  LAST  103   17,3320  55'457 1           TS     BLAST      BLAST IS AN INTERMEDIATE VARIABLE
A0483                                                                    USED IN DETERMINING THE JET ON-TIMES
 0484  REF   3  LAST 1052   17,3321  6 3306 1           AD     =-.1SEC
 0485                       17,3322  0 0006 1           EXTEND
 0486  REF   1              17,3323  6 3334 0           BZMF   AD14MSR
 0487  REF   8  LAST 1053   17,3324  51'522 0           INDEX  NRJETS     THE ROLL ROTATION WILL LAST LONGER
 0488  REF   4  LAST 1053   17,3325  3 3307 0           CA     DFTMAX     THAN THE T5 CYCLE TIME
 0489  REF   4  LAST 1053   17,3326  55'547 1           TS     DFT
 0490                       17,3327  4 0000 0           COM
 0491  REF  11  LAST 1053   17,3330  27'561 0           ADS    TAU
 0492  REF   3  LAST 1052   17,3331  3 3310 0           CAF    =+.1SEC    LIMIT THE LENGTH OF ROLL ROTATION
 0493  REF   3  LAST 1053   17,3332  55'457 1           TS     BLAST      COMMANDS TO 0.1 SEC SO THAT ONLY Y-Z
 0494  REF   1              17,3333  1 3377 0           TCF    ASMBLWR    TRANSLATION COMMANDS CONTINUE

 0495  REF   4  LAST 1053   17,3334  4 1457 1  AD14MSR  CS     BLAST      SEE IF THE JET ON-TIME LESS THAN
 0496  REF   6  LAST 1052   17,3335  6 3313 0           AD     =14MS      MINIMUM IMPULSE TIME
 0497                       17,3336  0 0006 1           EXTEND
 0498  REF   1              17,3337  6 3342 1           BZMF   RBLASTOK
 0499  REF   7  LAST 1053   17,3340  3 3313 0           CAF    =14MS      IF SO, LIMIT MINIMUM ON-TIME TO 14 MS
 0500  REF   5  LAST 1053   17,3341  55'457 1           TS     BLAST
 0501  REF   6  LAST 1053   17,3342  3 1457 0  RBLASTOK CA     BLAST
 0502                       17,3343  0 0006 1           EXTEND
 0503  REF   9  LAST 1053   17,3344  7 1522 1           MP     NRJETS
 0504  REF   5  LAST 1053   17,3345  23'547 0           LXCH   DFT
 0505  REF  12  LAST 1053   17,3346  55'561 0           TS     TAU        ZERO TAU
 0506  REF   2  LAST 1053   17,3347  1 3377 0           TCF    ASMBLWR
```

```
0507                    17,3350   65252 1           DEC     -.333333        = -1/3
0508                    17,3351   57777 1           DEC     -.500000        = -1/2
0509                    17,3352   40000 0           DEC     -.999999        = -1 (NEGMAX)
0510                    17,3353   00000 1  NJET     DEC     0
0511                    17,3354   37777 1           DEC     .999999         = +1 (POSMAX)
0512                    17,3355   20000 0           DEC     .500000         = +1/2
0513                    17,3356   12525 0           DEC     .333333         = +1/3
```

P0514 WHEN THE ROTATION COMMANDS ARE COMPLETED. IT IS NECESSARY TO REPLACE THESE COMMANDS BY NEW COMMANDS WHICH
R0516 CONTINUE ON WITH THE TRANSLATIONS IF ANY ARE PRESENT.
R0517 IN THIS SECTION THESE NEW COMMANDS ARE GENERATED AND STORED FOR REPLACEMENT OF THE CHANNEL COMMANDS WHEN THE
R0519 CORRESPONDING ROTATIONS ARE COMPLETED.

R0520 GENERATION OF THE SECOND PITCH(X-TRANS) WORD...PWORD2

```
0521   REF   8  LAST 1045   17,3357  11'626 0  ASMBLWP  CCS    RACFAIL
0522   REF   1              17,3360  1 3366 0           TCF    FPX2      IF FAILURE ON AC IGNORE X-TRANSLATION
0523                        17,3361  1 3363 0           TCF    +2
0524   REF   2  LAST 1055   17,3362  1 3366 0           TCF    FPX2
0525   REF   7  LAST 1041   17,3363  51'513 1           INDEX  XNDX1
0526   REF   5  LAST 1045   17,3364  3 2660 0           CA     XLNNDX
0527   REF 234  LAST 1045   17,3365  50 000 1           INDEX  A
0528   REF   3  LAST 1042   17,3366  3 2714 1  FPX2     CA     PYTABLE
0529   REF   2  LAST 1041   17,3367  7 2733 0           MASK   PJETS
0530   REF   2  LAST  103   17,3370  55'454 1           TS     PWORD2
0531   REF   1              17,3371  1 3230 1           TCF    YAWTIME

0532   REF   3  LAST 1041   17,3372  3 1453 1  PBYPASS  CA     PWORD1    THE T6 PROGRAM WILL LOAD PWORD2
0533   REF   3  LAST 1055   17,3373  55'454 1           TS     PWORD2    UPON ENTRY
0534   REF 194  LAST 1036   17,3374  3 5021 1           CAF    ZERO
0535   REF   8  LAST 1051   17,3375  55'461 1           TS     BLAST1    THERE IS NO PWORD2
0536   REF   2  LAST 1055   17,3376  1 3230 1           TCF    YAWTIME
```

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P0537 GENERATION OF THE SECOND ROLL (Y,Z) WORD (RWORD2)

```
0538  REF   8  LAST 1045   17,3377  11'515 0  ASMBLWR  CCS   YNDX      CHECK FOR Y-TRANS
0539  REF   1               17,3400  1 3410 0          TCF   ACBD2Y
0540  REF 195  LAST 1055   17,3401  3 5021 1  ND2Y     CAF   ZERO
0541  REF   2  LAST  103   17,3402  55'452 1          TS    RWORD2
0542  REF   7  LAST 1045   17,3403  11'516 0          CCS   ZNDX      CHECK FOR Z-TRANS
0543  REF   1               17,3404  1 3453 1          TCF   ACBD2Z
0544  REF 196  LAST 1056   17,3405  3 5021 1  ND2Z     CAF   ZERO
0545  REF   3  LAST 1056   17,3406  27'452 1          ADS   RWORD2
0546  REF   1               17,3407  1 3164 0          TCF   PITCHTIM    RWORD2 ASSEMBLED

0547  REF   4  LAST 1043   17,3410  11'630 1  ACBD2Y   CCS   ACORBD
0548  REF   1               17,3411  1 3426 0          TCF   AC2Y       CAN DO Y-TRANS
0549  REF   2  LAST 1056   17,3412  1 3426 0          TCF   AC2Y
0550                        17,3413  1 3414 1          TCF   +1         USING AC FOR ROLL
0551  REF   9  LAST 1055   17,3414  11'626 0          CCS   RACFAIL
0552  REF   1               17,3415  1 3401 0          TCF   ND2Y       USING AC AND AC HAS FAILED
0553                        17,3416  1 3420 0          TCF   +2
0554  REF   2  LAST 1056   17,3417  1 3401 0          TCF   ND2Y       DITTO

0555  REF   9  LAST 1056   17,3420  51'515 1          INDEX YNDX       NO FAILURES, CAN DO Y
0556  REF   6  LAST 1055   17,3421  3 2660 0          CA    XLNNDX
0557  REF 235  LAST 1055   17,3422  50 000 1          INDEX A
0558  REF   3  LAST 1045   17,3423  3 3130 0          CA    RTABLE
0559  REF   2  LAST 1043   17,3424  7 3147 1          MASK  ACRJETS
0560  REF   3  LAST 1056   17,3425  1 3402 0          TCF   ND2Y +1

0561  REF  10  LAST 1056   17,3426  11'626 0  AC2Y     CCS   RACFAIL
0562  REF  38  LAST 1045   17,3427  3 6214 0          CAF   THREE
0563                        17,3430  1 3432 0          TCF   +2
0564  REF  32  LAST 1045   17,3431  3 6211 0          CAF   SIX
0565  REF  10  LAST 1056   17,3432  51'515 1          INDEX YNDX
0566  REF   3  LAST 1045   17,3433  6 2771 1          AD    XLNINDX
0567  REF 236  LAST 1056   17,3434  50 000 1          INDEX A
0568  REF   3  LAST 1045   17,3435  3 3151 1          CA    YZTABLE
0569  REF   2  LAST 1045   17,3436  7 3163 1          MASK  ACYJETS
0570  REF   4  LAST 1056   17,3437  55'452 1          TS    RWORD2
0571                        17,3440  0 0006 1          EXTEND
0572  REF  34  LAST 1046   17,3441  7 5014 0          MP    BIT4
0573  REF   3  LAST 1046   17,3442  6 7715 0          AD    =-2
0574  REF  10  LAST 1053   17,3443  55'522 1          TS    NRJETS
0575  REF   7  LAST 1053   17,3444  4 1457 1          CS    BLAST
0576  REF   4  LAST 1053   17,3445  6 3310 0          AD    =+.1SEC
0577                        17,3446  0 0006 1          EXTEND
0578  REF  11  LAST 1056   17,3447  7 1522 1          MP    NRJETS
0579  REF  91  LAST 1025   17,3450  3 0001 0          CA    L
0580  REF   6  LAST 1053   17,3451  27'547 1          ADS   DFT
0581  REF   4  LAST 1056   17,3452  1 3403 1          TCF   ND2Y +2
```

```
0582   REF   5  LAST 1056   17,3453  11'630 1  ACBD2Z   CCS    ACORBD
0583   REF   1              17,3454  1 3504 1           TCF    BDF2Z          USING BD-ROLL
0584   REF   2  LAST 1057   17,3455  1 3504 1           TCF    BDF2Z          MUST CHECK FOR BD FAILURES
0585                        17,3456  1 3457 0           TCF    +1
0586   REF   8  LAST 1045   17,3457  11'627 1           CCS    RBDFAIL        USING AC FOR ROLL, CAN DO Z-TRANS
0587   REF  39  LAST 1056   17,3460  3 6214 0           CAF    THREE
0588                        17,3461  1 3463 1           TCF    +2
0589   REF  33  LAST 1056   17,3462  3 6211 0           CAF    SIX
0590   REF   8  LAST 1056   17,3463  51'516 1           INDEX  ZNDX
0591   REF   4  LAST 1056   17,3464  6 2771 1           AD     XLN1NDX
0592   REF 237  LAST 1056   17,3465  50 000 1           INDEX  A
0593   REF   4  LAST 1056   17,3466  3 3151 1           CA     YZTABLE
0594   REF   2  LAST 1044   17,3467  7 3162 0           MASK   BDZJETS
0595   REF   5  LAST 1056   17,3470  27'452 1           ADS    RWORD2
0596                        17,3471  0 0006 1           EXTEND
0597   REF  40  LAST 1044   17,3472  7 5011 0           MP     BIT7
0598   REF   4  LAST 1056   17,3473  6 7715 0           AD     =-2
0599   REF  12  LAST 1056   17,3474  55'522 1           TS     NRJETS
0600   REF   8  LAST 1056   17,3475  4 1457 1           CS     BLAST
0601   REF   5  LAST 1056   17,3476  6 3310 0           AD     =+.1SEC
0602                        17,3477  0 0006 1           EXTEND
0603   REF  13  LAST 1057   17,3500  7 1522 1           MP     NRJETS
0604   REF  92  LAST 1056   17,3501  3 0001 0           CA     L
0605   REF   7  LAST 1056   17,3502  27'547 1           ADS    DFT
0606   REF   2  LAST 1056   17,3503  1 3164 0           TCF    PITCHTIM

0607   REF   9  LAST 1057   17,3504  11'627 1  BDF2Z    CCS    RBDFAIL
0608   REF   1              17,3505  1 3405 1           TCF    NO2Z           USING BD-ROLL AND BD HAS FAILED
0609                        17,3506  1 3510 1           TCF    +2
0610   REF   2  LAST 1057   17,3507  1 3405 1           TCF    NO2Z           DITTO
0611   REF   9  LAST 1057   17,3510  51'516 1           INDEX  ZNDX
0612   REF   7  LAST 1056   17,3511  3 2660 0           CA     XLNNDX
0613   REF 238  LAST 1057   17,3512  50 000 1           INDEX  A
0614   REF   4  LAST 1056   17,3513  3 3130 0           CA     RTABLE
0615   REF   2  LAST 1045   17,3514  7 3150 1           MASK   BDRJETS
0616   REF   3  LAST 1057   17,3515  1 3406 1           TCF    NO2Z +1

0617   REF  11  LAST 1046   17,3516  3 1451 0  RBYPASS  CA     RWORD1
0618   REF   6  LAST 1057   17,3517  55'452 1           TS     RWORD2
0619   REF 197  LAST 1056   17,3520  3 5021 1           CAF    ZERO
0620   REF   9  LAST 1057   17,3521  55'457 1           TS     BLAST
0621   REF   3  LAST 1057   17,3522  1 3164 0           TCF    PITCHTIM
```

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P0622 GENERATION OF THE SECOND YAW (X-TRANS) WORD...YWORD2

```
0623   REF  10  LAST 1057   17,3523  11'627 1  ASMBLWY  CCS    RBDFAIL
0624   REF   1              17,3524  1 3532 1           TCF    FYX2        IF FAILURE ON BD IGNORE X-TRANSLATION
0625                        17,3525  1 3527 0           TCF    +2
0626   REF   2  LAST 1058   17,3526  1 3532 1           TCF    FYX2
0627   REF   6  LAST 1042   17,3527  51'514 0           INDEX  XNDX2
0628   REF   8  LAST 1057   17,3530  3 2660 0           CA     XLNNDX
0629   REF 239  LAST 1057   17,3531  50 000 1           INDEX  A
0630   REF   4  LAST 1055   17,3532  3 2714 1  FYX2     CA     PYTABLE
0631   REF   2  LAST 1042   17,3533  7 2734 1           MASK   YJETS
0632   REF   2  LAST  103   17,3534  55'456 0           TS     YWORD2
0633   REF   1              17,3535  1 3542 0           TCF    T6SETUP

0634   REF   3  LAST 1042   17,3536  3 1455 1  YBYPASS  CA     YWORD1
0635   REF   3  LAST 1058   17,3537  55'456 0           TS     YWORD2
0636   REF 198  LAST 1057   17,3540  3 5021 1           CAF    ZERO
0637   REF   8  LAST 1052   17,3541  55'463 0           TS     BLAST2
```

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P0638 SORT THE JET ON-TIMES

R0639 AT THIS POINT ALL THE CHANNEL COMMANDS AND JET ON-TIMES HAVE BEEN DETERMINED. IN SUMMARY THESE ARE-

R0641 RWORD1
R0642 RWORD2 BLAST

R0643 PWORD1
R0644 PWORD2 BLAST1

R0645 YWORD1
R0646 YWORD2 BLAST2

R0647 IN THIS SECTION THE JET ON-TIMES ARE SORTED AND THE SEQUENCE OF T6 INTERRUPTS IS DETERMINED. TO FACILITATE
R0649 THE SORTING PROCESS AND THE T6 PROGRAM, THE VARIABLES BLAST, BLAST1, BLAST2, ARE RESERVED AS DOUBLE PRECISION
R0651 WORDS. THE LOWER PART OF THESE WORDS CONTAIN A BRANCH INDEX ASSOCIATED WITH THE ROTATION AXIS OF THE HIGHER
R0653 ORDER WORD.

```
 0654   REF 199  LAST 1058   17,3542  3 5021 1  T6SETUP  CAF     ZERO          BRANCH INDEX FOR ROLL
 0655   REF  10  LAST 1057   17,3543  55'460 0           TS      BLAST +1
 0656   REF  14  LAST 1030   17,3544  3 5015 0           CAF     FOUR          BRANCH INDEX FOR PITCH
 0657   REF   9  LAST 1055   17,3545  55'462 1           TS      BLAST1 +1
 0658   REF   9  LAST 1016   17,3546  3 5024 1           CAF     ELEVEN        BRANCH INDEX FOR YAW
 0659   REF   9  LAST 1058   17,3547  55'464 1           TS      BLAST2 +1

 0660   REF  11  LAST 1059   17,3550  4 1457 1           CS      BLAST
 0661   REF  10  LAST 1059   17,3551  6 1461 0           AD      BLAST1
 0662                        17,3552  0 0006 1           EXTEND
 0663   REF   1              17,3553  6 3577 1           BZMF    DXCHT12       T1 GR T2
 0664   REF  11  LAST 1059   17,3554  4 1461 1  CHECKT23 CS      BLAST1
 0665   REF  10  LAST 1059   17,3555  6 1463 1           AD      BLAST2
 0666                        17,3556  0 0006 1           EXTEND
 0667   REF   1              17,3557  6 3603 1           BZMF    DXCHT23
 0668   REF  12  LAST 1059   17,3560  4 1461 1  CALCDT6  CS      BLAST1
 0669   REF  11  LAST 1059   17,3561  27'463 0           ADS     BLAST2
 0670   REF  12  LAST 1059   17,3562  4 1457 1           CS      BLAST
 0671   REF  13  LAST 1059   17,3563  27'461 1           ADS     BLAST1        END OF SORTING PROCEDURE
 0672                        17,3564  0 0006 1           EXTEND                RESET T5LOC TO BEGIN PHASE1
 0673   REF   1              17,3565  3 3576 0           DCA     RCS2CADR
 0674   REF  21  LAST 1036   17,3566  53'313 0           DXCH    T5LOC
 0675   REF  69  LAST 1018   17,3567  4 5017 0  ENDJETS  CS      BIT1          RESET BIT1 FOR INITIALIZATION OF
 0676   REF  49  LAST 1033   17,3570  7 1501 0           MASK    RCSFLAGS      T6 PROGRAM
 0677   REF  50  LAST 1059   17,3571  55'501 0           TS      RCSFLAGS
 0678   REF 200  LAST 1059   17,3572  4 5021 0           CS      ZERO          RESET T5PHASE FOR PHASE1
 0679   REF  10  LAST 1022   17,3573  55'465 0           TS      T5PHASE
 0680   REF  40  LAST 1036   17,3574  1 5333 0           TCF     RESUME        RESUME INTERRUPTED PROGRAM


 0681   REF  38  LAST 1039   E6,1510                     EBANK=  KMPAC
 0682   REF   5  LAST 1002   17,3575   02122 1  RCS2CADR 2CADR   RCSATT
 0682                        17,3576   42066 1
```

```
0683   REF  13  LAST 1059   17,3577  53'460 0  DXCHT12  DXCH   BLAST
0684   REF  14  LAST 1059   17,3600  53'462 1           DXCH   BLAST1
0685   REF  14  LAST 1060   17,3601  53'460 0           DXCH   BLAST
0686   REF   1              17,3602  1 3554 1           TCF    CHECKT23

0687   REF  15  LAST 1060   17,3603  53'462 1  DXCHT23  DXCH   BLAST1
0688   REF  12  LAST 1059   17,3604  53'464 1           DXCH   BLAST2
0689   REF  16  LAST 1060   17,3605  53'462 1           DXCH   BLAST1
0690   REF  15  LAST 1060   17,3606  4 1457 1           CS     BLAST
0691   REF  17  LAST 1060   17,3607  6 1461 0           AD     BLAST1
0692                        17,3610  0 0006 1           EXTEND
0693                        17,3611  6 3613 0           BZMF   +2
0694   REF   1              17,3612  1 3560 0           TCF    CALCDT6
0695   REF  16  LAST 1060   17,3613  53'460 0           DXCH   BLAST
0696   REF  18  LAST 1060   17,3614  53'462 1           DXCH   BLAST1
0697   REF  17  LAST 1060   17,3615  53'460 0           DXCH   BLAST
0698   REF   2  LAST 1060   17,3616  1 3560 0           TCF    CALCDT6
```

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P0699 T6 PROGRAM AND CHANNEL SETUP

```
0700                                21,3765                         BANK    21
0701  REF   1                      17,2000                         SETLOC  DAPS5
0702                                17,3617                         BANK

0703  REF  19  LAST 1039           17,3617  22 016 0  T6START       LXCH    BANKRUPT
0704                                17,3620  0 0006 1               EXTEND
0705  REF  15  LAST 1039           17,3621  22 012 1               QXCH    QRUPT
0706  REF   5  LAST 1039           17,3622  10 031 1               CCS     TIME6          CHECK TO SEE IF TIME6 WAS RESET
0707  REF  41  LAST 1059           17,3623  1 5333 0               TCF     RESUME         AFTER T6RUPT OCCURED(IN T5RUPT)
0708                                17,3624  1 3626 1               TCF     +2             IF SO WAIT FOR NEXT T6RUPT BEFORE
0709  REF  42  LAST 1061           17,3625  1 5333 0               TCF     RESUME         TAKING ACTION

0710  REF  51  LAST 1059           17,3626  4 1501 0               CS      RCSFLAGS
0711  REF  70  LAST 1059           17,3627  7 5017 0               MASK    BIT1           IF BIT1 IS 0 RESET TO 1
0712                                17,3630  0 0006 1               EXTEND                 AND INITIALIZE CHANNEL
0713  REF   1                      17,3631  1 3642 0               BZF     T6RUPTOR
0714  REF  52  LAST 1061           17,3632  27'501 0               ADS     RCSFLAGS
0715  REF  12  LAST 1057           17,3633  3 1451 0               CA      RWORD1
0716                                17,3634  0 0006 1               EXTEND                 INITIALIZE CHANNELS 5,6 WITH WORD1
0717  REF   7  LAST  997           17,3635  01 006 0               WRITE   CHAN6
0718  REF   4  LAST 1055           17,3636  3 1453 1               CA      PWORD1
0719  REF   4  LAST 1058           17,3637  6 1455 1               AD      YWORD1
0720                                17,3640  0 0006 1               EXTEND
0721  REF   3  LAST  697           17,3641  01 005 0               WRITE   CHAN5

0722  REF  18  LAST 1060           17,3642  11'457 1  T6RUPTOR      CCS     BLAST
0723  REF   1                      17,3643  1 3722 1               TCF     ZBLAST         ZERO BLAST1
0724  REF   1                      17,3644  1 3661 1               TCF     REPLACE        REPLACE WORD1
0725                                17,3645  1 3647 0               TCF     +2
0726  REF   2  LAST 1061           17,3646  1 3661 1               TCF     REPLACE
0727  REF  19  LAST 1060           17,3647  11'461 1  T6L1          CCS     BLAST1
0728  REF   1                      17,3650  1 3725 0               TCF     ZBLAST1
0729  REF   1                      17,3651  1 3666 0               TCF     REPLACE1
0730                                17,3652  1 3654 1               TCF     +2
0731  REF   2  LAST 1061           17,3653  1 3666 0               TCF     REPLACE1
0732  REF  13  LAST 1060           17,3654  11'463 0  T6L2          CCS     BLAST2
0733  REF   1                      17,3655  1 3730 1               TCF     ZBLAST2
0734  REF   1                      17,3656  1 3673 1               TCF     REPLACE2
0735  REF  43  LAST 1061           17,3657  1 5333 0               TCF     RESUME
0736  REF   2  LAST 1061           17,3660  1 3673 1               TCF     REPLACE2

0737  REF  19  LAST 1061           17,3661  51'460 1  REPLACE       INDEX   BLAST +1
0738  REF   1                      17,3662  0 3700 0               TC      REPLACER
0739  REF 112  LAST 1043           17,3663  4 5017 0               CS      ONE
0740  REF  20  LAST 1061           17,3664  55'457 1               TS      BLAST
0741  REF   1                      17,3665  1 3647 0               TCF     T6L1

0742  REF  20  LAST 1061           17,3666  51'462 0  REPLACE1      INDEX   BLAST1 +1
```

```
0743   REF   2  LAST 1061   17,3667  0 3700 0           TC      REPLACER
0744   REF 113  LAST 1061   17,3670  4 5017 0           CS      ONE
0745   REF  21  LAST 1061   17,3671  55'461 1           TS      BLAST1
0746   REF   1              17,3672  1 3654 1           TCF     T6L2

0747   REF  14  LAST 1061   17,3673  51'464 0  REPLACE2 INDEX   BLAST2 +1
0748   REF   3  LAST 1062   17,3674  0 3700 0           TC      REPLACER
0749   REF 114  LAST 1062   17,3675  4 5017 0           CS      ONE
0750   REF  15  LAST 1062   17,3676  55'463 0           TS      BLAST2
0751   REF  44  LAST 1061   17,3677  1 5333 0           TCF     RESUME

0752   REF   7  LAST 1057   17,3700  3 1452 0  REPLACER CA      RWORD2
0753                        17,3701  0 0006 1           EXTEND                  INITIALIZE CHANNELS 5,6 WITH WORD 2
0754   REF   8  LAST 1061   17,3702  01 006 0           WRITE   CHAN6
0755   REF 204  LAST 1021   17,3703  0 0002 0           TC      Q

0756   REF   3  LAST 1058   17,3704  3 2734 0  REPLACEP CA      YJETS
0757                        17,3705  0 0006 1           EXTEND
0758   REF   4  LAST 1061   17,3706  02 005 0           RAND    CHAN5
0759   REF   4  LAST 1055   17,3707  6 1454 0           AD      PWORD2
0760                        17,3710  0 0006 1           EXTEND
0761   REF   5  LAST 1062   17,3711  01 005 0           WRITE   CHAN5
0762   REF 205  LAST 1062   17,3712  0 0002 0           TC      Q

0763   REF   3  LAST 1055   17,3713  3 2733 1  REPLACEY CA      PJETS
0764                        17,3714  0 0006 1           EXTEND
0765   REF   6  LAST 1062   17,3715  02 005 0           RAND    CHAN5
0766   REF   4  LAST 1058   17,3716  6 1456 1           AD      YWORD2
0767                        17,3717  0 0006 1           EXTEND
0768   REF   7  LAST 1062   17,3720  01 005 0           WRITE   CHAN5
0769   REF 206  LAST 1062   17,3721  0 0002 0           TC      Q

0770   REF 201  LAST 1059   17,3722  3 5021 1  ZBLAST   CAF     ZERO
0771   REF  21  LAST 1061   17,3723  57'457 0           XCH     BLAST
0772   REF   1              17,3724  1 3732 0           TCF     ENABT6
0773   REF 202  LAST 1062   17,3725  3 5021 1  ZBLAST1  CAF     ZERO
0774   REF  22  LAST 1062   17,3726  57'461 0           XCH     BLAST1
0775   REF   2  LAST 1062   17,3727  1 3732 0           TCF     ENABT6
0776   REF 203  LAST 1062   17,3730  3 5021 1  ZBLAST2  CAF     ZERO
0777   REF  16  LAST 1062   17,3731  57'463 1           XCH     BLAST2
0778   REF   6  LAST 1061   17,3732  54 031 1  ENABT6   TS      TIME6
0779   REF  10  LAST 1039   17,3733  3 5001 0           CAF     NEGMAX
0780                        17,3734  0 0006 1           EXTEND
0781   REF  11  LAST 1039   17,3735  05 013 0           WOR     CHAN13          ENABLE T6RUPT
0782   REF  45  LAST 1062   17,3736  1 5333 0           TCF     RESUME

R0783                  END OF T6 INTERRUPT

0784                        17,3737           ENDSLECT EQUALS
```

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```
R0001   SUBROUTINE TO READ GYMBAL ANGLES AND FORM DIFFERENCES.  GIMBAL ANGLES ARE SAVED IN 2S COMPLEMENT, BUT THE
R0003   DIFFERENCES ARE IN 1S COMP.     ENTER AND READ ANGLES EACH .1 SEC.

R0004           CM/DSTBY = 1  FOR DAP OPERATION
R0005           CM/DSTBY = 0 TO TERMINATE DAP OPERATION.

 0006                           15,2434                          BANK   15

 0007   REF   1                 15,2000                          SETLOC ETRYDAP
 0008                           15,2434                          BANK

 0009   REF   1                                                  COUNT  15/DAPEN

 0010   REF  29  LAST  889      E6,1661                          EBANK= AOG

 0011   REF   6  LAST  998      15,2434  3 4377 0  READGYMB CA     TEN             KEEP RESTART DT GOING RELATIVE TO
 0012   REF   5  LAST  825      15,2435  27'725 1         ADS    CM/GYMDT        PIPTIME. (GROUP 6)

A0013                                                             IF A RESTART OCCURS, SKIP PRESENT CYCLE. THE
A0014                                                             PHASCHNG PROTECTION IS IN CM/DAPIC.

 0015   REF  40  LAST 1022      15,2436  3 5012 1         CA     BIT6            CHECK FOR FINE ALIGN MODE OF CDU.
 0016   REF  28  LAST 1015      15,2437  7 1321 1         MASK   IMODES33        ( PROTECT AOG/PIP ETC AS WELL AS
 0017                           15,2440  0 0006 1         EXTEND                  GIMBAL DIFFERENCES)
 0018   REF   1                 15,2441  1 2447 0         BZF    READGYM1        OK

 0019   REF  71  LAST 1061      15,2442  4 5017 0         CS     BIT1            NOT IN FINE ALIGN. SO IDLE.
 0020   REF  10  LAST  887      15,2443  7 0102 0         MASK   CM/FLAGS        SET GYMDIFSW =0
 0021   REF  11  LAST 1063      15,2444  54 102 0         TS     CM/FLAGS
 0022   REF   1                 15,2445  0 6000 1         TC     FLUSHJET        QUENCH JETS. SINCE MAY BE A WHILE.
 0023   REF   1                 15,2446  0 2514 0         TC     CM/GYMIC +2

 0024   REF  27  LAST 1037      15,2447  3 0032 0  READGYM1 CA     CDUX
 0025   REF  30  LAST 1063      15,2450  57'661 1         XCH    AOG
 0026                           15,2451  0 0006 1         EXTEND
 0027   REF  31  LAST 1063      15,2452  21'661 0         MSU    AOG             -DELAOG=AOG(N-1) - AOG(N)
 0028   REF   2  LAST  111      15,2453  55'675 0         TS     -DELAOG

 0029   REF  15  LAST 1027      15,2454  3 0033 1         CA     CDUY
 0030   REF   2  LAST  111      15,2455  57'662 1         XCH    AIG
 0031                           15,2456  0 0006 1         EXTEND
 0032   REF   3  LAST 1063      15,2457  21'662 0         MSU    AIG
 0033   REF   2  LAST  111      15,2460  55'676 0         TS     -DELAIG

 0034   REF  21  LAST 1037      15,2461  3 0034 0         CA     CDUZ
 0035   REF   3  LAST  824      15,2462  57'663 0         XCH    AMG
 0036                           15,2463  0 0006 1         EXTEND
 0037   REF   4  LAST 1063      15,2464  21'663 1         MSU    AMG
 0038   REF   2  LAST  111      15,2465  55'677 1         TS     -DELAMG
```

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```
0039   REF  12  LAST 1063   15,2466  4 0102 0  DOBRATE? CS     CM/FLAGS      CM/DSTBY=103D BIT2  GYMDIFSW=104D BIT1
0040   REF  40  LAST 1057   15,2467  7 6214 1            MASK   THREE
0041   REF 240  LAST 1058   15,2470  50 000 1            INDEX  A
0042                        15,2471  0 2472 1            TC     +1
0043   REF   1              15,2472  0 2501 1            TC     DOBRATE       OK, GO ON
0044   REF   2  LAST 1063   15,2473  0 2512 0            TC     CM/GYMIC      DONT CALC BODYRATE ON FIRST PASS.
0045                        15,2474  12 475 1            NOOP
0046   REF   2  LAST 1063   15,2475  0 6000 1            TC     FLUSHJET      TURN OFF ALL JETS

0047   REF  90  LAST  891   15,2476  0 5412 0            TC     PHASCHNG
0048                        15,2477   00006 1            OCT    00006         DEACTIVATE DAP GROUP 6.

0049   REF  51  LAST  996   15,2500  0 5324 1            TC     TASKOVER

0050   REF 115  LAST 1062   15,2501  3 5017 1  DOBRATE   CA     ONE           DO BODYRATE
0051   REF   2  LAST  112   15,2502  55'720 1  DOBRATE1  TS     JETEM         SKIP BODYRATE.

0052   REF   7  LAST 1063   15,2503  3 4377 0            CA     TEN           KEEP CDU READ GOING.
0053   REF  46  LAST  982   15,2504  0 5245 1            TC     WAITLIST
0054   REF  32  LAST 1063   E6,1661                      EBANK= AOG
0055   REF   2  LAST  219   15,2505   02434 0            2CADR  READGYMB
0055                        15,2506   32066 0

A0056                                                    DOES NOT PROTECT TEMK, SQ IN SPSIN/COS

0057   REF   3  LAST 1064   15,2507  11'720 1            CCS    JETEM
0058   REF   1              15,2510  0 2536 0            TC     BODYRATE
0059   REF  52  LAST 1064   15,2511  0 5324 1            TC     TASKOVER      SKIP CALC ON INITIAL PASS. (PASSES)

0060   REF  13  LAST 1064   15,2512  26 102 0  CM/GYMIC  ADS    CM/FLAGS      GYMDIFSW: C(A)=1, KNOW BIT IS 0
0061   REF 204  LAST 1062   15,2513  3 5021 1            CAF    ZERO
0062   REF   2  LAST  111   15,2514  55'711 0            TS     JETAG
0063   REF   2  LAST  111   15,2515  55'706 0            TS     OLDELP
0064   REF   2  LAST  111   15,2516  55'707 1            TS     OLDELQ
0065   REF   2  LAST  111   15,2517  55'710 1            TS     OLDELR
0066   REF   4  LAST  887   15,2520  55'723 1            TS     GAMDOT        NO GYM DIF, PROB NO GAM DIF.
0067   REF   1              15,2521  0 2502 1            TC     DOBRATE1
```

```
P0068   COME HERE TO CORRECT FOR OVERFLOW IN ANGULAR CALCULATIONS

0069   REF  93  LAST 1057   15,2522  54 001 1  ANGOVCOR TS      L          THIS COSTS 2 MCT TO USE.
0070   REF 207  LAST 1062   15,2523  0 0002 0            TC      Q          NO OVFL
0071   REF 241  LAST 1064   15,2524  50 000 1            INDEX   A
0072   REF   4  LAST  993   15,2525  3 5000 1            CAF     LIMITS
0073   REF  94  LAST 1065   15,2526  26 001 1            ADS     L
0074   REF 208  LAST 1065   15,2527  0 0002 0            TC      Q

0075                         6000                        BLOCK   3

0076   REF   1                                           COUNT   03/DAPEN

0077                         6000  3 0007 0  FLUSHJET    CA      7          COME HERE TO TURN OFF ALL JETS.
0078                         6001  0 0006 1              EXTEND
0079   REF   1               6002  01 006 0              WRITE   ROLLJETS   ZERO CHANNEL 6
0080                         6003  0 0006 1              EXTEND
0081   REF   1               6004  01 005 0              WRITE   PYJETS     ZERO CHANNEL 5
0082   REF 209  LAST 1065    6005  0 0002 0              TC      Q

0083                      15,2530                        BANK    15

0084   REF   2 LAST 1063 TO 1065:    60    60*           COUNT   15/DAPEN

0085   REF   2  LAST 1063   15,2000                     SETLOC  ETRYDAP
0086                      15,2530                        BANK

0087                      15,2530  4 0000 0  RATEAVG     COM                SUBROUTINE TO ESTIMATE RATES IN PRESENCE
0088   REF   4  LAST 1064   15,2531  6 1720 0            AD      JETEM      OF CONSTANT ACCELERATION.
0096                      15,2532  0 0006 1              EXTEND
0097   REF   3  LAST  443   15,2533  7 5002 1            MP      HALF       DELV (EST) = DELV +(DELV-OLDELV)/2
0098   REF   5  LAST 1065   15,2534  6 1720 0            AD      JETEM
0099   REF 210  LAST 1065   15,2535  0 0002 0            TC      Q
```

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P0101 THESE ARE CALLED FOR THE VARIOUS INITIALIZATIONS NEEDED.

```
0102                                20,3612                     BANK    20
0103   REF   1                     20,2000                     SETLOC  DAPS1
0104                                20,3612                     BANK

0105   REF   1                                                 COUNT   20/DAPEN

0106   REF  33  LAST 1064          E6,1661                     EBANK=  AOG

0107   REF   3  LAST  888          20,3612  3 5057 0  CM/DAPON CA      EBAOG
0108   REF  41  LAST  888          20,3613  54 003 0          TS      EBANK

0109   REF  57  LAST  829          20,3614  0 5560 1         TC      DOWNFLAG       RESET DAPBIT1.  T5 RESTART IDENTIFIER.
01095  REF   2  LAST  734          20,3615   00132 1         ADRES   DAPBIT1        BIT 15  FLAG 6            CM FLAGS.
0110   REF  58  LAST 1066          20,3616  0 5560 1         TC      DOWNFLAG       RESET DAPBIT2
01105  REF   2  LAST  734          20,3617   00133 0         ADRES   DAPBIT2        BIT 14  FLAG 6
0111                                20,3620  0 0006 1         EXTEND
0112   REF   1                     20,3621  3 3737 1         DCA     T5IDLER1       DISABLE RCS CALCULATION
0113   REF  22  LAST 1059          20,3622  53'313 0         DXCH    T5LOC
0114                                20,3623  0 0006 1         EXTEND
0115   REF   2  LAST 1066          20,3624  3 3737 1         DCA     T5IDLER1       DISABLE RCS JET CALLS
0116   REF   4  LAST 1016          20,3625  53'311 1         DXCH    T6LOC

0117   REF   3  LAST 1064          20,3626  0 6000 1         TC      FLUSHJET       JETS DEPARTED  ON SM. ZERO JET BITS.

0118   REF   6  LAST 1012          20,3627  4 7707 1         CS      13,14,15
0119   REF  73  LAST 1039          20,3630  7 1466 0         MASK    DAPDATR1       SET  CONFIG  BITS =0 FOR ENTRY
0120   REF  74  LAST 1066          20,3631  55'466 0         TS      DAPDATR1
0121                                20,3632  0 3636 1         TC      +4

0122   REF   8  LAST  946          20,3633  3 5036 1  NOTYET CA      .5SEC
0123   REF 243  LAST  935          20,3634  0 4662 1         TC      BANKCALL
0124   REF  14  LAST  935          20,3635   01732 0         CADR    DELAYJOB       (DELAYJOB DOES INHINT)
0125   REF  29  LAST 1035          20,3636  3 5005 1  +4     CA      BIT11          GAMDIFSW = 940  BIT11,  INITLY=0
0126   REF  14  LAST 1064          20,3637  7 0102 0         MASK    CM/FLAGS       IF ZERO, WAIT UNTIL CM/POSE UPDATE.
0127                                20,3640  0 0006 1         EXTEND
0128   REF   1                     20,3641  1 3633 0         BZF     NOTYET

0129   REF 116  LAST 1064          20,3642  4 5017 0         CS      ONE            ACTIVATE CM/DAP
0130   REF  53  LAST 1061          20,3643  55'501 0         TS      PCSFLAGS       USE BIT3 TO INITIALIZE NEEDLER ON
A0131                                                                               NEXT PASS.
0132   REF   3  LAST  795          20,3644  55'727 0         TS      P63FLAG        SO WAKEP62 WILL NOT BE INITIATED UNTIL
A0133                                                                               HEADSUP IS SET IN P62.
A0134                                                                  FLAG TO PREVENT MULTIPLE CALLS TO WAKEP62.

0135                                20,3645  3 0007 0         CA      7
0136   REF   3  LAST 1064          20,3646  55'711 0         TS      JETAG
0136I  REF   3  LAST  177          20,3647  55'713 1         TS      PAXERR1        KEEP NEEDLES ZERO UNTIL DAP UPDATE
A01362                                                                              IN CASE CMDAPMOD IS NOT +1.
```

```
0137                                20,3650  0 0004 0        INHINT
0138                                20,3651  0 0006 1        EXTEND
0139  REF   4  LAST  888            20,3652  3 1666 0        DCA     ALFA/180        DO ATTITUDE HOLD UNTIL KEYBOARD
0140  REF   3  LAST  793            20,3653  53'604 0        DXCH    ALFACOM         ESTABLISHES HEADSUP.
0141  REF   5  LAST  888            20,3654  3 1664 1        CA      ROLL/180
0142  REF   2  LAST  112            20,3655  55'717 0        TS      ROLLHOLD        FOR ATTITUDE HOLD IN MODE +1.
0143                                20,3656  0 0006 1        EXTEND
0144  REF   4  LAST 1065            20,3657  7 5002 1        MP      HALF
0145  REF  13  LAST  873            20,3660  55'715 1        TS      ROLLC           NOT INTERESTED IN LO WORD.

0146  REF  15  LAST 1066            20,3661  4 0102 0        CS      CM/FLAGS
0147  REF  30  LAST  968            20,3662  7 5004 1        MASK    BIT12           CMDAPARM =930 BIT12  INITLY=0
0148  REF  16  LAST 1067            20,3663  26 102 0        ADS     CM/FLAGS        SET BIT TO 1.

0149  REF  16  LAST  823            20,3664  4 0076 1        CS      FLAGWRD2        SET  NODOFLAG  TO PREVENT FURTHER
0150  REF  72  LAST 1063            20,3665  7 5017 0        MASK    BIT1            V 37 ENTRIES.
0151  REF  17  LAST 1067            20,3666  26 076 1        ADS     FLAGWRD2

0152                                20,3667  0 0003 1        RELINT

0153  REF  55  LAST  959            20,3670  0 4701 0        TC      POSTJUMP
0154  REF   1                       20,3671   54342 0        CADR    P62.1
```

```
P0155   INITIALIZE CM/DAP.   WAITLIST CALL FOR READGYMB.  SET SWITCH CM/DSTBY =1
R0156   SO READACCS WILL ENTER A WTLST CALL FOR  SETJTAG  .
R0157    CMDAPARM  = 0   , SO ONLY BODY RATE AND ATTITUDE CALCULATIONS ARE DONE.
R0158   SET AVEGEXIT TO CONTINUE AT CM/POSE
R0159

 0160   REF   4  LAST 1066   20,3672  3 5057 0  CM/DAPIC CA     EBADG
 0161   REF  42  LAST 1066   20,3673  54 003 0            TS     EBANK

 0162                        20,3674  0 0004 0            INHINT
 0163   REF  15  LAST  849   20,3675  4 1205 0  CM/DAP2C CS     PIPTIME +1
A0164                                                            PRIO OF P62 L PRIO AVG.:PIPTM=PIPTM1
 0165   REF   6  LAST 1065   20,3676  55'720 1            TS     JETEM

 0166   REF   1              20,3677  3 5002 0            CA     POS1/2
 0167   REF   2  LAST 1068   20,3700  6 5002 0            AD     POS1/2
 0168   REF  14  LAST  769   20,3701  6 0025 0            AD     TIME1       OVFL GUARANTEED
 0169   REF   7  LAST 1068   20,3702  27'720 1            ADS    JETEM       C(A) = DELTA TIME SINCE PIPUP

 0170   REF  23  LAST 1018   20,3703  4 5022 0            CS     FIVE
 0171   REF   8  LAST 1068   20,3704  6 1720 0            AD     JETEM
 0172   REF 242  LAST 1065   20,3705  10 000 0            CCS    A
 0173   REF   1              20,3706  6 3735 0            AD     -CDUT+1
 0174                        20,3707  1 3705 1            TCF    -2

 0175                        20,3710  13 711 1            NOOP
 0176   REF 117  LAST 1066   20,3711  6 5017 1            AD     ONE         SEND NO ZERO TO WTLST
 0177   REF   6  LAST 1063   20,3712  55'725 1            TS     CM/GYMDT    FOR RESTART
 0178   REF  47  LAST 1064   20,3713  0 5245 1            TC     WAITLIST
 0179   REF  34  LAST 1066   E6,1661                      EBANK= ADG
 0180   REF   3  LAST 1064   20,3714   02434 0            2CADR  READGYMB
 0180                        20,3715   32066 0

 0181   REF   1              20,3716  4 3734 0            CS     CM/SWIC1    GAMDIFSW, GYMDIFSW, CM/DSTBY
 0182   REF  17  LAST 1067   20,3717  7 0102 0            MASK   CM/FLAGS    DAPARM, .05GSW, LATSW, ENTRYDSP
 0183   REF   1              20,3720  6 4377 0            AD     CM/SWIC2    SET CM/DSTBY, LATSW
A01831                                                          DISABLE ENTRY DISPLAY, SINCE DES. GIMB.
A01832                                                          CALC. (P62.3) GOES TO ENDEXIT.
 0184   REF  18  LAST 1068   20,3721  54 102 0            TS     CM/FLAGS

 0185                        20,3722  3 0007 0            CA     7
 0186   REF   5  LAST  888   20,3723  55'666 1            TS     BETA/180    NECESSARY: NO OVFL CORRECTION
 0188   REF 118  LAST 1068   20,3724  3 5017 1            CA     ONE         INITIALIZE THE TM OF BODY RATES VIA
 0189   REF   1              20,3725  54 305 0            TS     SW/NDX        UPBUFF.

 0190   REF  29  LAST  875   20,3726  0 5372 1            TC     2PHSCHNG    DOES INHINT/RELINT
 0191                        20,3727   40116 0            OCT    40116       SAVE TBASE6
 0192                        20,3730   05024 1            OCT    05024
 0193                        20,3731   13000 0            OCT    13000

 0194   REF  56  LAST 1067   20,3732  0 4701 0            TC     POSTJUMP
```

```
0195   REF   1              20,3733   54326 1          CADR    P62.2

0196                        20,3734   16017 0  CM/SWIC1 OCT     16017
01961  REF   8  LAST 1064     4377            CM/SWIC2 =       TEN            00012 : CM/DSTBY, LATSW
0197                        20,3735   77766 0  -CDUT+1  OCT     77766
0198   REF  23  LAST 1066     1312                      EBANK=  T5LOC
0199   REF   6  LAST  734   20,3736   03153 0  T5IDLER1 2CADR   T5IDLOC
0199                        20,3737   12062 0
```

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```
P0200   THIS SECTION CALCULATES THE ANGULAR BODY RATES EACH .1 SEC.  THE ANGULAR RATES ARE THOSE ALONG THE BODY AXES
R0202   XB, YB, ZB, AND ARE NORMALLY DESIGNATED  P, Q, R.        REQUIREMENT:  TEMPORARY ERASE. JETEM, JETEM +1

R0204             SINCE RESTARTS ZERO THE JET OUTPUT CHANNELS, NO ATTEMPT IS MADE TO RESTART THE  ENTRY DAPS. THAT IS,
R0206   THE 0.1 SEC DAPS WILL MISS A CYCLE, AND WILL PICK UP AT THE NEXT 0.1 SEC UPDATE. MOST OF THE TIME THE 2 SEC
R0208   ROLL SYSTEM WILL MISS ONLY 0.1 SEC OF CONTROL. HOWEVER IF THE RESTART OCCURS AFTER THE  SECTION TIMETST HAS
R0210   STARTED, THEN THE ROLL SYSTEM WILL MISS ONE CYCLE.
R0211   THIS IS NECESSARY  UNDER THE GROUNDRULE THAT NO JET COMMANDS SHALL BE LESS THAN 14 MS.

 0213   REF  35  LAST 1068   E6,1661                        EBANK= AOG
 0214                        15,2536                        BANK   15
 0215   REF   3  LAST 1065   15,2000                        SETLOC ETRYDAP
 02151                       15,2536                        BANK

 0216   REF   3 LAST 1065 TO 1066:     6    66*             COUNT  15/DAPEN

 0218   REF   5  LAST 1063   15,2536  3 1663 0  BODYRATE CA     AMG             THESE ARE 2S COMPL NOS, BUT USE ANYWAY.
 0219   REF   3  LAST  999   15,2537  0 5074 1          TC     SPCOS
 0220   REF   2  LAST  112   15,2540  55'511 1          TS     COSM

 0221   REF  36  LAST 1070   15,2541  3 1661 1          CA     AOG             C(AOG) = AOG/180
 0222   REF   3  LAST  999   15,2542  0 5075 0          TC     SPSIN           SINO
 0223   REF   2  LAST  112   15,2543  55'512 1          TS     SINO            SINO = SIN(AOG)
 0224                        15,2544  0 0006 1          EXTEND
 0225   REF   3  LAST 1070   15,2545  7 1511 1          MP     COSM
 0226   REF   2  LAST  112   15,2546  55'514 1          TS     SINOCOSM        SO CM

 0227   REF  37  LAST 1070   15,2547  3 1661 1          CA     AOG
 0228   REF   4  LAST 1070   15,2550  0 5074 1          TC     SPCOS           COSO
 0229   REF   2  LAST  112   15,2551  55'513 0          TS     COSO

 0230                        15,2552  0 0006 1          EXTEND
 0231   REF   4  LAST 1070   15,2553  7 1511 1          MP     COSM
 0232   REF   1              15,2554  55'515 0          TS     COSOCOSM        CO CM

R0233   PITCHDOT:    Q TCDU/180 = IDOT TCDU/180 COSO COSM + MDOT TCDU/180 SINO

 0234   REF   3  LAST 1063   15,2555  4 1677 1          CS     -DELAMG
 0235                        15,2556  0 0006 1          EXTEND
 0236   REF   3  LAST 1070   15,2557  7 1512 1          MP     SINO
 0237   REF   9  LAST 1068   15,2560  53'721 0          DXCH   JETEM           2 LOCS _
 0238   REF   3  LAST 1063   15,2561  4 1676 0          CS     -DELAIG
 0239                        15,2562  0 0006 1          EXTEND
 0240   REF   2  LAST 1070   15,2563  7 1515 0          MP     COSOCOSM
 0241   REF  10  LAST 1070   15,2564  21'721 0          DAS    JETEM
 0242   REF  11  LAST 1070   15,2565  3 1720 0          CA     JETEM
 0243   REF   3  LAST 1064   15,2566  57'707 0          XCH    OLDELQ
 0244   REF   1              15,2567  0 2530 0          TC     RATEAVG
 0245   REF   2  LAST  111   15,2570  55'702 1          TS     QREL            PITCHDOT = Q TCDU/180
```

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```
P0246   YAWDOT:   R TCDU/180 = -IDOT TCDU/180 COSM SIND + MDOT TCDU/180 COSD

 0247   REF   4  LAST 1070   15,2571  4 1677 1        CS      -DELAMG
 0248                        15,2572  0 0006 1        EXTEND
 0249   REF   3  LAST 1070   15,2573  7 1513 0        MP      COSD
 0250   REF  12  LAST 1070   15,2574  53'721 0        DXCH    JETEM
 0251   REF   4  LAST 1070   15,2575  3 1676 1        CA      -DELAIG
 0252                        15,2576  0 0006 1        EXTEND
 0253   REF   3  LAST 1070   15,2577  7 1514 1        MP      SINOCOSM
 0254   REF  13  LAST 1071   15,2600  21'721 0        DAS     JETEM
 0255   REF  14  LAST 1071   15,2601  3 1720 0        CA      JETEM
 0256   REF   3  LAST 1064   15,2602  57'710 0        XCH     OLDELR
 0257   REF   2  LAST 1070   15,2603  0 2530 0        TC      RATEAVG
 0258   REF   2  LAST  111   15,2604  55'703 0        TS      RREL            YAWDOT = R TCDU/180

R0259    ROLLDOT:   P TCDU/180 = ODOT TCDU/180 + IDOT TCDU/180 SINM

 0260   REF   6  LAST 1070   15,2605  3 1663 0        CA      AMG
 0261   REF   4  LAST 1070   15,2606  0 5075 0        TC      SPSIN
 0262   REF   2  LAST  112   15,2607  55'510 0        TS      SINM

 0263                        15,2610  0 0006 1        EXTEND
 0264   REF   5  LAST 1071   15,2611  7 1676 0        MP      -DELAIG
 0265   REF  15  LAST 1071   15,2612  55'720 1        TS      JETEM
 0266   REF 205  LAST 1064   15,2613  3 5021 1        CA      ZERO
 0267                        15,2614  20 001 1        DDOUBL                  ROUND L INTO A
 0268   REF   3  LAST 1063   15,2615  6 1675 1        AD      -DELAOG
 0269   REF  16  LAST 1071   15,2616  6 1720 0        AD      JETEM
 0270   REF 243  LAST 1068   15,2617  4 0000 0        CS      A
 0271   REF  17  LAST 1071   15,2620  55'720 1        TS      JETEM
 0272   REF   3  LAST 1064   15,2621  57'706 1        XCH     OLDELP
 0273   REF   3  LAST 1071   15,2622  0 2530 0        TC      RATEAVG
 0274   REF   2  LAST  111   15,2623  55'701 1        TS      PREL            ROLLDOT = P TCDU/180

A0275                                                   IF GAMDOT  < 0.5 DEG/SEC, THEN GAMDOT =0

 0276   REF   5  LAST 1064   15,2624  11'723 1        CCS     GAMDOT
 0277                        15,2625  0 2627 0        TC      +2
 0278   REF   1              15,2626  0 2651 1        TC      NOGAMDOT
 0279   REF   6  LAST 1067   15,2627  4 1664 0        CS      ROLL/180
 0280   REF   5  LAST 1071   15,2630  0 5075 0        TC      SPSIN
 0281                        15,2631  0 0006 1        EXTEND
 0282   REF   6  LAST 1071   15,2632  7 1723 1        MP      GAMDOT
 0283   REF  18  LAST 1071   15,2633  55'721 0        TS      JETEM  +1        -SR GAMDOT
 0284                        15,2634  0 0006 1        EXTEND
 0285   REF   1              15,2635  7 3177 1        MP      SINTRIM          SIN(-20)   (FOR NOMINAL L/D = .3)
 0287   REF   3  LAST 1071   15,2636  27'701 1        ADS     PREL             PREL TCDU/180=(P-SALF SR GAMDOT)TCDU/180

 0288   REF   7  LAST 1071   15,2637  3 1664 1        CA      ROLL/180
 0289   REF   5  LAST 1070   15,2640  0 5074 1        TC      SPCOS
```

```
0290                          15,2641  4 0000 0          COM
0291                          15,2642  0 0006 1          EXTEND
0292  REF   7  LAST 1071     15,2643  7 1723 1          MP      GAMDOT
0293  REF   3  LAST 1070     15,2644  27'702 1          ADS     QREL          QREL TCDU/180=(Q-CR GAMDOT) TCDU/180

0294  REF  19  LAST 1071     15,2645  4 1721 0          CS      JETEM +1      B( ) = -SR GAMDOT
0295                          15,2646  0 0006 1          EXTEND
0296  REF   1                15,2647  7 3200 1          MP      COSTRIM       COS(-20)   (FOR NOMINAL L/D = .3)
0297  REF   3  LAST 1071     15,2650  27'703 0          ADS     RREL          RREL TCDU/180=(R+CALF SR GAMDOT)TCDU/180

0298  REF  31  LAST 1067     15,2651  3 5004 0  NOGAMDOT CA      BIT12         CMDAPARM = 930  BIT 12
0299  REF  19  LAST 1068     15,2652  7 0102 0          MASK    CM/FLAGS
0300                          15,2653  0 0006 1          EXTEND
0301  REF  53  LAST 1064     15,2654  1 5324 0  STBYDUMP BZF     TASKOVER      DAP NOT ARMED.

0302  REF  27  LAST 1035     15,2655  3 4777 1          CA      POSMAX        PICK UP AT ATTRATES IN 10 MS OR SO.
0303  REF  25  LAST 1039     15,2656  54 030 0          TS      TIME5

0304                          15,2657  0 0006 1          EXTEND
0305  REF   1                15,2660  3 2664 1          DCA     ATDOTCAD
0306  REF  24  LAST 1069     15,2661  53'313 0          DXCH    T5LOC
A0307                                                          DOES NOT PROTECT TEMK, SQ IN SPSIN/COS

0308  REF  54  LAST 1072     15,2662  0 5324 1          TC      TASKOVER

0309  REF  38  LAST 1070     E6,1661                            EBANK= ADG
0310  REF   1                15,2663  02665 0  ATDOTCAD 2CADR  ATTRATES
0310  REF   1                15,2664  32066 0
```

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P0311 CALCULATE BODY ATTITUDE RATES AND INTEGRATE TO OBTAIN ATTITUDE ANGLES.

R0312 CB PHIDOT TCDU/180 = (CA PREL + SA RREL) TCDU/180
R0313 BETADOT TCDU/180 = (-SA PREL + CA RREL) TCDU/180
R0314 ALFADOT TCDU = (QREL + SB PHIDOT) TCDU/180

```
 0315   REF  20  LAST 1061   15,2665  22 016 0  ATTRATES LXCH   BANKRUPT        CONTINUE HERE VIA T5
 0316                        15,2666  0 0006 1            EXTEND                 TASK MAY BE SKIPPED AT RESTART.
 0317   REF  16  LAST 1061   15,2667  22 012 1            QXCH   QRUPT
 0318   REF  11  LAST  362   15,2670  3 0021 1            CA     SR
 0319                        15,2671  6 0000 1            DOUBLE
 0320   REF   2  LAST  113   15,2672  55'623 0            TS     CM/SAVE
A0321                                                          DOES NOT PROTECT TEMK, SQ IN SPSIN/COS

 0322   REF   4  LAST 1072   15,2673  3 1702 0            CA     QREL
 0323   REF   5  LAST 1067   15,2674  6 1665 0            AD     ALFA/180
 0324   REF   1              15,2675  0 2522 0            TC     ANGOVCOR
 0325   REF   6  LAST 1073   15,2676  55'665 1            TS     ALFA/180
 0326   REF   6  LAST 1071   15,2677  0 5074 1            TC     SPCOS
 0327   REF   2  LAST  112   15,2700  55'506 1            TS     CALFA          CALFA
 0328   REF   2  LAST  111   15,2701  55'705 0            TS     PHIDOT

 0329                        15,2702  0 0006 1            EXTEND
 0330   REF   4  LAST 1071   15,2703  7 1701 1            MP     PREL
 0331   REF   3  LAST 1073   15,2704  57'705 1            XCH    PHIDOT         CA PREL
 0332                        15,2705  0 0006 1            EXTEND
 0333   REF   4  LAST 1072   15,2706  7 1703 0            MP     RREL           CA RREL
 0334   REF   2  LAST  111   15,2707  55'704 1            TS     BETADOT

 0335   REF   7  LAST 1073   15,2710  3 1665 0            CA     ALFA/180
 0336   REF   6  LAST 1071   15,2711  0 5075 0            TC     SPSIN
 0337   REF   2  LAST  112   15,2712  55'507 0            TS     SALFA          SIN(ALFA)

 0338                        15,2713  0 0006 1            EXTEND
 0339   REF   5  LAST 1073   15,2714  7 1703 0            MP     RREL           SA RREL
 0340   REF   4  LAST 1073   15,2715  27'705 0            ADS    PHIDOT         CB PHIDOT, SAVED.

 0341   REF   3  LAST 1073   15,2716  4 1507 0            CS     SALFA
 0342                        15,2717  0 0006 1            EXTEND
 0343   REF   5  LAST 1073   15,2720  7 1701 1            MP     PREL
 0344   REF   3  LAST 1073   15,2721  27'704 1            ADS    BETADOT        SAVE BETADOT TCDU/180
 0345   REF   6  LAST 1068   15,2722  27'666 1            ADS    BETA/180       BETA DONE.

 0346   REF   7  LAST 1073   15,2723  0 5075 0            TC     SPSIN
 0347                        15,2724  0 0006 1            EXTEND
 0348   REF   5  LAST 1073   15,2725  7 1705 0            MP     PHIDOT         NEGLECT CB IN  CB PHIDOT
 0349   REF   8  LAST 1073   15,2726  6 1665 0            AD     ALFA/180
 0350   REF   2  LAST 1073   15,2727  0 2522 0            TC     ANGOVCOR
 0351   REF   3  LAST 1073   15,2730  55'665 1            TS     ALFA/180       ALFA DONE.
```

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```
0352                                15,2731  4 0000 0          COM
0353   REF   4  LAST 1067          15,2732  6 1603 0          AD      ALFACOM
0354   REF   3  LAST 1073          15,2733  0 2522 0          TC      ANGOVCOR        JUST IN CASE ...
0355   REF   9  LAST 1023          15,2734  55'477 0          TS      AK1
0356   REF   2  LAST  113          15,2735  55'572 1          TS      QAXERR          FOR PITCH FDAI  AND EDIT.

0357   REF   6  LAST 1073          15,2736  3 1705 1          CA      PHIDOT          PHIDOT TCDU/180, NEGLECTING CB
0358   REF   8  LAST 1071          15,2737  6 1664 1          AD      ROLL/180
0359   REF   4  LAST 1074          15,2740  0 2522 0          TC      ANGOVCOR
0360   REF   3  LAST  177          15,2741  55'714 0          TS      ROLLTM          ROLL/180 FOR TM.
0361   REF   9  LAST 1074          15,2742  55'664 0          TS      ROLL/180        ROLL DONE.

R0362       START YAW AUTOPILOT HERE .  RATE DAMPING WITH ENFORCED COORDINATED ROLL MANEUVER.

03631  REF   7  LAST 1073          15,2743  4 1666 1          CS      BETA/180        IF IN ATM, SAVE 'RAXERR' FOR TM DNLST.
03632  REF   2  LAST  112          15,2744  6 1604 1          AD      BETACOM
03633  REF   1                     15,2745  55'573 0          TS      RAXERR          IF OUTSIDE ATM, USE TM REGISTER 'RAXERR'
A03634                                                                                 AS A TEMPORARY. (DAP OPERATION IS IN INTERRUPT, SO
A03635                                                                                 IS OK.)  FINAL C(RAXERR) AT END OF DAP CYCLE WILL
A03636                                                                                 BE R-AXIS ERROR.

0364   REF  31  LAST 1011          15,2746  3 5015 0          CA      BIT3            .05GSW =102D BIT3       SW=0, LESS .05G
0365   REF  20  LAST 1072          15,2747  7 0102 0          MASK    CM/FLAGS        SWITCH =1, GREATER THAN .05 G
0366                                15,2750  0 0006 1          EXTEND
0367   REF   1                     15,2751  1 3037 1          BZF     EXDAP           IF G LESS THAN .05
0368   REF 119  LAST 1068          15,2752  4 5017 0          CS      ONE             IF G GEQ  THAN .05
0369   REF   5  LAST  794          15,2753  55'700 0          TS      CMDAPMOD        SAVE -1 FOR USE IN CM/RCS

0370   REF  10  LAST 1074          15,2754  55'477 0          TS      AK1             TO ZERO PITCH AND YAW FDAI NEEDLES
0371   REF  10  LAST 1023          15,2755  55'500 1          TS      AK2             IN ATM.  (MODE =-1)

03713  REF   6  LAST 1073          15,2756  4 1701 1          CS      PREL            YAW ERROR = RREL - PREL TAN(ALFA)
0372                                15,2757  0 0006 1          EXTEND
0373   REF   2  LAST 1071          15,2760  7 3177 1          MP      SINTRIM         LET SIN(-20) BE APPROX FOR TAN(-20)
0374   REF   6  LAST 1073          15,2761  6 1703 1          AD      RREL
0375   REF   1                     15,2762  0 3027 1          TC      2D/SDZ          GO TEST DZ. GET TAG: +0 IF IN DZ
0376   REF 244  LAST 1071          15,2763  50 000 1          INDEX   A               +/- 1 IF NOT
0377   REF   1                     15,2764  3 3202 1          CAF     YJETCODE

0378   REF  20  LAST 1072          15,2765  55'720 1          TS      JETEM

R0379       START PITCH AUTOPILOT HERE.  RATE DAMPING ONLY.

0380   REF   5  LAST 1073          15,2766  3 1702 0          CA      QREL
0381   REF   2  LAST 1074          15,2767  0 3027 1          TC      2D/SDZ
0382   REF 245  LAST 1074          15,2770  50 000 1  EXDAPIN  INDEX   A               COME HERE FROM EX ATM DAP
0383   REF   1                     15,2771  3 3205 0          CAF     P/RJCODE
0384   REF  21  LAST 1074          15,2772  27'720 1          ADS     JETEM           COMBINE ALL NEW BITS.

0385                                15,2773  0 0006 1          EXTEND                  DOES NOT REQUIRE SAVING OLD CODES.
```

```
0386  REF  2  LAST 1065  15,2774  01 005 0        WRITE  PYJETS       SET PYCHAN TO DESIRED BIT CONFIG.

0387  REF  4  LAST 1066  15,2775  11'711 0       CCS    JETAG
0388  REF  1             15,2776  0 3216 1       TC     CM/RCS
0389  REF  1             15,2777  0 3677 1       TC     CM/FDAI
0390  REF  1             15,3000  0 3704 1       TC     CM/FDAIR -1    (JETAG=-1 EQUIVALENT TO CMDAPMOD=+1)
```

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P0391 DEAD ZONE LOGIC USED BY ENTRY DIGITAL AUTOPILOTS.

```
0392  REF 246  LAST 1074   15,3001  10 000 0  3DDZ      CCS   A          YAWLIM=1.0-3/180=16384-273=16111
0393  REF   1              15,3002  6 3175 1             AD    YAWLIM
0394  REF   1              15,3003  1 3033 0             TCF   DZCOM
0395  REF   2  LAST 1076   15,3004  6 3175 1             AD    YAWLIM
0396  REF   1              15,3005  1 3034 1             TCF   DZNOCOM

A0397                                                          BIASED DZ FOR EXT ATM DAP.
0398  REF   1              15,3006  55'624 1  BIASEDZ     TS    JETEM2     SAVE RATE/180. ERROR/180 IS IN L.
0399  REF 247  LAST 1076   15,3007  10 000 0             CCS   A          START ERROR DZ.
0400  REF   1              15,3010  4 3174 1             CS    CM/BIAS    = .6/180
0401                       15,3011  1 3013 1             TCF   +2
0402  REF   2  LAST 1076   15,3012  3 3174 0             CA    CM/BIAS
0403  REF  95  LAST 1065   15,3013  6 0001 0             AD    L          BIAS THE ERROR.
0404  REF 211  LAST 1065   15,3014  22 002 0             LXCH  Q          SAVE CALLERS RETURN ADDRESS.
0405  REF   1              15,3015  0 3001 0             TC    3DDZ       GO GENERATE THE ERROR BIT.
0406  REF  96  LAST 1076   15,3016  52 002 1             DXCH  L          BIT TO L, RESTORE CALLERS Q.
0407  REF   2  LAST 1076   15,3017  11'624 1  4D/SDZ     CCS   JETEM2     CAME HERE IN EXT ATM. C(L) = ERROR BIT
0408  REF   1              15,3020  6 3172 0             AD    4D/SLIM    IF RATE GEQ 4D/S, SET L=0 AND TAKE
0409                       15,3021  1 3023 1             TCF   +2         JET BITS ACCORDING TO SGN OF RATE.
0410  REF   2  LAST 1076   15,3022  6 3172 0             AD    4D/SLIM
0411  REF 248  LAST 1076   15,3023  54 000 0             TS    A
0412                       15,3024  1 3026 1             TCF   +2         RATE OK. CONTINUE
0413                       15,3025  22 007 0             ZL               RATE GEQ 4 D/S. OVER RIDE ERROR BIT
0414  REF   3  LAST 1076   15,3026  57'624 0             XCH   JETEM2     AND CONTINUE TO GET SIGN.

0415  REF 249  LAST 1076   15,3027  10 000 0  2D/SDZ     CCS   A          COME HERE TO TEST IF A WITHIN 2DEG/S DZ
0416  REF   1              15,3030  6 3173 1             AD    YDOTLIM    1.0 - YDOT DZ        ( OR PDOT)
0417                       15,3031  1 3034 1             TCF   +3
0418  REF   2  LAST 1076   15,3032  6 3173 1             AD    YDOTLIM    YDOT DZ = 2 DEG/SEC
0419                       15,3033  4 0000 0  DZCOM      COM
0420  REF  22  LAST 1074   15,3034  55'721 0  DZNOCOM    TS    JETEM  +1  GENERATE TAG, SET C(A)= -+1 OUTSIDE DZ
0421  REF 206  LAST 1071   15,3035  3 5021 1             CA    ZERO       SET C(A) = +0 INSIDE
0422  REF 212  LAST 1076   15,3036  0 0002 0             TC    Q
```

P0423 EXTRA ATMOSPHERIC DIGITAL AUTOPILOT

R0424 1. IF ABS(CALF) -C(45) POS, USE — IF CALFA POS, CMDAPMOD= +0
R0426 BETA: YAW ERROR = SGN(CALF) (BETACOM -BETA) — IF CALFA NEG, CMDAPMOD =-0
R0428 RATE = BETADOT — IF CMDAPMOD =-0, RATE = RREL
R0430 R-AXIS = CONTROL

R0431 ROLL: ROLL ERROR = SGN(CALF) (ROLLC - ROLL) — IF CMDAPMOD = -0, RATE DAMP ONLY.
R0433 RATE = PREL
R0434 P-AXIS = CONTROL

R0435 2. IF C(45) GEQ CALFA GEQ -C(45), USE — CMDAPMOD = +1
R0437 BETA: ROLL ERROR = SGN(-SALF) (BETACOM -BETA)
R0438 RATE = BETADOT
R0439 P-AXIS = CONTROL

R0440 ROLL: YAW ERROR = SGN(SALF) (ROLLC -ROLL) — RATE DAMP ONLY.
R0442 RATE = RREL
R0443 R-AXIS = CONTROL

R0444 3. FOR ALL CASES , USE
R0445 ALFA: PITCH ERROR = (ALFACOM - ALFA)
R0446 RATE = QREL
R0447 Q-AXIS = CONTROL

R0448

```
0449   REF   6  LAST 1074   15,3037  55'700 0  EXDAP   TS      CMDAPMOD        +0 FOR NOW
0453   REF   3  LAST 1073   15,3040  11'506 1          CCS     CALFA
0454   REF   1              15,3041  6 3176 1          AD      C45LIM          =1.0-COS(45)
0455                        15,3042  1 3044 0          TCF     +2
0456   REF   2  LAST 1077   15,3043  6 3176 1          AD      C45LIM
0457   REF 250  LAST 1076   15,3044  54 000 0          TS      A
0458   REF   1              15,3045  1 3123 0          TCF     EXDAP2          HERE IF ABS(CALFA)  L  COS(45)

04582  REF   4  LAST 1077   15,3046  11'506 1          CCS     CALFA           |CALFA| > 0.707
04583                       15,3047  1 3050 0          TCF     +1              CONTINUE IF POS; GO TO EXDAP4 IF NEG.

0459   REF   4  LAST 1066   15,3050  11'727 0          CCS     P63FLAG         VALID VALUES ARE:  -1. +1. +0.
0460   REF   1              15,3051  0 3064 0          TC      EXDAP4
0461                        15,3052  0 3054 0          TC      +2
0462   REF   2  LAST 1077   15,3053  0 3064 0          TC      EXDAP4
0463   REF  91  LAST 1064   15,3054  0 5412 0          TC      PHASCHNG        SINGLE PASS THROUGH HERE.
0464                        15,3055   40334 1          OCT     40334
0465   REF 120  LAST 1074   15,3056  4 5017 0          CS      ONE
0466   REF   5  LAST 1077   15,3057  55'727 0          TS      P63FLAG         SET FLAG TO ASSURE SINGLE PASS.
0467   REF   1              15,3060  3 3171 0          CA      NSEC
0468   REF  48  LAST 1068   15,3061  0 5245 1          TC      WAITLIST
0469   REF  39  LAST 1072   E6,1661                    EBANK=  AOG
0470   REF   2  LAST  215   15,3062   02374 0          2CADR   WAKEP62         CALL TO TERMINATE P62 IN N SEC.
0470                        15,3063   54066 0
```

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```
A0471                                                          65 DEG/ 3DEG/SEC = 21 SEC NOMINAL
A0472                                                          TRANSIT TIME FROM ALFA=45 TO ALFA TRIM.

 0473   REF   5  LAST 1075   15,3064  11'711 0  EXDAP4  CCS   JETAG      ROLLJET INTERFACE TEST BETWEEN .1 SEC
 0474   REF   1              15,3065  1 3073 1          TCF   EXDAP3     DAP AND THE 2 SEC CM/RCS DAP
 0475   REF   2  LAST 1078   15,3066  1 3073 1          TCF   EXDAP3
 0476   REF 207  LAST 1076   15,3067  3 5021 1          CA    ZERO
 0477                        15,3070  0 0006 1          EXTEND               TURN OFF ROLL JETS IF ON AND WAIT
 0478   REF   2  LAST 1065   15,3071  01 006 0          WRITE ROLLJETS     UNTIL START  OF 2 SEC CM/RCS CYCLE
 0479   REF   6  LAST 1078   15,3072  55'711 0          TS    JETAG        RESTORE PROPER VALUE +0

A0480                                                                ROLL FDAI WILL BE IN ERROR UNTIL NEXT CM/RCS CALL.
 0481   REF   5  LAST 1077   15,3073  11'506 1  EXDAP3  CCS   CALFA      HERE IF ABS(CALFA) GEQ COS(45)
 0482   REF   2  LAST 1074   15,3074  3 1573 1          CA    RAXERR     C()= BETACOM - BETA/180
 0483   REF   1              15,3075  1 3101 0          TCF   EXDAP1
 0484   REF 208  LAST 1078   15,3076  4 5021 0          CS    ZERO
 0485   REF   7  LAST 1077   15,3077  55'700 0          TS    CMDAPMOD     FOR CM/RCS
 0486   REF   3  LAST 1078   15,3100  4 1573 0          CS    RAXERR       COMPLEMENT OF YAW ERROR.
 0487   REF   4  LAST 1078   15,3101  55'573 0  EXDAP1  TS    RAXERR       FOR YAW FDAI
 0488   REF  11  LAST 1074   15,3102  55'500 1          TS    AK2          WANT RAXERR FOR TM.
 0489   REF  97  LAST 1076   15,3103  54 001 1          TS    L
 0490   REF   8  LAST 1078   15,3104  11'700 0          CCS   CMDAPMOD     COORDINATE BETA CONTROL.
 0491                        15,3105  0 3110 1          TC    +3           C(CMDAPMOD) CAN BE +1, +0, OR -0.
 0492   REF 121  LAST 1077   15,3106  3 5017 1          CA    ONE          USE BETADOT TO COORD IN MODE +0
 0493   REF 251  LAST 1077   15,3107  50 000 1          INDEX A            OTHERWISE USE RREL.
 0494   REF   7  LAST 1074   15,3110  3 1703 1          CA    RREL
 0495   REF   1              15,3111  0 3006 1          TC    BIASEDZ      GO TEST DZ. +0 IF IN DZ, +-1 OTHERWISE
A0496                                                                      IF GEQ 4D/S, SET ERROR BIT IN L =0)
 0497                        15,3112  0 0006 1          EXTEND
 0498   REF  11  LAST 1017   15,3113  04 001 1          ROR   LCHAN        L HAS BETA BIT
 0499   REF 252  LAST 1078   15,3114  50 000 1          INDEX A
 0500   REF   2  LAST 1074   15,3115  3 3202 1          CAF   YJETCODE
 0501   REF  23  LAST 1076   15,3116  55'720 1          TS    JETEM

 0502   REF   3  LAST 1074   15,3117  3 1572 0          CA    QAXERR       ALFA ERROR.
 0503   REF  98  LAST 1078   15,3120  54 001 1          TS    L
 0504   REF   6  LAST 1074   15,3121  3 1702 0          CA    QREL         FOR ALFADOT USE QREL
 0505   REF   2  LAST 1078   15,3122  0 3006 1          TC    BIASEDZ
 0506                        15,3123  0 0006 1          EXTEND
 0507   REF  12  LAST 1078   15,3124  04 001 1          ROR   LCHAN
 0508   REF   1              15,3125  1 2770 1          TCF   EXDAPIN      CONTINUE ON IN DAP

 0509   REF   9  LAST 1078   15,3126  25'700 1  EXDAP2  INCR  CMDAPMOD     SET CMDAPMOD TO +1

 0510   REF 122  LAST 1078   15,3127  4 5017 0          CS    ONE          INDICATE CHANGE FROM .1 SEC UPDATE TO
 0511   REF   7  LAST 1078   15,3130  55'711 0          TS    JETAG        TO 2 SEC FOR ROLL JETS.( IF CMDAPMOD
A0512                                                                      =0 AND JETAG =-1, QUENCHES JETS IF ON)

 0513   REF   6  LAST 1077   15,3131  11'727 0          CCS   P63FLAG      IF FLAG WAS +1, SET =0.
 0514   REF   7  LAST 1078   15,3132  55'727 0          TS    P63FLAG
```

```
0515                                15,3133  13 134 0          NOOP

0516   REF   4  LAST 1073   15,3134  11'507 0          CCS     SALFA     BETA CONTROL WITH P JETS
0517   REF   5  LAST 1078   15,3135  4 1573 0          CS      RAXERR    B()= BETACOM - BETA/180
0518                        15,3136  1 3140 0          TCF     +2
0519   REF   6  LAST 1079   15,3137  3 1573 1          CA      RAXERR
0520   REF   4  LAST 1066   15,3140  55'713 1          TS      PAXERR1   TEMP SAVE.  ERROR/180
0521                        15,3141  0 0006 1          EXTEND
0522   REF   5  LAST 1067   15,3142  7 5002 1          MP      HALF      CM/FDAI EXPECTS ERROR/360.
0523   REF   5  LAST 1079   15,3143  57'713 0          XCH     PAXERR1   ERROR/360 FOR FDAI, GET ERROR/180.
0524   REF  99  LAST 1078   15,3144  54 001 1          TS      L
0525   REF   5  LAST 1079   15,3145  11'507 0          CCS     SALFA
0526   REF   4  LAST 1073   15,3146  4 1704 1          CS      BETADOT   USE BETADOT TO COORD IN MODE +1
0527                        15,3147  0 3151 1          TC      +2
0528   REF   5  LAST 1079   15,3150  3 1704 0          CA      BETADOT
0529   REF   3  LAST 1078   15,3151  0 3006 1          TC      BIASEDZ
0530                        15,3152  0 0006 1          EXTEND
0531   REF  13  LAST 1078   15,3153  04 001 1          ROR     LCHAN
0532   REF 253  LAST 1078   15,3154  50 000 1          INDEX   A
0533   REF   2  LAST 1074   15,3155  3 3205 0          CAF     P/RJCODE  GET ROLL CODE
0534                        15,3156  0 0006 1          EXTEND            ROLL CONTROL WITH YAW JETS.
0535   REF   3  LAST 1078   15,3157  01 006 0          WRITE   ROLLJETS  WE.LL SKIP REGULAR ROLL SYST

0536   REF   3  LAST 1067   15,3160  3 1717 1          CA      ROLLHOLD  ROLL/180 AT CM/DAPON TIME.
0537                        15,3161  0 0006 1          EXTEND
0538   REF  10  LAST 1074   15,3162  21'664 0          MSU     ROLL/180  1.S COMPL, BUT SO WHATS A BIT.?
0539   REF 100  LAST 1079   15,3163  54 001 1          TS      L         FORCE A LIMIT CYCLE IN YAW RATE.
0540   REF   6  LAST 1079   15,3164  11'507 0          CCS     SALFA
0541   REF 101  LAST 1079   15,3165  3 0001 0          CA      L         TO REMOVE ITS BIASING EFFECT ON M DOT.
0542   REF   2  LAST 1078   15,3166  0 3101 1          TC      EXDAP1
0543   REF 102  LAST 1079   15,3167  4 0001 1          CS      L
0544   REF   3  LAST 1079   15,3170  0 3101 1          TC      EXDAP1

0545                        15,3171   04064 1  NSEC     DEC     2100      65 DEG/ 3 DEG/SEC
A0546                                                          IF NSEC IS CHANGED, REMEMBER TO CHANGE 4.33SPOT.
0547                        15,3172   37734 0  4D/SLIM  DEC     16348     1.0 -4/180 D/S = 4/1800 EXP 14
0548                        15,3173   37756 1  YDOTLIM  DEC     16366     =1.0 - YDOT DZ= 16384 -18
A0549                                                                    YDOT DZ = YDOT TCDU/180 = 2/1800 EXP 14

0550                        15,3174   00067 0  CM/BIAS  DEC     55        =.6/180 814  = 55
0551                        15,3175   37267 0  YAWLIM   DEC     16055     YAWLIM=1.0-3.6/180=16384-329=16055
0552                        15,3176   11277 0  C45LIM   DEC     .29289    =1.0-COS(45)
R0553
05531                       15,3177   65033 1  SINTRIM  DEC     -.34202   SIN(-20)     (FOR NOMINAL L/D = .3)
05532                       15,3200   36044 1  COSTRIM  DEC      .93969   COS(-20)     (FOR NOMINAL L/D = .3)

R05534  TO MAKE DAP INSENSITIVE TO PITCH ERRORS DUE TO ACCUMULATED NAV ERRORS,USE NOMINAL VALUE (-20 DEG) FOR TRIM ALFA
R05536  USED DURING ATMOSPHERIC COORDINATION. OUTSIDE ATMOSPHERE, NAV ERRORS WILL BE SLIGHT, BUT ALFA CAN DIFFER GREATLY
R05538  FROM TRIM, SO USE ON-BOARD ESTIMATES.
```

```
A0554                                   JET CODE TABLES FOLLOW _

 0555                  15,3201   00120 1          OCTAL  00120      POS Y
 0556                  15,3202   00000 1 YJETCODE OCTAL  00000      RCS JET BITS
 0557                  15,3203   00240 1          OCTAL  00240      NEG Y
 0558                  15,3204   00005 1          OCTAL  00005      POS R JET BITS    ALSO POS P JET BITS
 0559                  15,3205   00000 1 P/RJCODE OCTAL  00000
 0560                  15,3206   00012 1          OCTAL  00012      NEG R             ALSO NEG P
```

```
P0561   RCS         THIS SECTION IS ENTERED EACH 2 SEC BY WAITLIST CALL FOLLOWING A DELAY OF 1.2 SEC AFTER PIPUP.
R0563   THE TASK SETJTAG  SETS A FLAG IN  JETAG  TO SIGNIFY THAT ROLL UPDATE IS DUE.  IN ROUGHLY 5 CS  BPDYRATE WILL BE
R0565   EXECUTED AND JETAG WILL CAUSE  CM/RCS  TO ACT ON ROLLC IMMEDIATELY THEREAFTER.  THE
R0567   TASK SAVES THE CALL TIME SO THAT CM/RCS CAN DETERMINE HOW MUCH OF THE 2 SEC INTERVAL REMAINS BEFORE THE
R0569   NEXT UPDATE.

 0570   REF  15  LAST 1068   15,3207  4 0025 1  SETJTAG  CS    TIME1          SAVE NOMINAL UPDATE TIME FOR SYNCH
 0571   REF   2  LAST  111   15,3210  55'712 0           TS    TUSED
A0572                                                                        THE 5 CS APPEARS IN TIMETST.
 0573   REF 123  LAST 1078   15,3211  3 5017 1           CA    ONE            RATHER THAN INCR, FOR SAFETY
 0574   REF   8  LAST 1078   15,3212  55'711 0           TS    JETAG          SET JETAG=1 TO CAUSE CM/RCS TO BE
 0575   REF  92  LAST 1077   15,3213  0 5412 0           TC    PHASCHNG
 0576                        15,3214   00001 0           OCT   00001

 0577   REF  55  LAST 1072   15,3215  0 5324 1           TC    TASKOVER       EXECUTED AFTER NEXT BODYRATE UPDATE

R0578   PREDICTIVE ROLL SYSTEM    ENTRY STEERING PROVIDES ROLL COMMAND IN LOC ROLLC. THE FOLLOWING CALCULATES THE
R0580   TRAJECTORY TO THE ORIGIN IN PHASE PLANE (X,V). PROGRAM ENTERS JET ON AND OFF CALLS INTO WTLST TO PRODUCE
R0582   THE DESIRED TRAJECTORY. ONLY THOSE CALLS WHICH CAN BE EXECUTED WITHIN THE INTERVAL T  (2 SEC) ARE ENTERED IN
R0584   WTLST. THE REMAINDER ARE RECONSIDERED AT NEXT UPDATE.

 0585   REF   4  LAST  190      5001            HALFPR   EQUALS NEGI/2 +1

A0586                                                                        CLEAR JETAG BEFORE TIMETST.  SET TO +0 TO SHOW
A0587                                                                        ROLL DAP CALLED. IN EVENT OF RESTART, BODYRATE
A0588                                                                        MAY MISS A CYCLE. CM/RCS WILL MISS A CYCLE ONLY
A0589                                                                        IF A RESTART OCCURS AFTER TIMETST COMMENCES.

 0590   REF 124  LAST 1081   15,3216  4 5017 0  CM/RCS   CS    ONE
 0591   REF   2  LAST  112   15,3217  55'617 1           TS    JNDX           SET NDX FOR POS ROLL, AND CHANGE LATER

 0592   REF   1              15,3220  4 5033 0           CS    2T/TCDU        ROLLDOT = DELADG + DELAIG SINM =DELR
 0593                        15,3221  0 0006 1           EXTEND
 0594   REF   7  LAST 1074   15,3222  7 1701 1           MP    PREL           DELR/180 = RDOT TCDU/180 = RDOT/1800
 0595   REF 103  LAST 1079   15,3223  6 0001 0           AD    L              -2 RDOT T/180 IN L
 0596   REF   2  LAST  112   15,3224  55'613 0           TS    -VT/180        SAVE -2VT/180 HERE

 0597   REF  11  LAST 1079   15,3225  4 1664 0           CS    ROLL/180
 0598   REF  12  LAST 1073   15,3226  54 021 0           TS    SR             SAVE (-R/180) /2

 0599   REF  21  LAST 1074   15,3227  4 0102 0           CS    CM/FLAGS
 0600   REF  35  LAST 1056   15,3230  7 5014 0           MASK  BIT4           LATSW = 1OID BIT4
 0601                        15,3231  0 0006 1           EXTEND               ROLL OVER TOP $
 0602   REF   1              15,3232  1 3240 0           BZF   GETLCX         NO, TAKE SHORTEST PATH
 0603   REF  22  LAST 1081   15,3233  26 102 0           ADS   CM/FLAGS       YES, ENFORCE ROLL OVER TOP.. (BIT =0)
 0604   REF  14  LAST 1067   15,3234  3 1715 0           CA    ROLLC          (ROLLC/180) /2
 0605   REF  13  LAST 1081   15,3235  6 0021 1           AD    SR             -(R/180) /2
 0606   REF   2  LAST  112   15,3236  57'614 0           XCH   LCX/360        DIFFERENT X REQD HERE. DISCONT AT 180.
 0607   REF   1              15,3237  1 3300 0           TCF   COMPAT         POSSIBLE OVFL ABOVE.
```

L CM ENTRY DIGITAL AUTOPILOT USER'S PAGE NO. 20 E6 S3

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0608  REF   3  LAST 1068   15,3240  3 5002 0  GETLCX  CA      POS1/2        FORM RCOM/360
0609                       15,3241  6 0000 1          DOUBLE
0610  REF  15  LAST 1081   15,3242  6 1715 0          AD      ROLLC
0611  REF   3  LAST 1081   15,3243  57'614 0          XCH     LCX/360       IGNORE POSSIBLE OVFL.

0612  REF  14  LAST 1081   15,3244  3 0021 1          CA      SR            FORM -R/360
0613  REF   5  LAST 1081   15,3245  6 5000 1          AD      NEG1/2
0614  REF   6  LAST 1082   15,3246  6 5000 1          AD      NEG1/2        IGNORE OVFL
0615  REF   4  LAST 1082   15,3247  57'614 0          XCH     LCX/360       -R/360
0616  REF   5  LAST 1082   15,3250  27'614 1          ADS     LCX/360       LCX/360 = RCOM/360 -R/360  RANGE (-1,1)

R0617 DOES SGN(-VT) (VT/180) (VT/180) (180/(4 A1 TT COSALFA)) + X/360 + SGN(X) / 2          OVFL   ?

0619  REF   3  LAST 1081   15,3251  11'613 0          CCS     -VT/180       TAKE SHORTEST ANGULAR PATH
0620  REF 125  LAST 1081   15,3252  6 5017 1          AD      ONE           (BASED ON SINGLE JET ACCELERATION)
0621                       15,3253  1 3255 1          TCF     +2
0622  REF 126  LAST 1082   15,3254  6 5017 1          AD      ONE
0623                       15,3255  0 0006 1          EXTEND
0624  REF   4  LAST 1082   15,3256  7 1613 0          MP      -VT/180       C(-VT/180) = -2 VT/180
0625                       15,3257  0 0006 1          EXTEND
0626  REF   1              15,3260  7 3750 1          MP      1/16A1        = 180/(16 A1 TT )
0627                       15,3261  0 0006 1          EXTEND
0628  REF   6  LAST 1078   15,3262  11'506 1          DV      CALFA
0629  REF 104  LAST 1081   15,3263  54 001 1          TS      L
0630  REF   6  LAST 1082   15,3264  11'614 1          CCS     LCX/360
0631  REF   4  LAST 1082   15,3265  3 5002 0          CAF     POS1/2
0632                       15,3266  1 3270 0          TCF     +2
0633  REF   5  LAST 1082   15,3267  4 5002 1          CS      POS1/2
0634  REF   7  LAST 1082   15,3270  6 1614 0          AD      LCX/360       IS LCX/360 LESS THAN 180 DEG  $
0635  REF 105  LAST 1082   15,3271  6 0001 0          AD      L
0636  REF 106  LAST 1082   15,3272  54 001 1          TS      L
0637  REF   2  LAST 1081   15,3273  1 3300 0          TCF     COMPAT        YES. GO ON.
0638  REF 254  LAST 1079   15,3274  50 000 1  TRTAGXPI INDEX  A             NO, SHIFT X BY - SGN(X) 2 PI
0639  REF   1              15,3275  4 5001 1          CS      HALFPR        +A YIELDS -1/2
0640                       15,3276  6 0000 1          DOUBLE
0641  REF   8  LAST 1082   15,3277  27'614 1          ADS     LCX/360

0642  REF   9  LAST 1082   15,3300  3 1614 0  COMPAT  CA      LCX/360       CORRECT FOR ASSUMED COORD TURN.
0643                       15,3301  0 0006 1          EXTEND
0644  REF   7  LAST 1082   15,3302  7 1506 1          MP      CALFA         COS ALFA
0645  REF  10  LAST 1082   15,3303  55'614 1          TS      LCX/360       SCALED LCX OK HERE.

0646  REF  10  LAST 1078   15,3304  11'700 0          CCS     CMDAPMOD      FOUR POSSIBILITIES HERE
0647  REF   1              15,3305  0 3675 0          TC      DZCALL1       EXIT, SETTING JETAG=0.(C(A)=0)
A0648                                                                       ALL 3 AXES ALREADY DONE.
0649                       15,3306  0 3307 0          TC      +1            G LESS THAN .05. CA POS. CONTINUE
0650  REF  11  LAST 1082   15,3307  3 1614 0          CA      LCX/360       G GEQ .05. CONTINUE IN CM/RCS
0651  REF  12  LAST 1082   15,3310  55'614 1          TS      LCX/360       CMDAPMOD=-0. DAMPING ONLY. SET LCX=0
06511 REF   9  LAST 1028   15,3311  55'571 1          TS      ERRORZ        INITIAL ROLL ERROR (UNREFLECTED) FOR TM.
0652  REF   6  LAST 1079   15,3312  55'713 1          TS      PAXERR1       SAVE LCX FOR FDAI AND EDIT.(  /360)
```

```
0653  REF   5  LAST 1082   15,3313  3 1613 1          CA     -VT/180        GET - 2 VT/180
0654  REF  15  LAST 1082   15,3314  54 021 0          TS     SR
0655  REF  16  LAST 1083   15,3315  3 0021 1          CA     SR             GET -VT/180, LEAVE -VT/360 IN SR FOR DZ
0656  REF   1              15,3316  55'570 0          TS     -VT/180E                          DIAGNOSTIC ****
0657  REF   6  LAST 1083   15,3317  57'613 1          XCH    -VT/180        NOW CONTENTS OF -VT/180 AS LABELED
0658                       15,3320  0 0006 1          EXTEND
0659  REF   7  LAST 1083   15,3321  7 1613 0          MP     -VT/180        B(A) = -2VT/180
0660                       15,3322  0 0006 1          EXTEND
0661  REF   1              15,3323  7 3750 1          MP     180/8ATT
0662  REF   2  LAST  112   15,3324  55'616 0          TS     VSQ/4API

R0663    IS SGN(VT) ( (180/4A1 TT) VT/180 VT/180 - .5 BUFLIM/360 )  -X/360     - .5 BUFLIM/360   POS  ?

0665                       15,3325  6 0000 1  WHICHALF DOUBLE                  FOR SECOND BURN,  A1
0666                       15,3326  4 0000 0          COM
0667  REF   1              15,3327  6 3754 1          AD     BUFLIM          =BUFLIM/(2 360)
0668  REF 107  LAST 1082   15,3330  54 001 1          TS     L
0669  REF   8  LAST 1083   15,3331  11'613 0          CCS    -VT/180
0670  REF 108  LAST 1083   15,3332  4 0001 1          CS     L
0671                       15,3333  1 3335 0          TCF    +2
0672  REF 109  LAST 1083   15,3334  3 0001 0          CA     L
0673  REF  13  LAST 1082   15,3335  6 1614 0          AD     LCX/360
0674  REF   2  LAST 1083   15,3336  6 3754 1          AD     BUFLIM
0675                       15,3337  0 0006 1          EXTEND
0676  REF   1              15,3340  6 3355 1          BZMF   REFLECT         POINT (X,V) IN LHP.

R0677    IS SGN(VT) ( (180/4A1 TT) VT/180 VT/180 - .5 BUFLIM/360 )  -X/360     + .5 BUFLIM/360   NEG  ?

0679                       15,3341  4 0000 0          COM
0680  REF   3  LAST 1083   15,3342  6 3754 1          AD     BUFLIM
0681  REF   4  LAST 1083   15,3343  6 3754 1          AD     BUFLIM
0682                       15,3344  0 0006 1          EXTEND
0683  REF   1              15,3345  6 3364 0          BZMF   DZ1             POINT (X,V) IN RHP.

R0684    IS POINT WITHIN VELOCITY DZ ?

0685  REF   1              15,3346  4 3747 1          CS     VSQMIN          IS VSQ/4API - (VSQ/4API) MIN  NEG  ?
0686  REF   3  LAST 1083   15,3347  6 1616 1          AD     VSQ/4API
0687                       15,3350  0 0006 1          EXTEND
0688  REF   1              15,3351  6 3657 0          BZMF   DZCALL          YES.

R0689         POINT IS IN BUFFER ZONE. THRUST TO X AXIS.

0690  REF   3  LAST 1081   15,3352  4 1617 1          CS     JNDX
0691  REF   2  LAST  113   15,3353  55'620 0          TS     JNDX1
0692  REF   1              15,3354  0 3437 1          TC     OVRLINE1

0699  REF   9  LAST 1083   15,3355  4 1613 0  REFLECT CS     -VT/180         REFLECT LHP INTO RHP REL TO TERM CONTR
0700  REF  10  LAST 1083   15,3356  55'613 0          TS     -VT/180
0701  REF  17  LAST 1083   15,3357  54 021 0          TS     SR              -VT/360  SAVED FOR DZ.
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0702   REF  14  LAST 1083   15,3360  4 1614 1          CS     LCX/360
0703   REF  15  LAST 1084   15,3361  55'614 1          TS     LCX/360
0704   REF   4  LAST 1083   15,3362  4 1617 1          CS     JNDX
0705   REF   5  LAST 1084   15,3363  55'617 1          TS     JNDX

R0706    IS VSQ/4API - (VSQ/4API) MIN  NEG   $

0707   REF   2  LAST 1083   15,3364  4 3747 1  DZ1     CS     VSQMIN          IS VSQ/4API - (VSQ/4API) MIN  NEG  $
0708   REF   4  LAST 1083   15,3365  6 1616 1          AD     VSQ/4API
0709                        15,3366  0 0006 1          EXTEND
0710   REF   1              15,3367  6 3371 1          BZMF   DZ2             YES, GO TEST FURTHER.
0711   REF   1              15,3370  1 3376 1          TCF    MAXVTEST        NO

R0712    IS X/360 - XMIN/360 -VT/360  NEG  $

0713   REF   1              15,3371  4 3752 0  DZ2     CS     XMIN/360        XMIN/360 = 4/360
0714   REF  16  LAST 1084   15,3372  6 1614 0          AD     LCX/360
0715   REF  18  LAST 1083   15,3373  6 0021 1          AD     SR              C(SR) = -VT/360
0716                        15,3374  0 0006 1          EXTEND                 IS X/360 - XMIN/360 -VT/360  NEG  $
0717   REF   2  LAST 1083   15,3375  6 3657 0          BZMF   DZCALL          YES,IN DZ. EXIT SETTING JETAG=0.

R0718    IS  XD/360 - VM/360K - XS/360   POS   ?

0719   REF   6  LAST 1084   15,3376  4 1617 1  MAXVTEST CS     JNDX
0720   REF   3  LAST 1083   15,3377  55'620 0          TS     JNDX1           NOW CAN SET JNDX1 FOR TON2 JETS.
0721   REF   1              15,3400  4 3754 0          CS     XS/360          XS/360 = (XMIN -YMIN/K) /360
0722   REF   5  LAST 1084   15,3401  6 1616 1          AD     VSQ/4API
0723   REF  17  LAST 1084   15,3402  6 1614 0          AD     LCX/360
0724   REF   2  LAST  112   15,3403  55'615 0          TS     XD/360          XD/360= X/360 +VSQ/4API   X INTERCEPT
A0725                                                                        BUT C(XD/360) = (XD - XS) /360
0726   REF   1              15,3404  6 3753 0          AD     -VM/360K        X INTERCEPT FOR MAX V (VM)
0727                        15,3405  4 0000 0          COM
0728                        15,3406  0 0006 1          EXTEND
0729   REF   1              15,3407  6 3415 1          BZMF   MAXVTIM1        YES. THRUST TO VM
0730   REF   3  LAST 1084   15,3410  3 1615 1          CA     XD/360
0731                        15,3411  0 0006 1          EXTEND
0732   REF   1              15,3412  7 5002 1          MP     KTRCS
0733                        15,3413  20 001 1          DDOUBL                 GO SAVE PREDICTED DRIFTING VELOCITY.

0734   REF   1              15,3414  0 3420 1          TC     GETON1          INSURE THAT Q IS POS AS TAG.
0735                        15,3415  0 0006 1  MAXVTIM1 EXTEND
0736                        15,3416  22 007 0          ZQ                     SET +0 AS TAG
0737   REF   1              15,3417  4 3753 1          CS     -VMT/180
0738   REF   1              15,3420  55'567 0  GETON1   TS     VDT/180         VDT/180 OR VMT/180.
0739   REF  11  LAST 1083   15,3421  6 1613 1          AD     -VT/180
0740                        15,3422  6 0000 1          DOUBLE
0741                        15,3423  0 0006 1          EXTEND
0742   REF   2  LAST 1083   15,3424  7 3750 1          MP     180/8ATT
0743   REF   2  LAST  113   15,3425  55'621 1          TS     TON1            TON1 / 4T
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0744                          15,3426  0 0006 1           EXTEND
0745  REF   1                 15,3427  6 3431 1           BZMF    OVRLINE
0746  REF   1                 15,3430  0 3443 1           TC      GETON2          RESET Q POS IF CAME FROM MAXVTIM1

0747  REF 213  LAST 1076      15,3431 10 002 1  OVRLINE  CCS     Q
0748  REF   2  LAST 1083      15,3432  1 3437 0           TCF     OVRLINE1
0749  REF   4  LAST 1084      15,3433  3 1620 1  MAXVTIM2 CA      JNOX1           ABOVE VM, SO THRUST DOWN
0750  REF   7  LAST 1084      15,3434 55'617 1           TS      JNOX
0751  REF   3  LAST 1084      15,3435  4 1621 1           CS      TON1
0752  REF   1                 15,3436  1 3442 1           TCF     OVRLINE2 +1

0753  REF  12  LAST 1084      15,3437  4 1613 0  OVRLINE1 CS      -VT/180         DRIFT AT V
0754  REF   2  LAST 1084      15,3440 55'567 0           TS      VDT/180
0755  REF 209  LAST 1078      15,3441  3 5021 1  OVRLINE2 CA      ZERO
0756  REF   4  LAST 1085      15,3442 55'621 1           TS      TON1
0757  REF   3  LAST 1085      15,3443  3 1567 1  GETON2   CA      VDT/180         VDT/180, OR VMT/180 OR VT/180
0758                          15,3444  6 0000 1           DOUBLE
0759                          15,3445  0 0006 1           EXTEND
0760  REF   3  LAST 1084      15,3446  7 3750 1           MP      180/8ATT
0761                          15,3447  6 0000 1           DOUBLE          FOR SECOND BURN, A1
0762  REF   2  LAST  112      15,3450 55'607 0           TS      TON2            = TON2 / 4T

0763                          15,3451  4 0000 0           COM
0764                          15,3452  0 0006 1           EXTEND
0765  REF   1                 15,3453  6 3457 1           BZMF    GETOFF
0766  REF   3  LAST 1085      15,3454 55'607 0           TS      TON2
07661 REF   8  LAST 1085      15,3455  3 1617 0           CA      JNDX
07662 REF   5  LAST 1085      15,3456 55'620 0           TS      JNDX1

0767  REF   4  LAST 1085      15,3457  4 1607 0  GETOFF   CS      TON2            TON2 / 4T
0768                          15,3460  0 0006 1           EXTEND
0769  REF   4  LAST 1085      15,3461  7 1567 0           MP      VDT/180         VDT/180, OR VT/180, OR VMT/180.
0770  REF   4  LAST 1084      15,3462 55'615 0           TS      XD/360          USE AS TEMP
0771  REF   5  LAST 1085      15,3463  4 1567 0           CS      VDT/180
07711                         15,3464  0 0006 1           EXTEND
07712 REF   1                 15,3465  1 3501 1           BZF     TOFFOVFL        OMIT THE DIVIDE IF DEN = 0.
0772  REF  13  LAST 1085      15,3466  6 1613 1           AD      -VT/180
0773                          15,3467  0 0006 1           EXTEND
0774  REF   5  LAST 1085      15,3470  7 1621 1           MP      TON1            TON1 /4T
0775  REF   5  LAST 1085      15,3471  6 1615 1           AD      XD/360          TEMP = -VDT/180 / 2 TON2
0776  REF  18  LAST 1084      15,3472  6 1614 0           AD      LCX/360
0777                          15,3473 22 007 0           ZL
0778  REF 110  LAST 1083      15,3474 56 001 0           XCH     L               TEST THE DIVIDE
0779                          15,3475  0 0006 1           EXTEND
0780  REF   6  LAST 1085      15,3476 11'567 0           DV      VDT/180
0781                          15,3477  0 0006 1           EXTEND
0782  REF   1                 15,3500  1 3503 0           BZF     GETOFF2         DIVIDE OK

0787  REF   1                 15,3501  3 5045 0  TOFFOVFL CA      2JETT           OVFL, USE  2T  FOR CONVENIENCE.
0788  REF   1                 15,3502  1 3510 1           TCF     TIMSCAL
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0796   REF 111  LAST 1085   15,3503  56 001 0  GETOFF2  XCH    L          GET NUMERATOR.
0797                        15,3504  0 0006 1           EXTEND
0798   REF   7  LAST 1085   15,3505  11'567 0           DV     VDT/180    C(A) = TOFF / 2T
0799                        15,3506  0 0006 1           EXTEND
0800   REF   2  LAST 1085   15,3507  7 5045 1           MP     2JETT
0801   REF   2  LAST  112   15,3510  55'605 1  TIMSCAL  TS     TOFF       IN CS

0802   REF   1              15,3511  .3 3751 1          CAF    4JETT
0803                        15,3512  0 0006 1           EXTEND
0804   REF   6  LAST 1085   15,3513  7 1621 1           MP     TON1       C(TON1) = TON1 / 4T
0805   REF   7  LAST 1086   15,3514  55'621 1           TS     TON1        IN CS

0806   REF   2  LAST 1086   15,3515  3 3751 1           CAF    4JETT
0807                        15,3516  0 0006 1           EXTEND
0808   REF   5  LAST 1085   15,3517  7 1607 0           MP     TON2       C(TON2) = TON2 / 4T
0809   REF   6  LAST 1086   15,3520  55'607 0           TS     TON2       IN CS

0810   REF 210  LAST 1085   15,3521  3 5021 1           CA     ZERO       CANNOT REDO AFTER TIMETST. TUSED GONE
0811   REF   9  LAST 1081   15,3522  55'711 0           TS     JETAG      SET +0 TO SHOW ROLL DAP CALLED.

A0812                                                                     CAUSE THE TM OF BODY RATES VIA UPBUFF TO BE
A0813                                                                     INITIALIZED. ALSO CAUSE NEEDLES TO BE DONE ON NEXT
A0814                                                                     AND ON ALTERNATE PASSES THROUGH CM/DUMPR.

0815   REF 127  LAST 1082   15,3523  3 5017 1           CA     ONE
0816   REF   2  LAST 1068   15,3524  54 305 0           TS     SW/NDX
```

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P0817   TIMETEST SECTION FOR RCS
R0818   ENTER WITH THREE TIME INTERVALS AND THE CORRESPONDING JET CODE INDEXES IN ERASEABLE LOCS TON1, TOFF, TON2, JNDX
R0820   JNDX1.  SECTION PROCESSES TIME INTERVALS FOR WTLST CALLS AND ASSURES THAT WTLST CALLS ARE MADE ONLY
R0822   (1) FOR POS INTERVALS GREATER THAN A SPECIFIED MINIMUM ( HERE CHOSEN AS  2 CS) AND
R0824   (2) FOR THE INTERVALS THAT WILL BE EXECUTED WITHIN THE TIME REMAINING IN THE SAMPLE INTERVAL T  (2 SEC).
R0826   TIMETST  ESTABLISHES 6 LOCS CONTAINING JET CODES AND CORRESPONDING TIME  INTERVALS. THUS: TON1, T1BITS,
R0828   TOFF, TBITS,  TON2, T2BITS.   OF THESE THE FIRST 2 LOCS ARE TEMPORARY. FOR IMMEDIATE ACTION. IN GENERAL.
R0830   SECTION JETCALL  BELOW PROCESSES THIS LIST.

 0831   REF  16  LAST 1081   15,3525  3 0025 0  TIMETST  CA     TIME1      CORRECT FOR POSSIBLE TIME1 OVFL.
 0832   REF   6  LAST 1082   15,3526  6 5002 0           AD     POS1/2
 0833   REF   7  LAST 1087   15,3527  6 5002 0           AD     POS1/2     OVFL GUARANTEED.
 0834   REF   3  LAST 1081   15,3530  27'712 0           ADS    TUSED      B(TUSED) =-TUSED =-DLTIME1

 0835   REF   1              15,3531  3 3746 1           CA     -T-3       =-T +2 -5  (SEE SETJTAG)
A0836                                                                     THE +2 REQUIRED FOR PROPER BRANCH.
 0837   REF   4  LAST 1087   15,3532  27'712 0           ADS    TUSED      TUSED = TIME(K)-TIME(K-1)-T+2

 0838   REF  50  LAST 1043   15,3533  4 5016 1           CS     TWO        USE 2 SINCE TIME3 UNCERTAIN TO 1
 0839   REF   8  LAST 1086   15,3534  6 1621 0           AD     TON1
 0840                        15,3535  0 0006 1           EXTEND
 0841   REF   1              15,3536  6 3550 1           BZMF   TIMETST1
 0842   REF   9  LAST 1085   15,3537  51'617 0           INDEX  JNDX
 0843   REF   3  LAST 1079   15,3540  3 3205 0           CAF    P/RJCODE
 0844   REF   2  LAST  113   15,3541  55'622 1           TS     T1BITS

 0845   REF   9  LAST 1087   15,3542  3 1621 0           CA     TON1
 0846   REF   5  LAST 1087   15,3543  27'712 0           ADS    TUSED
 0847                        15,3544  0 0006 1           EXTEND
 0848   REF   1              15,3545  6 3552 0           BZMF   TOFFTEST
 0849   REF 211  LAST 1086   15,3546  3 5021 1           CA     ZERO
 0850   REF   1              15,3547  1 3603 0           TCF    TIMETST3
 0851   REF 128  LAST 1086   15,3550  4 5017 0  TIMETST1 CS     ONE
 0852   REF  10  LAST 1087   15,3551  55'621 1           TS     TON1
 0853   REF  51  LAST 1087   15,3552  4 5016 1  TOFFTEST CS     TWO
 0854   REF   3  LAST 1086   15,3553  6 1605 0           AD     TOFF
 0855                        15,3554  0 0006 1           EXTEND
 0856   REF   1              15,3555  6 3564 0           BZMF   TIMETST2
 0857   REF   4  LAST 1087   15,3556  3 1605 0           CA     TOFF
 0858   REF   6  LAST 1087   15,3557  27'712 0           ADS    TUSED
 0859                        15,3560  0 0006 1           EXTEND
 0860   REF   1              15,3561  6 3566 1           BZMF   TON2TEST
 0861   REF 212  LAST 1087   15,3562  3 5021 1           CA     ZERO
 0862   REF   1              15,3563  1 3605 0           TCF    TIMETST4
 0863   REF 129  LAST 1087   15,3564  4 5017 0  TIMETST2 CS     ONE
 0864   REF   5  LAST 1087   15,3565  55'605 1           TS     TOFF
 0865   REF  52  LAST 1087   15,3566  4 5016 1  TON2TEST CS     TWO
 0866   REF   7  LAST 1086   15,3567  6 1607 1           AD     TON2
 0867                        15,3570  0 0006 1           EXTEND
 0868   REF   1              15,3571  6 3606 1           BZMF   TIMETST5
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0869   REF   6  LAST 1085   15,3572  51'620 1           INDEX  JNDX1
0870   REF   4  LAST 1087   15,3573  3 3205 0           CAF    P/RJCODE
0871   REF   2  LAST  112   15,3574  55'610 0           TS     T2BITS
0872   REF   8  LAST 1087   15,3575  3 1607 1           CA     TON2
0873   REF   7  LAST 1087   15,3576  27'712 0           ADS    TUSED
0874                        15,3577  0 0006 1           EXTEND
0875   REF   1              15,3600  6 3610 0           BZMF   JETCALL1
0876   REF 213  LAST 1087   15,3601  3 5021 1           CA     ZERO
0877   REF   2  LAST 1087   15,3602  1 3607 1           TCF    TIMETST5 +1
0878   REF  11  LAST 1087   15,3603  55'621 1 TIMETST3  TS     TON1
0879   REF 130  LAST 1087   15,3604  4 5017 0           CS     ONE
0880   REF   6  LAST 1087   15,3605  55'605 1 TIMETST4  TS     TOFF
0881   REF 131  LAST 1088   15,3606  4 5017 0 TIMETST5  CS     ONE
0882   REF   9  LAST 1088   15,3607  55'607 0           TS     TON2

R0883  SECTION  JETCALL  EXAMINES CONTENTS OF JET TIMES IN LIST, ESTABLISHES WTLST ENTRIES, AND EXECUTES CORRESPONDING
R0885  JET CODES. A POSITIVE NZ NUMBER IN A TIME REGISTER INDICATES THAT A WTLST CALL IS TO BE MADE, AND ITS JET BITS
R0887  EXECUTED. A +0 INDICATES THAT THE TIME INTERVAL DOES NOT APPLY, BUT THE  CORRESPONDING JET BITS ARE TO BE
R0889  EXECUTED. A NEG NUMBER INDICATES THAT THE TIME INTERVAL HAS BEEN PROCESSED. IN EVENT OF +0 OR -1, THE
R0891  SUBSEQUENT TIME REGISTER IS EXAMINED FOR POSSIBLE ACTION. THUS JET BITS TO BE EXECUTED MAY COME FROM MORE
R0893  THAN ONE REGISTER.

0894   REF 214  LAST 1088   15,3610  3 5021 1  JETCALL1 CA     ZERO
0895   REF   2  LAST  112   15,3611  55'611 1           TS     OUTTAG
0896   REF   2  LAST  112   15,3612  55'612 1           TS     NUJET
0897   REF   2  LAST  112   15,3613  55'606 1           TS     TBITS
0898   REF  12  LAST 1088   15,3614  53'622 1           DXCH   TON1
0899   REF 255  LAST 1082   15,3615  10 000 0           CCS    A
0900   REF   1              15,3616  1 3633 0           TCF    JETCALL2        CALL WTLST
0901   REF   3  LAST 1088   15,3617  23'612 0 JETCALL3  LXCH   NUJET          WTLST ENTRIES COME HERE FROM JETCALL
0902   REF 132  LAST 1088   15,3620  4 5017 0           CS     ONE
0903   REF   7  LAST 1088   15,3621  53'606 1           DXCH   TOFF
0904   REF 256  LAST 1088   15,3622  10 000 0           CCS    A
0905   REF   2  LAST 1088   15,3623  1 3633 0           TCF    JETCALL2        CALL WTLST
0906   REF   4  LAST 1088   15,3624  23'612 0           LXCH   NUJET
0907   REF 133  LAST 1088   15,3625  4 5017 0           CS     ONE
0908   REF  10  LAST 1088   15,3626  53'610 0           DXCH   TON2
0909   REF 257  LAST 1088   15,3627  10 000 0           CCS    A
0910   REF   3  LAST 1088   15,3630  1 3633 0           TCF    JETCALL2        CALL WTLST
0911   REF   5  LAST 1088   15,3631  23'612 0           LXCH   NUJET
0912   REF   1              15,3632  0 3642 1           TC     JETACTN         C(A) = +0
0913   REF 112  LAST 1086   15,3633  56 001 0 JETCALL2  XCH    L               SAVE JET BITS FOR AFTER WTLST CALL
0914   REF   6  LAST 1088   15,3634  27'612 1           ADS    NUJET
0915   REF 113  LAST 1088   15,3635  56 001 0           XCH    L
0916   REF 134  LAST 1088   15,3636  6 5017 1           AD     ONE             RESTORE FOR CCS
0917   REF  49  LAST 1077   15,3637  0 5245 1           TC     WAITLIST
0918   REF  40  LAST 1077   E6,1661                     EBANK= AOG
0919   REF   1              15,3640   03650 1          2CADR  JETCALL
0919   REF   1              15,3641   32066 0
0920   REF   7  LAST 1088   15,3642  3 1612 0 JETACTN   CA     NUJET           COME HERE WHEN DESIRED JET CODE IS KNOWN
```

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0921                              15,3643  0 0006 1           EXTEND                NO NEED TO SAVE OLD CODES
0922  REF   4  LAST 1079         15,3644  01 006 0           WRITE  ROLLJETS       SET RCHAN TO NEW BIT CONFIG.

0923  REF   3  LAST 1088         15,3645  11'611 1           CCS    OUTTAG
0924  REF  56  LAST 1081         15,3646  0 5324 1           TC     TASKOVER
0925  REF   2  LAST 1075         15,3647  0 3705 0 ROLLDUMP  TC     CM/FDAIR

A0926                                                                EDIT DUMP AT ABOVE LOCATION.

R0927   WAITLIST ENTRIES COME HERE.

0928  REF  45  LAST 1011         15,3650  3 5016 0 JETCALL   CAF    BIT2           CM/DSTBY =103D BIT2
0929  REF   4  LAST 1089         15,3651  55'611 1           TS     OUTTAG         SIGNIFY WTLST ENTRY
0930  REF  23  LAST 1081         15,3652  7 0102 0           MASK   CM/FLAGS       IS SYSTEM DISABLED  $
0931                              15,3653  0 0006 1           EXTEND
0932  REF   2  LAST 1088         15,3654  1 3643 1           BZF    JETACTN +1     YES, QUENCH ROLL JETS,IF ON AND EXIT.
0933                              15,3655  22 007 0           ZL                    NO, CONTINUE.
0934  REF   1                     15,3656  1 3617 0           TCF    JETCALL3       C(A) POS, C(L) =+0

R0935    DEAD ZONE ENTRIES COME HERE.

09351 REF  11  LAST 1082         15,3657  4 1700 0 DZCALL    CS     CMDAPMOD       POSSIBLE VALUES OF CMDAPMOD: -1, +0, -0.
09352 REF  73  LAST 1067         15,3660  7 5017 0           MASK   BIT1
09353 REF 114  LAST 1088         15,3661  54 001 1           TS     L              C(L)=0 FOR -0; C(L)=1 FOR -1 OR +0.
09354 REF 258  LAST 1088         15,3662  50 000 1           INDEX  A              ERASBLE ORDER: ROLLTM,ROLLC,ROLLC +1.
09355 REF   4  LAST 1074         15,3663  3 1714 1           CA     ROLLTM         GET ROLL/180 OR ROLLC  (/360).
09356 REF 115  LAST 1089         15,3664  50 001 0           INDEX  L
09357 REF 259  LAST 1089         15,3665  54 000 0           TS     A              IF C(L)=1, STORE 'ROLLC' IN 'L'.
09358 REF 116  LAST 1089         15,3666  6 0001 0           AD     L              (BOTH MUST BE SCALED DEG/180)
09359 REF   5  LAST 1074         15,3667  0 2522 0           TC     ANGOVCOR       C(A)=ROLL/180  OR  2 ROLLC  .
0936  REF   4  LAST 1079         15,3670  55'717 0           TS     ROLLHOLD       IF CMDAPMOD =-0, SAVE ROLL ANGLE,
A09361                                                                                  OTHERWISE, SAVE ROLL COMMAND.

09362 REF 215  LAST 1088         15,3671  3 5021 1           CA     ZERO           COME HERE IF IN DZ, AND CANCEL JETS.
0937                              15,3672  0 0006 1           EXTEND                INHINT NOT NEEDED HERE.
0938  REF   5  LAST 1089         15,3673  01 006 0           WRITE  ROLLJETS       TURN OFF ALL ROLL JETS.
0939  REF   8  LAST 1086         15,3674  55'567 0           TS     VDT/180        SET =0 TO SHOW IN DEAD ZONE.
0940  REF  10  LAST 1086         15,3675  55'711 0 DZCALL1   TS     JETAG          COME HERE WITH C(A)=0.
0941  REF   1                     15,3676  0 3647 1           TC     ROLLDUMP
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P0942    CM ENTRY FDAI DISPLAY

R0943  CALCULATE BY INTEGRATION THE ROLL ERROR BETWEEN THE 2 SEC CM/RCS UPDATES . DISPLAY ATTITUDE ERRORS AS FOLLOWS:
R0945            ATM DAP:    DISPLAY ONLY ROLL ATTITUDE ERROR.
R0946            EXT ATM DAP:    PRESENT 3 ATTITUDE ERRORS RELATIVE TO THE APPROPRIATE BODY AXES EACH .1 SEC.
R0948                                        ROLL    ROLLC-ROLL
R0949                                        PITCH   ALFAC-ALFA
R0950                                        YAW     BETAC-BETA

R0951  DURING ENTRY, THE FDAI NEEDLES HAVE FULL SCALE OF 67.5 DEG IN ROLL AND  16.875 DEG IN PITCH AND YAW.
R0953  THE SUBROUTINE  NEEDLER  EXPECTS (ANGLE/180) AND SCALES TO 16.875 DEG   FULL SCALE.

A0958                                                                  COME HERE EACH .1 SEC. (CMDAPMOD=+1 COMES BELOW)
 0959  REF   7  LAST 1074   15,3677  4 1705 0  CM/FDAI  CS     PHIDOT          INTEGRATE ROLL ERROR 'TWEEN 2SEC UPDATES
 0960                       15,3700  0 0006 1            EXTEND
 0961  REF   8  LAST 1082   15,3701  7 1506 1            MP     CALFA           FOR ASSUMED COORDINATION.
 0962                       15,3702  0 0006 1            EXTEND
 0963  REF   6  LAST 1079   15,3703  7 5002 1            MP     HALF
 0964  REF   7  LAST 1082   15,3704  27'713 1            ADS    PAXERR1         ROLL ERROR/360.    OVFL OK.

A0965                                                                  EDIT DUMP AT ABOVE LOCATION.
 0966  REF   7  LAST 1090   15,3705  3 5002 0  CM/FDAIR CA     HALF
 0967                       15,3706  0 0006 1            EXTEND
 0968  REF   6  LAST 1090   15,3707  7 1713 1            MP     PAXERR1         FULL SCALE FOR FDAI (ROLL) IS 67.5 D
 0969  REF   1              15,3710  55'476 1            TS     PAXERR          .25 (ROLL ERROR/180) FOR FDAI NEEDLE.

A0970                                                                  PROGRAM TO FILE BODY  RATES FOR TM ON ONE PASS AND
A0971                                                                  TO UPDATE THE NEEDLE DISPLAY ON THE NEXT.
A0972                                                                  SYNCHRONIZATION WITH CM/RCS IS USED SO THAT THE TM
A0973                                                                  IS DONE WITH THE ROLL SYSTEM AND NEEDLES START ON
A0974                                                                  THE SUBSEQUENT PASS.
A0975

 0976  REF   3  LAST 1086   15,3711  4 0305 0  CM/DUMPR CS     SW/NDX          COMBINED ALTERNATION SWITCH AND FILE
 09761 REF   4  LAST 1090   15,3712  54 305 0            TS     SW/NDX
 0977                       15,3713  0 0006 1            EXTEND                 INDEX.
 0978  REF   1              15,3714  6 3720 1            BZMF   CMTMFILE        FILE STARTS WITH SW/NDX +1 AND GOES TO
A0979                                                                  ENDBUF.
A0980                                                                  INDEX IS POS FOR NEEDLES

 0981  REF  39  LAST 1014   15,3715  0 4740 0            TC     IBNKCALL
 0982  REF  10  LAST 1012   15,3716   42420 1           CADR   NEEDLER

 0983  REF   1              15,3717  0 3736 0            TC     CM/END

A0984                                                                  INDEX IS NEG FOR TM FILE

 0985  REF  41  LAST 1064   15,3720  6 6214 0  CMTMFILE AD     THREE
 0986                       15,3721  0 0006 1            EXTEND
 0987  REF   1              15,3722  6 3726 1            BZMF   SAVENDX
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0988   REF  17  LAST 1087   15,3723  3 0025 0            CA      TIME1          INITIALIZE THE TM LIST IN UPBUFF.
0989   REF   3  LAST   72   15,3724  54 304 1            TS      CMTMTIME
0990   REF   3  LAST  871   15,3725  4 5025 1            CS      THIRTEEN        INITIALIZE COUNTER
0991   REF   5  LAST 1090   15,3726  54 305 0  SAVENDX   TS      SW/NDX         A NEGATIVE NUMBER.
0992                        15,3727  0 0006 1            EXTEND
0993   REF   8  LAST 1081   15,3730  3 1702 0            DCA     PREL
0994   REF   6  LAST 1091   15,3731  50 305 1            INDEX   SW/NDX
0995   REF   2  LAST   72   15,3732  52 324 0            DXCH    ENDBUF -1
0996   REF   8  LAST 1078   15,3733  3 1703 1            CA      RREL
0997   REF   7  LAST 1091   15,3734  50 305 1            INDEX   SW/NDX
0998   REF   3  LAST 1091   15,3735  54 325 1            TS      ENDBUF +1

0999   REF   3  LAST 1073   15,3736  3 1623 1  CM/END    CA      CM/SAVE
1000   REF  19  LAST 1084   15,3737  54 021 0            TS      SR
A1001                                                          DOES NOT PROTECT TEMK, SQ IN SPSIN/COS

1002                        15,3740  0 0006 1            EXTEND
1003   REF   1              15,3741  3 3745 1            DCA     T5IDLER2
1004   REF  25  LAST 1072   15,3742  53'313 0            DXCH    T5LOC
1005   REF  46  LAST 1062   15,3743  0 5333 1            TC      RESUME

1006   REF  26  LAST 1091       1312                     EBANK=  T5LOC
1007   REF   7  LAST 1069   15,3744   03153 0  T5IDLER2 2CADR   T5IDLOC
1007                        15,3745   12062 0
A1008                                                  DEFINE THE FOLLOWING 17D REGISTERS IN UPBUFF TO BE
A1009                                                  USED TO TELEMETER CM VEHICLE BODY RATE INFORMATION.
A1010                                                  THE INFORMATION IS FILED EACH 0.2 SEC. GIVING 15D
A1011                                                  DATA POINTS EACH 1 SEC.  TM LIST IS READ TWICE
A1012                                                  EACH 2 SECONDS.

A1013                                                  THE SEQUENCE IS:    SP TIME       INITIAL TIME
A1014                                                                      SWITCH        ALSO INDEX.
A1015                                                                      P             ROLL RATE
A1016                                                                      Q             PITCH RATE
A1017                                                                      R             YAW RATE
A1018                                                                      ETC.

A1019                                          CMTMTIME =      UPBUFF
A1020                                          SW/NDX   =      UPBUFF  +1
A1021                                          ENDBUF   =      UPBUFF  +16D
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P10211  SPACER

R1022   CONSTANTS USED IN THE ROLL CONTROL SYSTEM:
R1023   CONSTANTS ARE THE FOLLOWING: A = 9.1 DEG/SECSQ, VM = 20 DEG/SEC,        T = 2 SEC,  TCDU = .1 SEC,
R1025   XMIN = 4 DEG, VMIN = 2 DEG/SEC, K = .25, A1 = 4.55 DEG/SECSQ,          VI = 1 DEG/SEC, INTERCEPT WITH DZ SIDE
R1027   XBUF = 4 DEG

 1028                          15,3746   77464 1  -T-3      DEC     -203              CS
 1029                          15,3747   00012 1  VSQMIN    DEC     .61050061 E-3     VSQ MIN/4 A PI = 4/(4  (9.1)  180)
 1030   REF   5  LAST  568       5033             2T/TCDU   =       OCT50             T/TCDU  EXP-14   TCDU =.1SEC
 1031                          15,3750   23617 0  180/8ATT  DEC     .61813187         180/(8  (9.1) 4)=(180/ATT)  EXP -3
 1032   REF   2  LAST 1084    15,3753            -VMT/180  =       -VM/360K          = 20  (2) / 180
 1033   REF   3  LAST  586       5045             2JETT     =       4SECS             CS            2 (2) 100   INTEGER
 1034                          15,3751   01440 0  4JETT     DEC     800               CS            4 (2) 100   INTEGER
 1035                          15,3752   00266 0  XMIN/360  DEC     182               XMIN/360 = 4/ 360  EXP 14  = 182 INTEGER
 1036                          15,3753   70706 1  -VM/360K  DEC     -.22222222        =-20/( 360  (.25))
 1037   REF   4  LAST 1085    15,3750            1/16A1    =       180/8ATT
A1037I                                                                  1/16A1    = 180/(16 A1 TT)
A1038                                                                   =180/(16  4.55  4)
 1039                          15,3754   00133 0  XS/360    DEC     91                =(XMIN +VI (T-1/K))/360 = 2/360 EXP 14
 1040   REF   2  LAST 1084    15,3754            BUFLIM    =       XS/360            4/(2  360)

 1041   REF   8  LAST 1090       5002            KTRCS     =       HALF              KT = (.25) 2 = .5
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*** END OF TVCDAPS .011 ***

L DOWN-TELEMETRY PROGRAM USER'S PAGE NO. 1 E0 S3

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R0001   PROGRAM NAME- DOWN TELEMETRY PROGRAM
R0002   MOD NO.- 0      TO COMPLETELY REWRITE THE DOWN TELEMETRY PROGRAM AND DOWNLINK ERASABLE DUMP PROGRAM FOR THE
R0004                   PURPOSE OF SAVING APPROXIMATELY 150 WORDS OF CORE STORAGE.
R0006                   THIS CHANGE REQUIRES AN ENTIRELY NEW METHOD OF SPECIFYING DOWNLINK LISTS.REFER TO DOWNLINK
R0008                   LISTS LOG SECTION FOR MORE DETAILS. HOWEVER THIS CHANGE WILL NOT AFFECT THE GROUND PROCESSING
R0010                   OF DOWN TELEMETRY DATA.
R0011   MOD BY- KILROY, SMITH, DEWITT
R0012   DATE-   020CT67
R0013   AUTHORS- KILROY. SMITH. DEWITT. DEWOLF. FAGIN
R0014   LOG SECTION- DOWN-TELEMETRY PROGRAM
R0015   FUNCTIONAL DESCRIPTION- THIS ROUTINE IS INITIATED BY TELEMETRY END
R0016           PULSE FROM THE DOWNLINK TELEMETRY CONVERTER. THIS PULSE OCCURS
R0017           AT 50 TIMES PER SEC(EVERY 20 MS) THEREFORE DODOWNTM IS
R0018           EXECUTED AT THESE RATES. THIS ROUTINE SELECTS THE APPROPRIATE
R0019           AGC DATA TO BE TRANSMITTED DOWNLINK AND LOADS IT INTO OUTPUT
R0020           CHANNELS 34 AND 35. THE INFORMATION IS THEN GATED OUT FROM THE
R0021           LGC IN SERIAL FASHION.
R0022           THIS PROGRAM IS CODED FOR A 2 SECOND DOWNLIST. SINCE DOWNRUPTS
R0023           OCCUR EVERY 20MS AND 2 AGC COMPUTER WORDS CAN BE PLACED IN
R0024           CHANNELS 34 AND 35 DURING EACH DOWNRUPT THE PROGRAM IS CAPABLE
R0025           OF SENDING 200 AGC WORDS EVERY 2 SECONDS.
R0026   CALLING SEQUENCE- NONE
R0027           PROGRAM IS ENTERED VIA TCF DODOWNTM WHICH IS EXECUTED AS A
R0028           RESULT OF A DOWNRUPT. CONTROL IS RETURNED VIA TCF RESUME WHICH
R0029           IN EFFECT IS A RESUME.
R0030   SUBROUTINES CALLED- NONE
R0031   NORMAL EXIT MODE- TCF RESUME
R0032   ALARM OR ABORT EXIT MODE- NONE
R0033   RESTART PROTECTION:
R0034           ON A FRESH START AND RESTART THE 'STARTSUB' SUBROUTINE WILL INITIALIZE THE DOWNLIST POINTER(ACTUALLY
R0036           DNTMGOTO) TO THE BEGINNING OF THE CURRENT DOWNLIST(I.E. CURRENT CONTENTS OF DNLSTADR). THIS HAS THE
R0038           EFFECT OF IGNORING THE REMAINDER OF THE DOWNLIST WHICH THE DOWN-TELEMETRY PROGRAM WAS WORKING ON WHEN
R0040           THE RESTART(OR FRESH START) OCCURRED AND RESUME DOWN TELEMETRY FROM THE BEGINNING OF THE CURRENT
R0042           DOWNLIST.
R0043           ALSO OF INTEREST IS THE FACT THAT ON A RESTART THE AGC WILL ZERO DOWNLINK CHANNELS 13, 34 AND 35.
R0047   DOWNLINK LIST SELECTION:
R0048           THE APPROPRIATE DOWNLINK LISTS ARE SELECTED BY THE FOLLOWING:
R0049           1. FRESH START
R0050           2. V37EXXE  WHERE XX = THE MAJOR MODE BEING SELECTED.
R0051           3. UPDATE PROGRAM(P27)
R0052           4.      NON-V37 SELECTABLE TYPE PROGRAMS(E.G. AGS INITIALIZATION(SUNDANCE,LUMINARY) AND P61-P62
R00522                  TRANSITION(COLOSSUS) ETC.).
R00525  DOWNLINK LIST RULES AND LIMITATIONS:
R00526          READ SECTION(S) WHICH FOLLOW 'DEBRIS' WRITEUP.
R0053   OUTPUT-  EVERY 2 SECONDS 100 DOUBLE PRECISION WORDS(I.E. 200 LGC
R0054           COMPUTER WORDS) ARE TRANSMITTED VIA DOWNLINK.
R0055   ERASABLE INITIALIZATION REQUIRED- NONE
R0056           'DNTMGOTO' AND 'DNLSTADR' ARE INITIALIZED BY THE FRESH START PROGRAM.
R0058   DEBRIS(ERASABLE LOCATIONS DESTROYED BY THIS PROGRAM)-
R0059           LOATALST,DNTMBUFF TO DNTMBUFF +21D,TMINDEX,DNQ.
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L DOWN-TELEMETRY PROGRAM USER'S PAGE NO. 2 EO S3

R0060

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P0065   DODOWNTM IS ENTERED EVERY 20 MS BY AN INTERRUPT TRIGGERED BY THE
R0066   RECEIPT OF AN ENDPULSE FROM THE SPACECRAFT TELEMETRY PROGRAMMER.

R0067   NOTES REGARDING DOWNLINK LISTS ASSOCIATED WITH THIS PROGRAM:
R0068   1. DOWNLISTS. - DOWNLISTS MUST BE COMPILED IN THE SAME BANK AS THE
R0069      DOWN-TELEMETRY PROGRAM. THIS IS DONE FOR EASE OF CODING, FASTER
R0070      EXECUTION.
R0075   2. EACH DOWNLINK LIST CONSISTS OF A CONTROL LIST AND A NUMBER OF
R0076      SUBLISTS.
R0077   3. A SUBLIST REFERS TO A SNAPSHOT OR DATA COMMON TO THE SAME OR OTHER
R0078      DOWNLINK LISTS.  ANY SUBLIST CONTAINING COMMON DATA NEEDS TO BE
R0079      CODED ONLY ONCE FOR THE APPLICABLE DOWNLINK LISTS.
R0080   4. SNAPSHOT SUBLISTS REFER SPECIFICALLY TO HOMOGENOUS DATA WHICH MUST BE
R0081      SAVED IN A BUFFER DURING ONE DOWNRUPT.
R0082   5. THE 1DNADR FOR THE 1ST WORD OF SNAPSHOT DATA IS FOUND AT THE END
R0083      OF EACH SNAPSHOT SUBLIST, SINCE THE PROGRAM CODING SENDS THIS DP WORD
R0084      IMMEDIATELY AFTER STORING THE OTHERS IN THE SNAPSHOT BUFFER.
R0085   6. ALL LISTS ARE COMBINATIONS OF CODED ERASABLE ADDRESS CONSTANTS
R0086      CREATED FOR THE DOWNLIST PROGRAM.
R0087         A. 1DNADR              1-WORD DOWNLIST ADDRESS.
R0088            SAME AS ECADR, BUT USED WHEN THE WORD ADDRESSED IS THE LEFT
R0089            HALF OF A DOUBLE-PRECISION WORD FOR DOWN TELEMETRY.
R0090         B. 2DNADR - 6DNADR     N-WORD DOWNLIST ADDRESS, N = 2 - 6.
R0091            SAME AS 1DNADR, BUT WITH THE 4 UNUSED BITS OF THE ECADR FORMAT
R0092            FILLED IN WITH 0001-0101.  USED TO POINT TO A LIST OF N DOUBLE-
R0093            PRECISION WORDS, STORED CONSECUTIVELY, FOR DOWN TELEMETRY.
R0094         C. DNCHAN              DOWNLIST CHANNEL ADDRESS.
R0095            SAME AS 1DNADR, BUT WITH PREFIX BITS 0111.  USED TO POINT TO
R0096            A PAIR OF CHANNELS FOR DOWN TELEMETRY.
R0097         D. DNPTR               DOWN TELEMETRY SUBLIST POINTER.
R0098          SAME AS CAF BUT TAGGED AS A CONSTANT. USED IN CONTROL LIST TO POINT TO A SUBLIST.
R0100          CAUTION--- A DNPTR CANNOT BE USED IN A SUBLIST.
R0101   7. THE WORD ORDER CODE IS SET TO ZERO AT THE BEGINNING OF EACH DOWNLIST (I.E. CONTROL LIST) AND WHEN
R0103      A '1DNADR TIME2' IS DETECTED IN THE CONTROL LIST(ONLY).
R0104   8. IN THE SNAPSHOT SUBLIST ONLY, THE DNADR'S CANNOT POINT TO THE FIRST WORD OF ANY EBANK.

R0106   DOWNLINK LIST RESTRICTIONS:
R0107     (THE FOLLOWING POINTS MAY BE LISTED ELSEWHERE BUT ARE LISTED HERE SO  IT IS CLEAR THAT THESE THINGS CANNOT BE
R0109     DONE)

R0110   1. SNAPSHOT DOWNLIST:
R0111     (A) CANNOT CONTAIN THE FOLLOWING ECADRS(I.E. 1DNADR'S): 0, 400, 1000, 1400, 2000, 2400, 3000, 3400.
R0113     (B) CAN CONTAIN ONLY 1DNADR'S

R0114   2. ALL DOWNLINKED DATA(EXCEPT CHANNELS) IS PICKED UP BY A <DCA<SO DOWNLINK LISTS CANNOT CONTAIN THE
R0116      EQUIVALENT OF THE FOLLOWING ECADRS(I.E. 1DNADRS): 377, 777, 1377, 1777, 2377, 27777, 3377, 3777.

R0118      (NOTE: THE TERM EQUIVALENT ' MEANT THAT THE 1DNADR  TO 6DNADR  WILL BE PROCESSED LIKE 1 TO 6 ECADRS)

R0120   3. CONTROL LISTS AND SUBLISTS CANNOT HAVE ENTRIES = OCTAL 00000 OR OCTAL 77777
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R0122   4. THE '1DNADR TIME2' WHICH WILL CAUSE THE DOWNLINK PROGRAM TO SET THE WORDER CODE TO 3 MUST APPEAR IN THE
R0124      CONTROL SECTION OF THE DOWNLIST.

R0125   5. 'DNCHAN 0' CANNOT BE USED.

R0126   6. 'DNPTR 0' CANNOT BE USED.

R0127   7. DNPTR CANNOT APPEAR IN A SUBLIST.

R0128


R0129   EBANK SETTINGS
R0130           IN THE PROCESS OF SETTING THE EBANK(WHEN PICKING UP DOWNLINK DATA) THE DOWN TELEMETRY PROGRAM PUTS
R0132           'GARBAGE' INTO BITS15-12 OF EBANK. HUGH BLAIR-SMITH WARNS US THAT BITS15-12 OF EBANK MAY BECOME
R0134           SIGNIFICANT SOMEDAY IN THE FUTURE. IF/WHEN THAT HAPPENS, THE PROGRAM SHOULD INSURE(BY MASKING ETC.)
R0136           THAT BITS15-12 OF EBANK ARE ZERO.
R0137   INITIALIZATION REQUIRED- TO INTERRUPT CURRENT LIST AND START A NEW ONE..
R0138       1.  ADRES OF DOWNLINK LIST INTO DNLSTADR
R0139       2.  NEGONE INTO SUBLIST
R0140       3.  NEGONE INTO DNECADR

 0142                        22,3510                         BANK   22
 0143   REF   2  LAST  170   05,2000                         SETLOC DOWNTELM
 0144                        05,3521                         BANK

 0145   REF  23  LAST  179     0340                          EBANK= DNTMBUFF

 0146   REF   1                                             COUNT  05/DPROG

 0147   REF  21  LAST 1073   05,3521  54 016 1  DODOWNTM TS     BANKRUPT
 0148                        05,3522  0 0006 1           EXTEND
 0149   REF  17  LAST 1073   05,3523  22 012 1           QXCH   QRUPT          SAVE Q
 0150   REF  41  LAST 1057   05,3524  3 5011 1           CA     BIT7           SET WORD ORDER CODE TO 1. EXCEPTION- AT
 0151                        05,3525  0 0006 1           EXTEND                THE BEGINNING OF EACH LIST THE WORD
 0152   REF  12  LAST 1062   05,3526  05 013 0           WOR    CHAN13         CODE WILL BE SET BACK TO 0.
 0153   REF   3  LAST  260   05,3527  0 0335 1           TC     DNTMGOTO       GO TO APPROPRIATE PHASE OF PROGRAM

 0154   REF  17  LAST  971   05,3530  3 7716 0  DNPHASE1 CA     NEGONE         INITIALIZE ALL CONTROL WORDS
 0155   REF   1              05,3531  54 337 1           TS     SUBLIST        WORDS TO MINUS ONE
 0156   REF   1              05,3532  54 336 0           TS     DNECADR
 0157   REF   1              05,3533  3 3653 1           CA     LDNPHAS2       SET DNTMGOTO =0 ALL SUBSEQUENT DOWNRUPTS
 0158   REF   4  LAST 1096   05,3534  54 335 0           TS     DNTMGOTO       GO TO DNPHASE2
 0159   REF   1              05,3535  1 3551 1           TCF    NEWLIST
 0160   REF   2  LAST 1096   05,3536  10 336 0  DNPHASE2 CCS    DNECADR        SENDING OF DATA IN PROGRESS
 0161   REF   1              05,3537  0 3666 1  DODNADR  TC     FETCH2WD       YES - THEN FETCH THE NEXT 2 SP WORDS
 0162   REF  27  LAST  832   05,3540   77753 0  MINTIME2-1DNADR TIME2          NEGATIVE OF TIME2 1DNADR
 0163                        05,3541  1 3542 0           TCF    +1             (ECADR OF  3776 + 74001 = 77777)

 0164   REF   2  LAST 1096   05,3542  10 337 1           CCS    SUBLIST        IS THE SUBLIST IN CONTROL
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0165   REF   1                05,3543  1 3701 0          TCF     NEXTINSL        YES
0166                          05,3544   74001 0 DNADRDCR OCT     74001           DNADR COUNT AND ECADR DECREMENTER

0167   REF   1                05,3545  3 0334 0 CHKLIST  CA      CTLIST
0168                          05,3546  0 0006 1          EXTEND
0169   REF   2  LAST 1096     05,3547  6 3551 0          BZMF    NEWLIST         IT WILL BE NEGATIVE AT END OF LIST
0170   REF   1                05,3550  1 3556 0          TCF     NEXTINCL
0171   REF   6  LAST  792     05,3551  50 332 0 NEWLIST  INDEX   DNLSTCOD
0172   REF   1                05,3552  3 2335 0          CA      ONTABLE         INITIALIZE CTLIST WITH
0173   REF   2  LAST 1097     05,3553  54 334 1          TS      CTLIST            STARTING ADDRESS OF NEW LIST
0174   REF   7  LAST 1097     05,3554  4 0332 1          CS      DNLSTCOD
0175   REF   1                05,3555  1 3771 1          TCF     SENDID +3
0177   REF   3  LAST 1097     05,3556  50 334 0 NEXTINCL INDEX   CTLIST
0178                          05,3557  3 0000 1          CA      0
0179   REF 260  LAST 1089     05,3560  10 000 0          CCS     A
0180   REF   4  LAST 1097     05,3561  24 334 0          INCR    CTLIST          SET POINTER TO PICK UP NEXT CTLIST WORD
0181                          05,3562  1 3566 0          TCF     +4              ON NEXT ENTRY TO PROG. (A SHOULD NOT =0)
0182   REF   5  LAST 1097     05,3563  56 334 0          XCH     CTLIST          SET CTLIST TO NEGATIVE AND PLACE(CODING)
0183                          05,3564  4 0000 0          COM                     UNCOMPLEMENTED DNADR INTO A.    (FOR LA)
0184   REF   6  LAST 1097     05,3565  56 334 0          XCH     CTLIST                                          (ST IN )
0185   REF 261  LAST 1097     05,3566  24 000 1 +4       INCR    A                                               (CTLIST)
0186   REF   3  LAST 1096     05,3567  54 336 0          TS      DNECADR         SAVE DNADR
0187   REF   1                05,3570  6 3540 0          AD      MINTIME2        TEST FOR TIME2 (NEG. OF ECADR)
0188   REF 262  LAST 1097     05,3571  10 000 0          CCS     A
0189   REF   1                05,3572  1 3576 1          TCF     SETWO +1        DON'T SET WORD ORDER CODE
0190                          05,3573   47777 0 MINB1314 OCT     47777           MINUS BIT 13 AND 14  (CAN'T GET HERE)
0191   REF   2  LAST 1097     05,3574  1 3576 1          TCF     SETWO +1        DON'T SET WORD ORDER CODE
0192   REF   1                05,3575  0 3620 0 SETWO    TC      WOZERO          GO SET WORD ORDER CODE TO ZERO.
0193   REF   4  LAST 1097     05,3576  3 0336 1 +1       CA      DNECADR         RELOAD A WITH THE DNADR.
0194   REF   1                05,3577  6 3573 0 +2       AD      MINB1314        IS THIS A REGULAR DNADR?
0195                          05,3600  0 0006 1          EXTEND
0196   REF   2  LAST 1096     05,3601  6 3666 1          BZMF    FETCH2WD        YES. (A MUST NEVER BE ZERO)
0197   REF   1                05,3602  6 7710 0          AD      MINB12          NO- IS IT A POINTER (DNPTR) OR A
0198                          05,3603  0 0006 1          EXTEND                      CHANNEL(DNCHAN)
0199   REF   1                05,3604  6 3624 1          BZMF    DODNPTR         IT'S A POINTER. (A MUST NEVER BE ZERO)

0200                          05,3605  0 0006 1 DODNCHAN TC      6               (EXECUTED AS EXTEND) IT S A CHANNEL
0201   REF   5  LAST 1097     05,3606  50 336 1          INDEX   DNECADR
0202                          05,3607  44'000 1          INDEX   0 -4000         (EXECUTED AS READ)
0203   REF 117  LAST 1089     05,3610  54 001 1          TS      L
0204                          05,3611  0 0006 1          TC      6               (EXECUTED AS EXTEND)
0205   REF   6  LAST 1097     05,3612  50 336 1          INDEX   DNECADR
0206                          05,3613  43'777 1          INDEX   0 -4001         (EXECUTED AS READ)
0207   REF   7  LAST 1097     05,3614  54 336 0          TS      DNECADR         SET DNECADR
0208   REF  18  LAST 1096     05,3615  3 7716 0          CA      NEGONE              TO MINUS
0209   REF   8  LAST 1097     05,3616  56 336 1          XCH     DNECADR                 WHILE PRESERVING A.
0210   REF   1                05,3617  1 3714 1          TCF     DNTMEXIT        GO SEND CHANNELS

0211   REF  42  LAST 1096     05,3620  4 5011 0 WOZERO   CS      BIT7
0212                          05,3621  0 0006 1          EXTEND
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0213   REF  13  LAST 1096   05,3622  03 013 0          WAND    CHAN13      SET WORD ORDER CODE TO ZERO
0214   REF 214  LAST 1085   05,3623  0 0002 0          TC      Q           RETURN TO CALLER

0215   REF   9  LAST 1097   05,3624  50 336 1 DODNPTR  INDEX   DNECADR    DNECADR CONTAINS ADRES OF SUBLIST
0216                        05,3625  0 0000 1          0       0           CLEAR AND ADD LIST ENTRY INTO A.
0217   REF 263  LAST 1097   05,3626  10 000 0          CCS     A           IS THIS A SNAPSHOT SUBLIST
0218   REF  10  LAST 1098   05,3627  3 0336 1          CA      DNECADR     NO, IT IS A REGULAR SUBLIST.
0219   REF   1              05,3630  1 3700 1          TCF     DOSUBLST    A MUST NOT BE ZERO.

0220   REF  11  LAST 1098   05,3631  56 336 1          XCH     DNECADR     YES, IT IS A SNAPSHOT SUBLIST.
0221   REF   3  LAST 1096   05,3632  54 337 1          TS      SUBLIST     C(DNECADR) INTO SUBLIST
0222   REF 216  LAST 1089   05,3633  3 5021 1          CAF     ZERO              A    INTO    A
0223   REF   2  LAST   73   05,3634  56 336 1          XCH     TMINDEX     (NOTE.. TMINDEX = DNECADR)

R0224  THE FOLLOWING CODING (FROM SNAPLOOP TO SNAPEND)IS FOR THE PURPOSE OF TAKING A SNAPSHOT OF 12 DP REGISTERS.
R0226  THIS IS DONE BY SAVING 11 DP REGISTERS IN DNTMBUFF AND SENDING THE FIRST DP WORD IMMEDIATELY.
R0228  THE SNAPSHOT PROCESSING IS THE MOST TIME CONSUMING AND THEREFORE THE CODING AND LIST STRUCTURE WERE DESIGNED
R0230  TO MINIMIZE TIME. THE TIME OPTIMIZATION RESULTS IN RULES UNIQUE TO THE SNAPSHOT PORTION OF THE DOWNLIST.
R0232  THESE RULES ARE.....
R0233                1.    ONLY 1DNADR'S CAN APPEAR IN THE SNAPSHOT SUBLIST
R0234                2.    THE 1DNADR'S CANNOT REFER TO THE FIRST LOCATION IN ANY  BANK.

0236   REF  43  LAST 1068   05,3635  54 003 0 SNAPLOOP TS      EBANK       SET EBANK
0237   REF   3  LAST  378   05,3636  7 4373 0          MASK    LOW8        ISOLATE RELATIVE ADDRESS
0238                        05,3637  0 0006 1          EXTEND
0239   REF 264  LAST 1098   05,3640  5 0000 1          INDEX   A
0240                        E3,1401                    EBANK=  1401
0241                        05,3641  3 1402 0          DCA     1401        PICK UP 2 SNAPSHOT WORDS.
0242   REF  24  LAST 1096      0340                    EBANK=  DNTMBUFF
0243   REF   3  LAST 1098   05,3642  50 336 1          INDEX   TMINDEX
0244   REF  25  LAST 1098   05,3643  52 341 0          DXCH    DNTMBUFF    STORE 2 SNAPSHOT WORDS IN BUFFER
0245   REF   4  LAST 1098   05,3644  24 336 1          INCR    TMINDEX     SET BUFFER INDEX FOR NEXT 2 WORDS.
0246   REF   5  LAST 1098   05,3645  24 336 1          INCR    TMINDEX
0247   REF   4  LAST 1098   05,3646  24 337 0 SNAPAGN  INCR    SUBLIST     SET POINTER TO NEXT 2 WORDS OF SNAPSHOT
0248   REF   5  LAST 1098   05,3647  50 337 0          INDEX   SUBLIST
0249                        05,3650  0 0000 1          0       0           = CA SSSS (SSSS = NEXT ENTRY IN SUBLIST)
0250   REF 265  LAST 1098   05,3651  10 000 0          CCS     A           TEST FOR LAST TWO WORDS OF SNAPSHOT.
0251   REF   1              05,3652  1 3635 0          TCF     SNAPLOOP    NOT LAST TWO.
0252   REF   1              05,3653   03536 1 LDNPHAS2 GENADR  DNPHASE2
0253   REF   6  LAST 1098   05,3654  54 337 1          TS      SUBLIST     YES, LAST.  SAVE A.
0254   REF  19  LAST 1097   05,3655  3 7716 0          CA      NEGONE      SET DNECADR AND
0255   REF  12  LAST 1098   05,3656  54 336 0          TS      DNECADR         SUBLIST POINTERS
0256   REF   7  LAST 1098   05,3657  56 337 0          XCH     SUBLIST             TO NEGATIVE VALUES.
0257   REF  44  LAST 1098   05,3660  54 003 0          TS      EBANK
0258   REF   4  LAST 1098   05,3661  7 4373 0          MASK    LOW8
0259                        05,3662  0 0006 1          EXTEND
0260   REF 266  LAST 1098   05,3663  5 0000 1          INDEX   A
0261                        E3,1401                    EBANK=  1401
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0262                          05,3664  3 1402 0            DCA     1401          PICK UP FIRST 2 WORDS OF SNAPSHOT.
0263  REF  26  LAST 1098        0340                       EBANK=  DNTMBUFF
0264  REF   2  LAST 1097      05,3665  1 3714 1 SNAPEND    TCF     DNTMEXIT        NOW GO SEND THEM.

0265  REF  13  LAST 1098      05,3666  3 0336 1 FETCH2WD   CA      DNECADR
0266  REF  45  LAST 1098      05,3667  54 003 0            TS      EBANK         SET EBANK
0267  REF   5  LAST 1098      05,3670  7 4373 0            MASK    LOW8          ISOLATE RELATIVE ADDRESS
0268  REF 118  LAST 1097      05,3671  54 001 1            TS      L
0269  REF   1                  05,3672  3 3544 1            CA      DNADROCR      DECREMENT COUNT AND ECADR
0270  REF  14  LAST 1099      05,3673  26 336 0            ADS     DNECADR
0271                          05,3674  0 0006 1            EXTEND
0272  REF 119  LAST 1099      05,3675  5 0001 0            INDEX   L
0273                          E3,1400                      EBANK=  1400
0274                          05,3676  3 1401 0            DCA     1400          PICK UP 2 DATA WORDS
0275  REF  27  LAST 1099        0340                       EBANK=  DNTMBUFF
0276  REF   3  LAST 1099      05,3677  1 3714 1            TCF     DNTMEXIT        NOW GO SEND THEM.

0277  REF   8  LAST 1098      05,3700  54 337 1 DOSUBLST   TS      SUBLIST       SET SUBLIST POINTER
0278  REF   9  LAST 1099      05,3701  50 337 0 NEXTINSL   INDEX   SUBLIST
0279                          05,3702  0 0000 1            0       0             = CA SSSS (SSSS = NEXT ENTRY IN SUBLIST)
0280  REF 267  LAST 1098      05,3703  10 000 0            CCS     A             IS IT THE END OF THE SUBLIST
0281  REF  10  LAST 1099      05,3704  24 337 0            INCR    SUBLIST       NO-
0282                          05,3705  1 3711 1            TCF     +4
0283  REF  11  LAST 1099      05,3706  54 337 1            TS      SUBLIST       SAVE A.
0284  REF  20  LAST 1098      05,3707  3 7716 0            CA      NEGONE        SET SUBLIST TO MINUS
0285  REF  12  LAST 1099      05,3710  56 337 0            XCH     SUBLIST       RETRIEVE A.
0286  REF 268  LAST 1099      05,3711  24 000 1  +4        INCR    A
0287  REF  15  LAST 1099      05,3712  54 336 0            TS      DNECADR       SAVE DNADR
0288  REF   3  LAST 1097      05,3713  1 3577 0            TCF     SETWD +2      GO USE COMMON CODING(PROBLEMS WOULD
A0289                                                                            OCCUR IF THE PROGRAM ENCOUNTERED A
A0290                                                                            DNPTR NOW)

0291                          05,3714  0 0006 1 DNTMEXIT   EXTEND                DOWN-TELEMETRY EXIT
0292  REF   1                  05,3715  01 034 1            WRITE   DNTM1         TO SEND A + L TO CHANNELS 34 + 35
0293  REF 120  LAST 1099      05,3716  3 0001 0            CA      L             RESPECTIVELY
0294                          05,3717  0 0006 1 TMEXITL    EXTEND
0295  REF   1                  05,3720  01 035 0            WRITE   DNTM2
0296  REF  47  LAST 1091      05,3721  1 5333 0 TMRESUME   TCF     RESUME        EXIT TELEMETRY PROGRAM VIA RESUME.

0297  REF   1                    7710                     MIN812  EQUALS -1/8
0298  REF   6  LAST 1098        0336                     DNECADR EQUALS TMINDEX
0299  REF   1                    0334                     CTLIST  EQUALS LDATALST
0300  REF   1                    0337                     SUBLIST EQUALS DNQ
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P0301   SUBROUTINE NAME- DNDUMP
R0302   FUNCTIONAL DESCRIPTION - TO SEND(DUMP) ALL ERASABLE STORAGE 'N' TIMES.(N = 1 TO 4). BANKS ARE SENT ONE AT A TIME
R0304            EACH BANK IS PRECEEDED BY AN ID WORD, SYNCH BITS, ECADR AND TIME1 FOLLOWED BY THE 256D WORDS OF EACH
R0306            EBANK. EBANKS ARE DUMPED IN ORDER(I.E. EBANK 0 FIRST, THEN EBANK1 ETC.)
R0308   CALLING SEQUENCE- THE GROUND OR ASTRONAUT BY KEYING V74E CAN INITIALIZE THE DUMP.
R0310            AFTER KEYING IN V74E THE CURRENT DOWNLIST WILL BE IMMEDIATELY TERMINATED AND THE DOWNLINK ERASABLE DUMP
R0312            WILL BEGIN.
R0313            ONCE INITIATED THE DOWNLINK ERASABLE DUMP CAN BE TERMINATED (AND INTERRUPTED DOWNLIST REINSTATED) ONLY
R0315            BY THE FOLLOWING:
R0316             1. A FRESH START
R0317             2. COMPLETION OF ALL DOWNLINK DUMPS REQUESTED (ACCORDING TO BITS SET IN DUMPCNT). NOTE THAT DUMPCNT
R0319                CAN BE ALTERED BY A V21N01.
R0320             3. AND INVOLUNTARILY BY A RESTART.
R0321   NORMAL EXIT MODE- TCF DNPHASE1
R0322   ALARM OR ABORT MODE- NONE
R0323   *SUBROUTINES CALLED- NONE.
R0324   ERASABLE INITIALIZATION REQUIRED-
R0325            DUMPCNT   OCT  20000   IF 4 COMPLETE ERASABLE DUMPS ARE DESIRED
R0326            DUMPCNT   OCT  10000   IF 2 COMPLETE ERASABLE DUMPS ARE DESIRED
R0327            DUMPCNT   OCT  04000   IF 1 COMPLETE ERASABLE DUMP  IS  DESIRED
R0328   DEBRIS- DUMPLOC, DUMPSW, DNTMGOTO, EBANK AND CENTRAL REGISTERS
R0329   TIMING-   TIME(IN SECS) = ((NO.DUMPS)*(NO.EBANKS)* (WDSPEREBANK + NO.IDWDS)) / NO.WDSPERSEC
R0331             TIME(IN SECS) =  (   4    )*(    8    )* (    256     +     4   ) /     100
R0333        THUS TIME(IN SECS TO SEND DUMP OF ERASABLE 4 TIMES VIA DOWNLINK) = 83.2 SECONDS

R0335   STRUCTURE OF ONE EBANK AS IT IS SENT BY DOWNLINK PROGRAM-
R0336      (REMINDER-THIS ONLY DESCRIBES ONE OF THE 8 EBANKS X 4 (DUMPS) = 32 EBANKS WHICH WILL BE SENT BY DNDUMP)
R0338          DOWNLIST                                          W
R0339           WORD   TAKEN FROM CONTENTS OF   EXAMPLE 0  COMMENTS

R0340             1    ERASID                   0177X  0  DOWNLIST I.D. FOR DOWNLINK ERASABLE DUMP (X=7 CSM, 6 LM)
R0342             2    LOWIDCOD                 77340  1  DOWNLINK SYNCH BITS.(SAME ONE USED IN ALL OTHER DOWNLISTS)
R0344             3    DUMPLOC                  13400  1  (SEE NOTES ON DUMPLOC)1= 3RD ERAS DUMP, 3400=ECADR OF 5TH WD
R0346             4    TIME1                    14120  1  TIME IN CENTISECONDS
R0347             5    FIRST WORD OF EBANK X    03400  1  IN THIS EXAMPLE THIS WORD = CONTENTS OF E7,1400 (ECADR 3400)
R0349             6    2ND   WORD OF EBANK X    00142  1  IN THIS EXAMPLE THIS WORD = CONTENTS OF E7,1401 (ECADR 3401)
R0351             7    3RD   WORD OF EBANK X    00142  1  IN THIS EXAMPLE THIS WORD = CONTENTS OF E7,1402 (ECADR 3402)
R0353             .                             1
R0354             .                             1
R0355             .                             1
R0356           260D  256TH WORD OF EBANK X     03777  1  IN THIS EXAMPLE THIS WORD = CONTENTS OF E7,1777 (ECADR 3777)

R0358   NOTE- DUMPLOC CONTAINS THE COUNTER AND ECADR FOR EACH WORD BEING SENT.
R0359         THE BIT STRUCTURE OF DUMPLOC IS FOLLOWS---
R0360                                        X = NOT USED
R0361             X ABC EEE RRRRRRRR       ABC = ERASABLE DUMP COUNTER(I.E. ABC = 0,1,2 OR 3 WHICH MEANS THAT
R0363                                            COMPLETE ERASABLE DUMP NUMBER  1,2,3 OR 4 RESPECTIVELY IS IN PROGRESS)
R0365                                      EEE = EBANK BITS
R0366                                RRRRRRRR = RELATIVE ADDRESS WITHIN AN EBANK.
```

```
0368   REF 217  LAST 1098   05,3722  3 5021 1  DNDUMPI  CA     ZERO       INITIALIZE DOWNLINK
0369   REF   1               05,3723  54 336 0           TS     DUMPLOC    ERASABLE DUMP
0370   REF   2  LAST 1097   05,3724  0 3766 0   +2      TC     SENDID     GO SEND ID AND SYNCH BITS
0371   REF   1               05,3725  3 3734 1           CA     LDNDUMP1   SET DNTMGOTO
0372   REF   5  LAST 1096   05,3726  54 335 0           TS     DNTMGOTO   TO LOCATION FOR NEXT PASS
0373   REF  18  LAST 1091   05,3727  3 0025 0           CA     TIME1      PLACE TIME1
0374   REF 121  LAST 1099   05,3730  56 001 0           XCH    L          INTO L
0375   REF   2  LAST 1101   05,3731  3 0336 1           CA     DUMPLOC    AND ECADR OF THIS EBANK INTO A
0376   REF   4  LAST 1099   05,3732  1 3714 1           TCF    DNTMEXIT   SEND DUMPLOC AND TIME1

0377   REF   1               05,3733   03735 0  LDNDUMP  ADRES  DNDUMP
0378   REF   1               05,3734   03750 0  LDNDUMP1 ADRES  DNDUMP1

0379   REF  53  LAST 1087   05,3735  3 5016 0  DNDUMP   CA     TWO        INCREMENT ECADR IN DUMPLOC
0380   REF   3  LAST 1101   05,3736  26 336 0           ADS    DUMPLOC    TO NEXT DP WORD TO BE
0381   REF   6  LAST 1099   05,3737  7 4373 0           MASK   LOW8       DUMPED AND SAVE IT.
0382   REF 269  LAST 1099   05,3740  10 000 0           CCS    A          IS THIS THE BEGINNING OF A NEW EBANK
0383   REF   1               05,3741  1 3752 0           TCF    DNDUMP2    NO- THEN CONTINUE DUMPING
0384   REF   4  LAST 1101   05,3742  3 0336 1           CA     DUMPLOC    YES- IS THIS THE END OF THE
0385   REF   1               05,3743  7 0333 0           MASK   DUMPCNT    N TH(N = 1 TO 4) COMPLETE ERASABLE
0386   REF   7  LAST 1015   05,3744  7 7671 1           MASK   PRIO34     DUMP(BIT14 FOR 4, BIT13 FOR 2 OR BIT12
0387   REF 270  LAST 1101   05,3745  10 000 0           CCS    A          FOR 1 COMPLETE ERASABLE DUMP(S)).
0388   REF   2  LAST  193   05,3746  1 3530 0           TCF    DNPHASE1   YES- START SENDING INTERRUPTED DOWNLIST
A0389                                                                    AGAIN
0390   REF   2  LAST  260   05,3747  1 3724 1           TCF    DNDUMPI +2 NO- GO BACK AND INITIALIZE NEXT BANK

0391   REF   1               05,3750  3 3733 0  DNDUMPI  CA     LDNDUMP    SET DNTMGOTO
0392   REF   6  LAST 1101   05,3751  54 335 0           TS     DNTMGOTO   FOR WORDS 3 TO 256D OF CURRENT EBANK

0393   REF   5  LAST 1101   05,3752  3 0336 1  DNDUMP2  CA     DUMPLOC
0394   REF  46  LAST 1099   05,3753  54 003 0           TS     EBANK      SET EBANK
0395   REF   7  LAST 1101   05,3754  7 4373 0           MASK   LOW8       ISOLATE RELATIVE ADDRESS.
0396   REF 215  LAST 1098   05,3755  54 002 1           TS     Q          (NOTE: MASK INSTRUCTION IS USED TO PICK
0397   REF  14  LAST  739   05,3756  3 5020 0           CA     NEGO       UP ERASABLE REGISTERS SO THAT EDITING
0398   REF 122  LAST 1101   05,3757  54 001 1           TS     L          REGISTERS 20-23 WILL NOT BE ALTERED.)
0399   REF 216  LAST 1101   05,3760  50 002 0           INDEX  Q
0400                        E3,1400                     EBANK= 1400       PICK UP LOW ORDER REGISTER OF PAIR
0401                        05,3761  7 1401 1           MASK   1401       OF ERASABLE REGISTERS.
0402   REF 123  LAST 1101   05,3762  56 001 0           XCH    L
0403   REF 217  LAST 1101   05,3763  50 002 0           INDEX  Q          PICK UP HIGH ORDER REGISTER OF PAIR
0404                        05,3764  7 1400 0           MASK   1400       OF ERASABLE REGISTERS.
0405   REF  28  LAST 1099      0340                     EBANK= DNTMBUFF
0406   REF   5  LAST 1101   05,3765  1 3714 1           TCF    DNTMEXIT   GO SEND THEM

0407                        05,3766  0 0006 1  SENDID   EXTEND             **ENTRANCE USED BY ERASABLE DUMP PROG.**
0408   REF   7  LAST 1101   05,3767  22 335 1           QXCH   DNTMGOTO   SET DNTMGOTO SO NEXT TIME PROG WILL GO
0409   REF   1               05,3770  3 5054 0           CAF    ERASID     TO LOCATION FOLLOWING :TC SENDID:

0410   REF 124  LAST 1101   05,3771  54 001 1           TS     L          **ENTRANCE USED BY REGULAR DOWNLINK PG**
```

```
0411   REF   2  LAST 1097   05,3772  0 3620 0        TC     WOZERO       GO SET WORD ORDER CODE TO ZERO
0412   REF   1               05,3773  3 2000 0        CAF    LOWIDCOD     PLACE SPECIAL ID CODE INTO L
0413   REF 125  LAST 1101   05,3774  56 001 0        XCH    L            AND ID BACK INTO A
0414   REF   6  LAST 1101   05,3775  1 3714 1        TCF    DNTMEXIT     SEND DOWNLIST ID CODE(S).
```

```
R0001           THE FOLLOWING ROUTINE CAN BE USED TO CALL A SUBROUTINE IN ANOTHER BANK. IN THE BANKCALL VERSION, THE
R0003   CADR OF THE SUBROUTINE IMMEDIATELY FOLLOWS THE  TC BANKCALL  INSTRUCTION, WITH C(A) AND C(L) PRESERVED.

 0005                              4662                    BLOCK   02
 00055  REF   1                                            COUNT   02/BANK

 0006   REF   4  LAST  420        4662  52 134 0  BANKCALL DXCH    BUF2            SAVE INCOMING A,L.
 0007   REF 218  LAST 1101        4663  50 002 0            INDEX   Q               PICK UP CADR.
 0008                             4664  3 0000 1            CA      0
 0009   REF 219  LAST 1103        4665  24 002 0            INCR    Q               SO WE RETURN TO THE LOC. AFTER THE CADR.

R0010           SWCALL IS IDENTICAL TO BANKCALL, EXCEPT THAT THE CADR ARRIVES IN A.

 0012   REF 126  LAST 1102        4666  54 001 1  SWCALL   TS      L
 0013   REF   5  LAST  484        4667  22 004 0            LXCH    FBANK           SWITCH BANKS, SAVING RETURN.
 0014   REF   7  LAST  622        4670  7 5054 1            MASK    LOW10           GET SUB-ADDRESS OF CADR.
 0015   REF 220  LAST 1103        4671  56 002 0            XCH     Q               A,L NOW CONTAINS DP RETURN.
 0016   REF   5  LAST 1103        4672  52 134 0            DXCH    BUF2            RESTORING INPUTS IF THIS IS A BANKCALL.
 0017   REF 221  LAST 1103        4673  50 002 0            INDEX   Q
 0018                             4674  0 2000 0            TC      10000           SETTING Q TO SWRETURN.

 0019   REF   6  LAST 1103        4675  56 134 1  SWRETURN XCH     BUF2 +1         COMES HERE TO RETURN TO CALLER. C(A,L)
 0020   REF   6  LAST 1103        4676  56 004 0            XCH     FBANK           ARE PRESERVED FOR RETURN.
 0021   REF   7  LAST 1103        4677  56 134 1            XCH     BUF2 +1
 0022   REF   8  LAST 1103        4700  0 0133 0            TC      BUF2

R0023           THE FOLLOWING ROUTINE CAN BE USED AS A UNILATERAL JUMP WITH C(A,L) PRESERVED AND THE CADR IMMEDIATELY
R0025   FOLLOWING THE TC POSTJUMP INSTRUCTION.

 0026   REF 222  LAST 1103        4701  56 002 0  POSTJUMP XCH     Q               SAVE INCOMING C(A).
 0027   REF 271  LAST 1101        4702  50 000 1            INDEX   A               GET CADR.
 0028                             4703  3 0000 1            CA      0

R0029           BANKJUMP IS THE SAME AS POSTJUMP, EXCEPT THAT THE CADR ARRIVES IN A.

 0031   REF   7  LAST 1103        4704  54 004 1  BANKJUMP TS      FBANK
 0032   REF   8  LAST 1103        4705  7 5054 1            MASK    LOW10
 0033   REF 223  LAST 1103        4706  56 002 0            XCH     Q               RESTORING INPUT C(A) IF THIS WAS A
 0034   REF 224  LAST 1103        4707  50 002 0  Q+10000   INDEX   0               POSTJUMP.
 0035                             4710  1 2000 1  PRIO12    TCF     10000           PRIO12 = TCF   10000 = 12000
```

P0036 THE FOLLOWING ROUTINE GETS THE RETURN CADR SAVED BY SWCALL OR BANKCALL AND LEAVES IT IN A.

```
0038  REF   9  LAST 1103   4711  3 5054 0  MAKECADR CAF    LOW10
0039  REF   9  LAST 1103   4712  7 0133 1           MASK   BUF2
0040  REF  10  LAST 1104   4713  6 0134 1           AD     BUF2 +1
0041  REF 225  LAST 1103   4714  0 0002 0           TC     Q


00465 REF   4  LAST  380   4715  54 135 1  SUPDACAL TS     MPTEMP
0047  REF   8  LAST 1103   4716  56 004 0           XCH    FBANK          SET FBANK FOR DATA.
00475                      4717  0 0006 1           EXTEND
0048  REF  10  LAST  587   4720  04 007 1           ROR    SUPERBNK       SAVE FBANK IN BITS 15-11, AND
00485 REF   5  LAST 1104   4721  56 135 0           XCH    MPTEMP          SUPERBANK IN BITS  7-5.
0049  REF  10  LAST 1104   4722  7 5054 1           MASK   LOW10
00495 REF 127  LAST 1103   4723  56 001 0           XCH    L              SAVE REL. ADR. IN BANK, FETCH SUPERBITS.
0050                       4724  0 0004 0           INHINT                BECAUSE RUPT DOES NOT SAVE SUPERBANK.
00505                      4725  0 0006 1           EXTEND
0051  REF  11  LAST 1104   4726  01 007 1           WRITE  SUPERBNK       SET SUPERBANK FOR DATA.
0052  REF 128  LAST 1104   4727  50 001 0           INDEX  L
00525                      4730  3 2000 0           CA     10000          PINBALL (FIX MEM DISP) PREVENTS DCA HERE
0053  REF   6  LAST 1104   4731  56 135 0           XCH    MPTEMP         SAVE 1ST WD. FETCH OLD FBANK AND SBANK.
00534                      4732  0 0006 1           EXTEND
00535 REF  12  LAST 1104   4733  01 007 1           WRITE  SUPERBNK       RESTORE SUPERBANK.
0054                       4734  0 0003 1           RELINT
00545 REF   9  LAST 1104   4735  54 004 1           TS     FBANK          RESTORE FBANK.
0055  REF   7  LAST 1104   4736  3 0135 0           CA     MPTEMP         RECOVER FIRST WORD OF DATA.
00555                      4737  0 0002 0           RETURN                24 WDS. DATACALL 516 MU, SUPDACAL 432 MU
```

L INTER-BANK COMMUNICATION USER'S PAGE NO. 3 EO S3

P0056 THE FOLLOWING ROUTINES ARE IDENTICAL TO BANKCALL AND SWCALL EXCEPT THAT THEY ARE USED IN INTERRUPT.

```
0058  REF   2  LAST  422    4740  52 073 1  IBNKCALL DXCH   RUPTREG3      USES RUPTREG3,4 FOR DP RETURN ADDRESS.
0059  REF 226  LAST 1104    4741  50 002 0           INDEX  Q
0060                        4742  3 0000 1           CAF    0
0061  REF 227  LAST 1105    4743  24 002 0           INCR   Q

0062  REF 129  LAST 1104    4744  54 001 1  ISWCALL  TS     L
0063  REF  10  LAST 1104    4745  22 004 0           LXCH   FBANK
0064  REF  11  LAST 1104    4746  7 5054 1           MASK   LOW10
0065  REF 228  LAST 1105    4747  56 002 0           XCH    Q
0066  REF   3  LAST 1105    4750  52 073 1           DXCH   RUPTREG3
0067  REF 229  LAST 1105    4751  50 002 0           INDEX  Q
0068                        4752  0 2000 0           TC     10000

0069  REF   3  LAST   68    4753  56 073 0  ISWRETRN XCH    RUPTREG4
0070  REF  11  LAST 1105    4754  56 004 0           XCH    FBANK
0071  REF   4  LAST 1105    4755  56 073 0           XCH    RUPTREG4
0072  REF   4  LAST 1105    4756  0 0072 1           TC     RUPTREG3
```

R0090 2. USPRCADR ACCESSES INTERPRETIVE CODING IN OTHER THAN THE USER'S FBANK. THE CALLING SEQUENCE IS AS FOLLOWS:

```
A0092                                  L       TC     USPRCADR
A0093                                  L+1     CADR   INTPRETX      INTPRETX IS THE INTERPRETIVE CODING
A0094                                                               RETURN IS TO L+2

0103  REF   6  LAST  422    4757  54 164 0  USPRCADR TS     LOC      SAVE A
0104  REF  23  LAST  958    4760  3 5010 0           CA     BIT8
0105  REF   7  LAST  371    4761  54 023 1           TS     EDOP     EXIT INSTRUCTION TO EDOP
0106  REF  14  LAST  585    4762  3 0006 1           CA     BBANK
0107  REF   1               4763  54 165 1           TS     BANKSET  USER'S BBANK TO BANKSET
0108  REF 230  LAST 1105    4764  50 002 0           INDEX  Q
0109                        4765  3 0000 1           CA     0
0110  REF  12  LAST 1105    4766  54 004 1           TS     FBANK    INTERPRETIVE BANK TO FBANK
0111  REF  12  LAST 1105    4767  7 5054 1           MASK   LOW10    YIELDS INTERPRETIVE RELATIVE ADDRESS
0112  REF 231  LAST 1105    4770  56 002 0           XCH    Q        INTERPRETIVE ADDRESS TO Q, FETCHING L+1
0113  REF   7  LAST 1105    4771  56 164 1           XCH    LOC      L+1 TO LOC, RETRIEVING ORIGINAL A
0114  REF   1               4772  1 4707 1           TCF    Q+10000
```

P0117 THERE ARE FOUR POSSIBLE SETTINGS FOR CHANNEL 07. (CHANNEL 07 CONTAINS THE SUPERBANK SETTING.)

	SUPERBANK	SETTING	S-REG. VALUE	PSEUDO-FIXED BANK NUMBERS	OCTAL PSEUDO ADDRESSES	
R0120						
R0121	----------	-------	----------	----------	----------	
R0122	SUPERBANK 3	0XX	2000 - 3777	30 - 37	70000 - 107777	(WHERE XX CAN BE ANYTHING AND
R0124						WILL USUALLY BE SEEN AS 11)
R0126	SUPERBANK 4	100	2000 - 3777	40 - 47	110000 - 127777	(AS FAR AS IT CAN BE SEEN,
R0128						ONLY BANKS 40-43 WILL EVER BE
R0130						AND ARE PRESENTLY AVAILABLE)
R0132	SUPERBANK 5	101	2000 - 3777	50 - 57	130000 - 147777	(PRESENTLY NOT AVAILABLE TO
R0134						THE USER)
R0136	SUPERBANK 6	110	2000 - 3777	60 - 67	150000 - 167777	(PRESENTLY NOT AVAILABLE TO
R0138						THE USER)

R0142 *** THIS ROUTINE MAYBE CALLED BY ANY PROGRAM LOCATED IN BANKS 00 - 27. I.E., NO PROGRAM LIVING IN ANY
R0144 SUPERBANK SHOULD USE SUPERSW. ***

R0145 SUPERSW MAYBE CALLED IN THIS FASHION:

```
R0146          CAF    ABBCON        WHERE -- ABBCON  BBCON  SOMETHIN --
R0147          TCR    SUPERSW       (THE SUPERBNK BITS ARE IN THE BBCON)
R0148          ...     ...
R0149          .       .
R0150          .       .
```

R0151 OR IN THIS FASHION :

```
R0152          CAF    SUPERSET      WHERE SUPERSET IS ONE OF THE FOUR AVAILABLE
R0154          TCR    SUPERSW       SUPERBANK BIT CONSTANTS:
R0155          ...     ...                                  SUPER011 OCTAL  60
R0157          .       .                                    SUPER100 OCTAL 100
R0159          .       .                                    SUPER101 OCTAL 120
R0161                                                       SUPER110 OCTAL 140

 0163                          4773  0 0006 1  SUPERSW  EXTEND
 0164  REF  13  LAST 1104     4774  01 007 1            WRITE  SUPERBNK      WRITE BITS 7-6-5 OF THE ACCUMULATOR INTO
A0165                                                                       CHANNEL 07
 0166  REF 232  LAST 1105     4775  0 0002 0            TC     Q             TC TO INSTRUCTION FOLLOWING
A0167                                                                         TC  SUPERSW
```

R0001 SECTION 1 DISPATCHER

R0002 ENTRY TO THE INTERPRETER. INTPRET SETS LOC TO THE FIRST INSTRUCTION, BANKSET TO THE BBANK OF THE
R0004 OBJECT INTERPRETIVE PROGRAM, AND INTBIT15 TO THE BIT15 CONTENTS OF FBANK. INTERPRETIVE PROGRAMS MAY BE IN
R0006 VIRTUALLY ALL BANKS PRESENT UNDER ANY SUPER-BANK SETTING, WITH THE RESTRICTION THAT PROGRAMS IN HIGH BANKS
R0008 (BIT15 OF FBANK = 1) DO NOT REFER TO LOWBANKS, AND VICE-VERSA. THE INTERPRETER DOES NOT SWITCH SUPERBANKS.
R0010 E-BANK SWITCHING OCCURS WHENEVER GENERAL ERASABLE (100 - 3777) IS ADDRESSED.

```
0012                              6006                    BLOCK   03

0013   REF   1                                            COUNT   03/INTER

00135                             6006  0 0003 1  INTPRET RELINT
0014                              6007  0 0006 1          EXTEND                  SET LOC TO THE WORD FOLLOWING THE TC.
0015   REF   8  LAST 1105        6010  22 164 1          QXCH    LOC

0016   REF  15  LAST 1105        6011  3 0006 1  +2      CA      BBANK           INTERPRETIVE BRANCHES FINISH HERE.
0017   REF   2  LAST 1105        6012  54 165 1          TS      BANKSET
0018   REF  43  LAST 1016        6013  7 5001 1          MASK    BIT15           GET 15TH BIT FOR INDEXABLE ADDRESSES.
0019   REF   5  LAST   69        6014  54 115 0          TS      INTBIT15

0020   REF   8  LAST 1105        6015  54 023 1          TS      EDOP            MAKE SURE NO INSTRUCTIONS LEFT OVER
0021   REF   1                   6016  1 6037 1          TCF     NEWOPS          PICK UP OP CODE PAIR AND BEGIN.

0022   REF  16  LAST 1107        6017  22 006 1  INTRSM  LXCH    BBANK           RESUME SUSPENDED INTERPRETIVE JOB
0023   REF 227  LAST  934        6020  1 6011 0          TCF     INTPRET +3
R0024            DLOAD LOADS MPAC, MPAC +1, LEAVING ZERO IN MPAC +2.

0025                              6021  0 0006 1  DLOAD   EXTEND
0026   REF   1                   6022  5 0116 1          INDEX   ADDRWD
0027                              6023  3 0001 0          DCA     0               LOAD DP C(C(ADDRWD)) INTO MPAC,MPAX +1
0028   REF 288  LAST  910        6024  52 155 1  SLOAD2  DXCH    MPAC
0029   REF 218  LAST 1101        6025  3 5021 1          CAF     ZERO            ZERO MPAC +2
```

```
P0030           AT THE END OF MOST INSTRUCTIONS. CONTROL IS GIVEN TO DANZIG TO DISPATCH THE NEXT OPERATION.

 0032   REF 289  LAST 1107     6026  54 156 1           TS     MPAC +2          AND DECLARE DP MODE

 0033   REF   4  LAST  542     6027  54 163 1 NEWMODE    TS     MODE             PROLOGUE FOR MODE-CHANGING INSTRUCTIONS.

 0034   REF   3  LAST 1107     6030  3 0165 0 DANZIG     CA     BANKSET          SET BBANK BEFORE TESTING NEWJOB SO THAT
 0035   REF  17  LAST 1107     6031  54 006 0            TS     BBANK            IT MAY BE SAVED DIRECTLY BY CHANJOB.

 0036   REF   9  LAST 1107     6032  10 023 1 NOTBNKSW   CCS    EDOP             SEE IF AN ORDER CODE IS LEFT OVER FROM
 0037   REF   1                6033  1 6046 1            TCF    OPJUMP           THE LAST PAIR RETRIEVED. IF SO, EXECUTE.
A0038                                                                            EDOP IS SET TO ZERO ON ITS RE-EDITING.

 0039   REF   6  LAST  874     6034  10 067 1            CCS    NEWJOB           SEE IF A JOB OF HIGHER PRIORITY IS
 0040   REF   1                6035  1 5170 0            TCF    CHANG2           PRESENT, AND IF SO, CHANGE JOBS.

 0041   REF   9  LAST 1107     6036  24 164 1            INCR   LOC              ADVANCE THE LOCATION COUNTER.
R0042           ITRACE (1) REFERS TO "NEWOPS".
 0043   REF  10  LAST 1108     6037  50 164 1 NEWOPS     INDEX  LOC              ENTRY TO BEGIN BY PICKING OP CODE PAIR.
 0044                          6040  3 0000 1            CA     0                MAY BE AN OPCODE PAIR OR A STORE CODE.
 0045   REF 272  LAST 1103     6041  10 000 0            CCS    A                TEST SIGN AND GET DABS(A).
 0046   REF   1                6042  1 6331 1            TCF    DOSTORE          PROCESS STORE CODE.

 0047                          6043   00177 0 LOW7       DCT    177

 0048   REF  10  LAST 1108     6044  54 023 1            TS     EDOP             OP CODE PAIR. LEAVE THE OTHER IN EDOP
 0049   REF   6  LAST  371     6045  7 6043 1            MASK   LOW7             WHERE  CCS EDOP  WILL HONOR IT NEXT.

 0050   REF  13  LAST  378     6046  54 020 1 OPJUMP     TS     CYR              LOWWD ENTERS HERE IF A RIGHT-HAND OP
 0051   REF  14  LAST 1108     6047  10 020 1            CCS    CYR              CODE IS TO BE PROCESSED. TEST PREFICES.
 0052   REF   1                6050  1 6216 0            TCF    OPJUMP2          TEST SECOND PREFIX BIT.

 0053   REF   1                6051  1 6712 1            TCF    EXIT             +0 OP CODE IS EXIT.
```

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P0054 PROCESS ADDRESSES WHICH MAY BE DIRECT, INDEXED, OR REFERENCE THE PUSHDOWN LIST.

```
0056   REF  74  LAST 1089    6052  7 5017 0  ADDRESS  MASK   BIT1    SEE IF ADDRESS IS INDEXED. CYR CONTAINED
0057   REF 273  LAST 1108    6053  10 000 0           CCS    A       400XX. SO BIT 1 IS NOW AS IT WAS IN CYR.
0058   REF   1               6054  1 6115 0           TCF    INDEX   FORM INDEXED ADDRESS.

0059   REF  11  LAST 1108    6055  50 164 1  DIRADRES INDEX  LOC     LOOK AHEAD TO NEXT WORD TO SEE IF
0060                         6056  4 0001 1  OCT40001 CS     1       ADDRESS IS GIVEN.
0061   REF 274  LAST 1109    6057  10 000 0           CCS    A
0062   REF   1               6060  1 6164 0           TCF    PUSHUP  IF NOT.

0063                         6061   77773 1  NEG4     DEC    -4

0064   REF  12  LAST 1109    6062  24 164 1           INCR   LOC     IF SO, TO SHOW WE PICKED UP A WORD.
0065   REF   2  LAST 1107    6063  54 116 0           TS     ADDRWD
```

```
P0066           FINAL DIGESTION OF DIRECT ADDRESSES OF OP CODES WITH 01 PREFIX IS DONE HERE. IN EACH CASE, THE
R0068   REQUIRED 12-BIT SUB-ADDRESS IS LEFT IN ADDRWD, WITH ANY REQUIRED E OR F BANK SWITCHING DONE. ADDRESSES LESS
R0070   THAN 450 ARE TAKEN TO BE RELATIVE TO THE WORK AREA. THE OP CODE IS NOW IN BITS 1-5 OF CYR WITH BIT 14 = 1.

0072    REF   1                 6064  6 6220 1          AD      -ENDVAC         SEE IF ADDRESS RELATIVE TO WORK AREA.
0073    REF 275  LAST 1109      6065  10 000 0          CCS     A
0074    REF   1                 6066  6 7712 1          AD      -ENDERAS        IF NOT, SEE IF IN GENERAL ERASABLE.
0075    REF   1                 6067  1 6074 0          TCF     IERASTST

0076    REF  18  LAST  887      6070  3 0120 1  NETZERO  CA      FIXLOC          IF SO, LEAVE THE MODIFIED ADDRESS IN
0077    REF   3  LAST 1109      6071  26 116 0          ADS     ADDRWD          ADDRWD AND DISPATCH.
0078    REF  15  LAST 1108      6072  50 020 0  ITR15    INDEX   CYR             THIS INDEX MAKES THE NEXT INSTRUCTION
0079    REF   1                 6073  7 6242 1          7       INDJUMP -1      TCF INDJUMP + OP, EDITING CYR.

0080                            6074  0 0006 1  IERASTST EXTEND
0081    REF   1                 6075  6 6105 0          BZMF    GEADDR          GO PROCESS GENERAL-ERASABLE ADDRESS.

0082    REF  13  LAST 1105      6076  7 5054 1          MASK    LOW10           FIXED BANK ADDRESS. RESTORE AND ADD B15.
0083    REF  14  LAST 1110      6077  6 5054 0          AD      LOW10           SWITCH BANKS AND LEAVE SUBADDRESS IN
0084    REF   4  LAST 1110      6100  56 116 1          XCH     ADDRWD          ADDRWD FOR OPERAND RETRIEVAL. (THIS
0085    REF   6  LAST 1107      6101  6 0115 1          AD      INTBIT15        METHOD PRECLUDES USE OF THE LAST
0086    REF  13  LAST 1105      6102  54 004 1          TS      FBANK           LOCATION IN EACH FBANK.)
0087    REF  16  LAST 1110      6103  50 020 0  ITR12    INDEX   CYR
0088    REF   2  LAST 1110      6104  7 6242 1          7       INDJUMP -1

0089    REF   8  LAST 1101      6105  7 4373 0  GEADDR   MASK    LOW8
0090    REF   4  LAST  378      6106  6 5051 0          AD      OCT1400
0091    REF   5  LAST 1110      6107  56 116 1          XCH     ADDRWD
0092    REF  47  LAST 1101      6110  54 003 0          TS      EBANK
0093    REF  17  LAST 1110      6111  50 020 0  ITR10    INDEX   CYR
0094    REF   3  LAST 1110      6112  7 6242 1          7       INDJUMP -1
```

```
P0095           THE FOLLOWING ROUTINE PROCESSES INTERPRETIVE INDEXED ADDRESSES. AN INTERPRETER INDEX REGISTER MAY
R0097   CONTAIN THE ADDRESS OF ANY ERASABLE REGISTER (0-42 BEING RELATIVE TO THE VAC AREA) OR ANY INTERPRETIVE PROGRAM
R0099   BANK, OR ANY INTEGER IN THAT RANGE.

0100   REF   1                  6113  3 7702 0  DODLOAD* CAF    DLOAD*          STODL* COMES HERE TO PROCESS LOAD ADR.
0101   REF  18  LAST 1110      6114  54 020 1            TS     CYR             (STOVL* ENTERS HERE).

0102   REF  19  LAST 1110      6115  3 0120 1  INDEX     CA     FIXLOC          SET UP INDEX LOCATION.
0103   REF   1                 6116  54 130 1            TS     INDEXLOC
0104   REF  13  LAST 1109      6117  24 164 1            INCR   LOC             (ADDRESS ALWAYS GIVEN).
0105   REF  14  LAST 1111      6120  50 164 1            INDEX  LOC
0106                           6121  4 0000 0            CS     0
0107   REF 276  LAST 1110      6122  10 000 0            CCS    A               INDEX 2 IF ADDRESS STORED COMPLEMENTED.
0108   REF   2  LAST 1111      6123  24 130 0            INCR   INDEXLOC
0109                           6124  16 125 0            NOOP

0110   REF   6  LAST 1110      6125  54 116 0            TS     ADDRWD          14 BIT ADDRESS TO ADDRWD.
0111   REF   2  LAST  133      6126  7 7711 0            MASK   HIGH4           IF ADDRESS GREATER THAN 2K, ADD INTBIT15
0112                           6127  0 0006 1            EXTEND
0113   REF   1                 6130  1 6133 1            BZF    INDEX2
0114   REF   7  LAST 1110      6131  3 0115 1            CA     INTBIT15
0115   REF   7  LAST 1111      6132  26 116 0            ADS    ADDRWD

0116   REF   3  LAST 1111      6133  50 130 0  INDEX2    INDEX  INDEXLOC
0117   REF  56  LAST  929      6134  4 0046 1            CS     X1
0118   REF   8  LAST 1111      6135  26 116 0            ADS    ADDRWD          DO AUGMENT, IGNORING AND CORRECTING OVF.

0119   REF   5  LAST  783      6136  7 7713 1            MASK   HIGH9           SEE IF ADDRESS IS IN WORK AREA.
0120                           6137  0 0006 1            EXTEND
0121   REF   1                 6140  1 6153 1            BZF    INDWORK
0122   REF   3  LAST 1111      6141  7 7711 0            MASK   HIGH4           SEE IF IN FIXED BANK.
0123                           6142  0 0006 1            EXTEND
0124   REF   1                 6143  1 6155 1            BZF    INDERASE

0125   REF   9  LAST 1111      6144  3 0116 1            CA     ADDRWD          IN FIXED - SWITCH BANKS AND CREATE
0126   REF  14  LAST 1110      6145  54 004 1            TS     FBANK           SUB-ADDRESS.
0127   REF  15  LAST 1110      6146  7 5054 1            MASK   LOW10
0128   REF   1                 6147  6 5005 1            AD     2K
0129   REF  10  LAST 1111      6150  54 116 0            TS     ADDRWD
0130   REF  19  LAST 1111      6151  50 020 0  ITR11     INDEX  CYR
0131   REF   4  LAST 1110      6152  3 6242 0            3      INDJUMP -1

0132   REF  20  LAST 1111      6153  3 0120 1  INDWORK   CA     FIXLOC          MAKE ADDRWD RELATIVE TO WORK AREA.
0133   REF   1                 6154  1 6161 0            TCF    ITR13 -1

0134   REF   5  LAST 1110      6155  3 5051 0  INDERASE  CA     OCT1400
0135   REF  11  LAST 1111      6156  56 116 1            XCH    ADDRWD
0136   REF  48  LAST 1110      6157  54 003 0            TS     EBANK
0137   REF   9  LAST 1110      6160  7 4373 0            MASK   LOW8
0138   REF  12  LAST 1111      6161  26 116 0  -1        ADS    ADDRWD
```

```
0139   REF  20  LAST 1111      6162  50 020 0  ITR13    INDEX  CYR
0140   REF   5  LAST 1111      6163  3 6242 0           3      INDJUMP -1
```

```
P0141           PUSH-UP ROUTINES. WHEN NO OPERAND ADDRESS IS GIVEN, THE APPROPRIATE OPERAND IS TAKEN FROM THE PUSH-DOWN
R0143   LIST. IN MOST CASES THE MODE OF THE RESULT (VECTOR OR SCALAR) OF THE LAST ARITHMETIC OPERATION PERFORMED
R0145   IS THE SAME AS THE TYPE OF OPERAND DESIRED (ALL ADD/SUBTRACT ETC.). EXCEPTIONS TO THIS GENERAL RULE ARE LISTED
R0147   BELOW (NOTE THAT IN EVERY CASE THE MODE REGISTER IS LEFT INTACT):

R0148           1.  VXSC AND V/SC WANT THE OPPOSITE TYPE OF OPERAND, E.G., IF THE LAST OPERATION YIELDED A VECTOR
R0150   RESULT, VXSC WANTS A SCALAR.

R0151           2.  THE LOAD CODES SHOULD LOAD THE ACCUMULATOR INDEPENDENT OF THE RESULT OF THE LAST OPERATION. THIS
R0153   INCLUDES VLOAD, DLOAD, TLOAD, PDDL, AND PDVL (NO PUSHUP WITH SLOAD).

R0154           3.  SOME ARITHMETIC OPERATIONS REQUIRE A STANDARD TYPE OF OPERAND REGARDLESS OF THE PREVIOUS OPERATION.
R0156   THIS INCLUDES SIGN WANTING DP AND TAD REQUIRING TP.

 0157   REF   1                 6164  3 4374 0  PUSHUP  CAF     OCT23           IF THE LOW 5 BITS OF CYR ARE LESS THAN
 0158   REF  21  LAST 1112      6165  7 0020 1          MASK    CYR             20, THIS OP REQUIRES SPECIAL ATTENTION.
 0159   REF   3  LAST  621      6166  6 6171 0          AD      -OCT10          (NO -0).
 0160   REF 277  LAST 1111      6167  10 000 0          CCS     A
 0161   REF   1                 6170  1 6202 0          TCF     REGUP           FOR ALL CODES GREATER THAN OCT 7.

 0162                           6171   77767 1 -OCT10   OCT     -10

 0163   REF   2  LAST 1049      6172  6 6061 0          AD      NEG4            WE NOW HAVE 7 - OP CODE(MOD4). SEE IF
 0164   REF 278  LAST 1113      6173  10 000 0          CCS     A               THE OP CODE (MOD4) IS THREE (REVERSE).
 0165   REF 279  LAST 1113      6174  50 000 1          INDEX   A               NO - THE MODE IS DEFINITE. PICK UP THE
 0166   REF   1                 6175  4 6213 0          CS      NO.WDS
 0167   REF   2  LAST 1113      6176  1 6204 0          TCF     REGUP +2

 0168   REF   5  LAST 1108      6177  50 163 0          INDEX   MODE            FOR VXSC AND V/SC WE WANT THE REQUIRED
 0169   REF   2  LAST  546      6200  4 6211 1          CS      REVCNT          PUSHLOC DECREMENT WITHOUT CHANGING THE
 0170   REF   3  LAST 1113      6201  1 6204 0          TCF     REGUP +2        MODE AT THIS TIME.

 0171   REF   6  LAST 1113      6202  50 163 0 REGUP    INDEX   MODE            MOST ALL OP CODES PUSHUP HERE.
 0172   REF   2  LAST 1113      6203  4 6213 0          CS      NO.WDS
 0173   REF   1                 6204  26 166 1  +2      ADS     PUSHLOC
 0174   REF  13  LAST 1111      6205  54 116 0          TS      ADDRWD
 0175   REF  22  LAST 1113      6206  50 020 0 ITR14    INDEX   CYR
 0176   REF   6  LAST 1112      6207  7 6242 1          7       INDJUMP -1      (THE INDEX MAKES THIS A TCF.)

 0177                           6210   00002 0          OCT     2               REVERSE PUSHUP DECREMENT. VECTOR TAKES 2
 0178                           6211   00006 1 REVCNT   OCT     6               WORDS, SCALAR TAKES 6.
 0179                           6212   00006 1          OCT     6
 0180                           6213   00002 0 NO.WDS   OCT     2               CONVENTIONAL DECREMENT IS 6 WORDS VECTOR
 0181                           6214   00003 1 OCTAL3   OCT     3               2 IN DP, AND 3 IN TP.
 0182                           6215   00006 1          OCT     6
```

```
P0183           TEST THE SECOND PREFIX BIT TO SEE IF THIS IS A MISCELLANEOUS OR A UNARY/SHORT SHIFT OPERATION.

 0185  REF  23  LAST 1113     6216  10 020 1  OPJUMP2  CCS    CYR          TEST SECOND PREFIX BIT.
 0186  REF   1                6217  1 6232 0           TCF    OPJUMP3      TEST THIRD BIT TO SEE IF UNARY OR SHIFT.

 0187                         6220   77722 0  -ENDVAC  DEC    -45

R0188           THE FOLLOWING ROUTINE PROCESSES ADDRESSES OF SUFFIX CLASS 10. THEY ARE BASICALLY WORK AREA ADDRESSES
R0190  IN THE RANGE 0 - 52, ERASABLE ECADR CONSTANTS FROM 100 - 3777, AND FCADRS ABOVE THAT. ALL 15 BITS ARE AVAILABLE
R0192  IN CONTRAST TO SUFFIX 1, IN WHICH ONLY THE LOW ORDER 14 ARE AVAILABLE.

 0193  REF  15  LAST 1111     6221  24 164 1  15BITADR INCR   LOC          (ENTRY HERE FROM STCALL).
 0194  REF  16  LAST 1114     6222  50 164 1           INDEX  LOC          PICK UP ADDRESS WORD.
 0195                         6223  3 0000 1           CA     0
 0196  REF   5  LAST   69     6224  54 117 1           TS     POLISH       WE MAY NEED A SUBADDRESS LATER.

 0197  REF   1                6225  3 5055 1           CAF    LOW7+2K      THESE INSTRUCTIONS ARE IN BANK 1.
 0198  REF  15  LAST 1111     6226  54 004 1           TS     FBANK
 0199  REF  24  LAST 1114     6227  7 0020 1           MASK   CYR
 0200  REF 280  LAST 1113     6230  50 000 1  ITR7     INDEX  A
 0201  REF   1                6231  1 6303 0           TCF    MISCJUMP
```

```
P0202           COMPLETE THE DISPATCHING OF UNARY AND SHORT SHIFT OPERATIONS.

 0203   REF  16  LAST 1114      6232  54 004 1  OPJUMP3  TS      FBANK       CALL IN BANK 0 (BITS 11-15 OF A ARE 0.)
R0204           ITRACE (6) REFERS TO "OPJUMP3".
 0205   REF  25  LAST 1114      6233  10 020 1           CCS     CYR         TEST THIRD PREFIX BIT.
 0206   REF 281  LAST 1114      6234  50 000 1           INDEX   A           THE DECREMENTED UNARY CODE IS IN BITS
 0207   REF   1                 6235  1 2000 1           TCF     UNAJUMP     1-4 OF A (ZERO, EXIT, HAS BEEN DETECTED)

 0208   REF   7  LAST 1113      6236  10 163 1           CCS     MODE        ITS A SHORT SHIFT CODE. SEE IF PRESENT
 0209   REF   1                 6237  1 2017 1           TCF     SHORTT      SCALAR OR VECTOR.
 0210   REF   2  LAST 1115      6240  1 2017 1           TCF     SHORTT
 0211   REF   1                 6241  1 2121 0           TCF     SHORTV      CALLS THE APPROPRIATE ROUTINE.

 0212   REF   1                 4364          FBANKMSK EQUALS BANKMASK
 0213   REF  22  LAST  304      6242   00122 0 LVBUF    ADRES   VBUF
```

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P0214 THE FOLLOWING IS THE JUMP TABLE FOR OP CODES WHICH MAY HAVE INDEXABLE ADDRESSES OR MAY PUSH UP.

```
0216  REF  1                6243  1 6454 0  INDJUMP  TCF  VLOAD   00 - LOAD MPAC WITH A VECTOR.
0217  REF  1                6244  1 7040 0            TCF  TAD     01 - TRIPLE PRECISION ADD TO MPAC.
0218  REF  1                6245  1 7624 1            TCF  SIGN    02 - COMPLEMENT MPAC (V OR SC) IF X NEG.
0219  REF  1                6246  1 7350 1            TCF  VXSC    03 - VECTOR TIMES SCALAR.
0220  REF  1                6247  1 6652 1            TCF  CGOTO   04 - COMPUTED GO TO.
0221  REF  2  LAST  405     6250  1 6437 0            TCF  TLOAD   05 - LOAD MPAC WITH TRIPLE PRECISION.
0222  REF  1                6251  1 6021 0            TCF  DLOAD   06 - LOAD MPAC WITH A DP SCALAR.
0223  REF  1                6252  1 7573 0            TCF  V/SC    07 - VECTOR DIVIDED BY SCALAR.

0224  REF  1                6253  1 6450 1            TCF  SLOAD   10 - LOAD MPAC IN SINGLE PRECISION.
0225  REF  1                6254  1 6567 1            TCF  SSP     11 - SET SINGLE PRECISION INTO X.
0226  REF  1                6255  1 6472 1            TCF  PDDL    12 - PUSH DOWN MPAC AND RE-LOAD IN DP.
0227  REF  1                6256  1 7303 1            TCF  MXV     13 - MATRIX POST-MULTIPLIED BY VECTOR.
0228  REF  1                6257  1 6526 1            TCF  PDVL    14 - PUSH DOWN AND VECTOR LOAD.
0229  REF  1                6260  1 6575 1            TCF  CCALL   15 - COMPUTED CALL.
0230  REF  1                6261  1 7306 1            TCF  VXM     16 - MATRIX PRE-MULTIPLIED BY VECTOR.
0231  REF  1                6262  1 7565 1            TCF  TSLC    17 - NORMALIZE MPAC (SCALAR ONLY).

0232  REF  1                6263  1 7543 0            TCF  DMPR    20 - DP MULTIPLY AND ROUND.
0233  REF  1                6264  1 7546 0            TCF  DDV     21 - DP DIVIDE BY.
0234  REF  1                6265  1 7552 0            TCF  BDDV    22 - DP DIVIDE INTO.
0235  REF  1                6266  1 7570 0            TCF  GSHIFT  23 - GENERAL SHIFT INSTRUCTION.
0236  REF  1                6267  1 6720 0            TCF  VAD     24 - VECTOR ADD.
0237  REF  1                6270  1 6716 0            TCF  VSU     25 - VECTOR SUBTRACT.
0238  REF  1                6271  1 7005 1            TCF  BVSU    26 - VECTOR SUBTRACT FROM.
0239  REF  1                6272  1 7300 1            TCF  DOT     27 - VECTOR DOT PRODUCT.

0240  REF  1                6273  1 7427 0            TCF  VXV     30 - VECTOR CROSS PRODUCT.
0241  REF  1                6274  1 7374 1            TCF  VPROJ   31 - VECTOR PROJECTION.
0242  REF  1                6275  1 6754 0            TCF  DSU     32 - DP SUBTRACT.
0243  REF  1                6276  1 7031 0            TCF  BDSU    33 - DP SUBTRACT FROM.
0244  REF  1                6277  1 6744 1            TCF  DAD     34 - DP ADD.
0245                        6300  1 6300 0            TCF          35 - AVAILABLE
0246  REF  1                6301  1 7541 1            TCF  DMPI    36 - DP MULTIPLY.
0247  REF  1                6302  1 7562 0            TCF  SETPD   37 - SET PUSH DOWN POINTER (DIRECT ONLY)
```

R0248 CODES 10 AND 14 MUST NOT PUSH UP. CODE 04 MAY BE USED FOR VECTOR DECLARE BEFORE PUSHUP IF DESIRED.

L INTERPRETER USER'S PAGE NO. 11 E0 S3

P0250 THE FOLLOWING JUMP TABLE APPLIES TO INDEX, BRANCH, AND MISCELLANEOUS INSTRUCTIONS.

0252	REF	1	6303	1 2371 1	MISCJUMP	TCF	AXT	00 - ADDRESS TO INDEX TRUE.
0253	REF	1	6304	1 2376 0		TCF	AXC	01 - ADDRESS TO INDEX COMPLEMENTED.
0254	REF	1	6305	1 2401 1		TCF	LXA	02 - LOAD INDEX FROM ERASABLE.
0255	REF	1	6306	1 2405 0		TCF	LXC	03 - LOAD INDEX FROM COMPLEMENT OF ERAS.
0256	REF	1	6307	1 2411 0		TCF	SXA	04 - STORE INDEX IN ERASABLE.
0257	REF	1	6310	1 2417 0		TCF	XCHX	05 - EXCHANGE INDEX WITH ERASABLE.
0258	REF	1	6311	1 2433 0		TCF	INCR	06 - INCREMENT INDEX REGISTER.
0259	REF	1	6312	1 2442 0		TCF	TIX	07 - TRANSFER ON INDEX.
0260	REF	1	6313	1 2425 1		TCF	XAD	10 - INDEX REGISTER ADD FROM ERASABLE.
0261	REF	1	6314	1 2436 0		TCF	XSU	11 - INDEX SUBTRACT FROM ERASABLE.
0262	REF	1	6315	1 2514 1		TCF	BZE/GOTO	12 - BRANCH ZERO AND GOTO.
0263	REF	1	6316	1 2521 1		TCF	BPL/BMN	13 - BRANCH PLUS AND BRANCH MINUS.
0264	REF	1	6317	1 2474 0		TCF	RTB/BHIZ	14 - RETURN TO BASIC AND BRANCH HI ZERO.
0265	REF	1	6320	1 2534 0		TCF	CALL/ITA	15 - CALL AND STORE QPRET.
0266	REF	1	6321	1 2543 0		TCF	SW/	16 - SWITCH INSTRUCTIONS AND AVAILABLE.
0267	REF	1	6322	1 2504 0		TCF	BOV(B)	17 - BRANCH ON OVERFLOW TO BASIC OR INT.

L INTERPRETER USER'S PAGE NO. 12 E0 S3

P0268 THE FOLLOWING JUMP TABLE APPIES TO UNARY INSTRUCTIONS.

```
0269   REF  1                                          COUNT  00/INTER

0270                    00,2000                        BANK   0          00 - EXIT - DETECTED EARLIER.
0271   REF  1           00,2000  1 3207 0  UNAJUMP     TCF    SQRT       01 - SQUARE ROOT.
0272   REF  1           00,2001  1 3527 0              TCF    SINE       02 - SIN.
0273   REF  1           00,2002  1 3516 1              TCF    COSINE     03 - COS.
0274   REF  1           00,2003  1 3607 1              TCF    ARCSIN     04 - ARC SIN.
0275   REF  1           00,2004  1 3611 0              TCF    ARCCOS     05 - ARC COS.
0276   REF  1           00,2005  1 3174 1              TCF    DSQ        06 - DP SQUARE.
0277   REF  1           00,2006  1 2116 1              TCF    ROUND      07 - ROUND TO DP.

0278   REF  1           00,2007  1 7637 0              TCF    COMP       10 - COMPLEMENT VECTOR OR SCALAR.
0279   REF  1           00,2010  1 3232 0              TCF    VDEF       11 - VECTOR DEFINE.
0280   REF  1           00,2011  1 3023 1              TCF    UNIT       12 - UNIT VECTOR.
0281   REF  1           00,2012  1 3176 0              TCF    ABVALABS   13 - LENGTH OF VECTOR OR MAG OF SCALAR.
0282   REF  1           00,2013  1 3245 0              TCF    VSQ        14 - SQUARE OF LENGTH OF VECTOR.
0283   REF  1           00,2014  1 6323 1              TCF    STADR      15 - PUSH UP ON STORE CODE.
0284   REF  1           00,2015  1 3274 1              TCF    RVQ        16 - RETURN VIA QPRET.
0285   REF  1           00,2016  1 3247 1              TCF    PUSH       17 - PUSH MPAC DOWN.
```

P0286 SECTION 2 LOAD AND STORE PACKAGE.

R0287 A SET OF EIGHT STORE CODES IS PROVIDED AS THE PRIMARY METHOD OF STORING THE MULTI-PURPOSE
R0289 ACCUMULATOR (MPAC). IF IN THE DANZIG SECTION LOC REFERS TO AN ALGEBRAICALLY POSITIVE WORD, IT IS TAKEN AS A
R0291 STORE CODE WITH A CORRESPONDING ERASABLE ADDRESS. MOST OF THESE CODES ARE TWO ADDRESS, SPECIFYING THAT THE WORD
R0293 FOLLOWING THE STORE CODE IS TO BE USED AS AN ADDRESS FROM WHICH TO RE-LOAD MPAC. FOUR OPTIONS ARE AVAILABLE:

R0295 1. STORE STORE MPAC. THE E ADDRESS MAY BE INDEXED.
R0297 2. STODL STORE MPAC AND RE-LOAD IT IN DP WITH THE NEXT ADDRESS (THE LOAD MAY BE INDEXED).
R0299 3. STOVL STORE MPAC AND RE-LOAD A VECTOR (AS ABOVE).
R0301 4. STCALL STORE AND DO A CALL (BOTH ADDRESSES MUST BE DIRECT HERE).

R0303 STODL AND STOVL WILL TAKE FROM THE PUSH-DOWN LIST IF NO LOAD ADDRESS IS GIVEN.

```
0305                              6323                    BLOCK  3

0306   REF   2 LAST 1107 TO 1118:   205   205*           COUNT  03/INTER

0307   REF   4  LAST 1108      6323  3 0165 0  STADR     CA     BANKSET     THE STADR CODE (PUSHUP UP ON STORE
0308   REF  17  LAST 1115      6324  54 004 1            TS     FBANK       ADDRESS) ENTERS HERE.
0309   REF  17  LAST 1114      6325  24 164 1            INCR   LOC
0310   REF  18  LAST 1119      6326  50 164 1  ITR1      INDEX  LOC         THE STORECODE WAS STORED COMPLEMENTED TO
0311                           6327  4 0000 0            CS     0           MAKE IT LOOK LIKE AN OPCODE PAIR.
0312   REF  21  LAST 1099      6330  6 7716 0            AD     NEGONE      (YUL CANT REMOVE 1 BECAUSE OF EARLY CCS)

0313   REF  14  LAST 1113      6331  54 116 0  DOSTORE   TS     ADDRWD
0314   REF   7  LAST  379      6332  7 4372 1            MASK   LOWI1       ENTRY FROM DISPATCHER. SAVE THE ERASABLE
0315   REF  15  LAST 1119      6333  56 116 1            XCH    ADDRWD      ADDRESS AND JUMP ON THE STORE CODE NO.
0316   REF   1                 6334  7 7671 1            MASK   B12T14
0317                           6335  0 0006 1            EXTEND
0318   REF  33  LAST 1042      6336  7 5013 1            MP     BIT5        EACH TRANSFER VECTOR ENTRY IS TWO WORDS.
0319   REF 282  LAST 1115      6337  50 000 1  ITR0      INDEX  A
0320   REF   1                 6340  1 6341 0            TCF    STORJUMP
```

P0321 STORE CODE JUMP TABLE. CALLS THE APPROPRIATE STORING ROUTINE AND EXITS TO DANZIG OR TO ADDRESS WITH
R0323 A SUPPLIED OPERATION CODE.

R03231 STORE STORE,1 AND STORE,2 RETURN TO DANZIG. THUS RESETTING THE EBANK TO ITS STATE AT INTPRET.

```
0324  REF   1              6341  0 6371 1  STORJUMP TC    STORE          STORE.
0325  REF   9  LAST  800   6342  1 6030 0           TCF   DANZIG         PICK UP NEW OP CODE(S).
0326  REF   1              6343  0 6363 1           TC    STORE,1
0327  REF  10  LAST 1120   6344  1 6030 0           TCF   DANZIG
0328  REF   1              6345  0 6366 1           TC    STORE,2
0329  REF  11  LAST 1120   6346  1 6030 0           TCF   DANZIG

0330  REF   2  LAST 1120   6347  0 6371 1           TC    STORE          STODL.
0331  REF   1              6350  1 6427 1           TCF   DODLOAD

0332  REF   3  LAST 1120   6351  0 6371 1           TC    STORE          STODL WITH INDEXED LOAD ADDRESS.
0333  REF   1              6352  1 6113 0           TCF   DODLOAD*

0334  REF   4  LAST 1120   6353  0 6371 1           TC    STORE          STOVL.
0335  REF   1              6354  1 6432 0           TCF   DOVLOAD

0336  REF   5  LAST 1120   6355  0 6371 1           TC    STORE          STOVL WITH INDEXED LOAD ADDRESS.
0337  REF   1              6356  1 6435 1           TCF   DOVLOAD*
0338  REF   6  LAST 1120   6357  0 6371 1           TC    STORE          STOTC.
0339  REF   1              6360  3 5030 1           CAF   CALLCODE
0340  REF  26  LAST 1115   6361  54 020 1          TS    CYR
0341  REF   1              6362  1 6221 1           TCF   15BITADR       GET A 15 BIT ADDRESS.
```

P0342 STORE CODE ADDRESS PROCESSOR.

```
0343   REF  21  LAST 1111   6363  50 120 1  STORE.1  INDEX  FIXLOC
0344   REF  57  LAST 1111   6364  4 0046 1           CS     X1
0345   REF   1              6365  1 6370 1           TCF    PRESTORE

0346   REF  22  LAST 1121   6366  50 120 1  STORE.2  INDEX  FIXLOC
0347   REF  32  LAST  934   6367  4 0047 0           CS     X2
0348   REF  16  LAST 1119   6370  26 116 0  PRESTORE ADS    ADDRWD      RESULTANT ADDRESS IS IN ERASABLE.

0349   REF  17  LAST 1121   6371  4 0116 0  STORE    CS     ADDRWD
0350   REF   1              6372  6 5034 0           AD     DEC45
0351   REF 283  LAST 1119   6373  10 000 0           CCS    A           DOES THE ADDRESS POINT TO THE WORK AREA?
0352   REF  23  LAST 1121   6374  3 0120 1           CA     FIXLOC      YES.
0353   REF   1              6375  1 6402 0           TCF    AHEAD5
0354   REF   6  LAST 1111   6376  3 5051 0           CA     OCT1400     NO.  SET EBANK & MAKE UP SUBADDRESS.
0355   REF  18  LAST 1121   6377  56 116 1           XCH    ADDRWD
0356   REF  49  LAST 1111   6400  54 003 0           TS     EBANK
0357   REF  10  LAST 1111   6401  7 4373 0           MASK   LOW8
0358   REF  19  LAST 1121   6402  26 116 0  AHEAD5   ADS    ADDRWD
```

```
P0359           STORING ROUTINES. STORE DP, TP, OR VECTOR AS INDICATED BY MODE.

 0360                                6403  0 0006 1  STARTSTO EXTEND                MPAC.+1 MUST BE STORED IN ANY EVENT.
R0361           ITRACE (5) REFERS TO "STARTSTO".
 0362   REF 290  LAST 1108          6404  3 0155 0            DCA     MPAC
 0363   REF  20  LAST 1121          6405  50 116 1            INDEX   ADDRWD
 0364                               6406  52 001 1            DXCH    0

 0365   REF   8  LAST 1115          6407  10 163 1            CCS     MODE
 0366   REF   1                     6410  1 6423 0            TCF     TSTORE
 0367   REF 233  LAST 1106          6411  0 0002 0            TC      Q

 0368                               6412  0 0006 1  VSTORE    EXTEND
 0369   REF 291  LAST 1122          6413  3 0160 0            DCA     MPAC +3
 0370   REF  21  LAST 1122          6414  50 116 1            INDEX   ADDRWD
 0371                               6415  52 003 0            DXCH    2

 0372                               6416  0 0006 1            EXTEND
 0373   REF 292  LAST 1122          6417  3 0162 1            DCA     MPAC +5
 0374   REF  22  LAST 1122          6420  50 116 1            INDEX   ADDRWD
 0375                               6421  52 005 0            DXCH    4
 0376   REF 234  LAST 1122          6422  0 0002 0            TC      Q

 0377   REF 293  LAST 1122          6423  3 0156 0  TSTORE    CA      MPAC +2
 0378   REF  23  LAST 1122          6424  50 116 1            INDEX   ADDRWD
 0379                               6425  54 002 1            TS      2
 0380   REF 235  LAST 1122          6426  0 0002 0            TC      0
```

```
P0381                ROUTINES TO BEGIN PROCESSING OF THE SECOND ADDRESS ASSOCIATED WITH ALL STORE-TYPE CODES EXCEPT STORE
R0383   ITSELF.

 0384   REF   1                    6427  3 7701 0  DODLOAD  CAF     DLOADCOD
 0385   REF  27  LAST 1120         6430  54 020 1            TS      CYR
 0386   REF   1                    6431  1 6055 0            TCF     DIRADRES        GO GET A DIRECT ADDRESS.

 0387   REF   1                    6432  3 5001 0  DOVLOAD  CAF     VLOADCOD
 0388   REF  28  LAST 1123         6433  54 020 1            TS      CYR
 0389   REF   2  LAST 1123         6434  1 6055 0            TCF     DIRADRES

 0390   REF   1                    6435  3 6056 1  DOVLOAD* CAF     VLOAD*
 0391   REF   2  LAST 1120         6436  1 6114 1            TCF     DODLOAD* +1     PROLOGUE TO INDEX ROUTINE.
```

```
P0392            THE FOLLOWING LOAD INSTRUCTIONS ARE PROVIDED FOR LOADING THE MULTI-PURPOSE ACCUMULATOR MPAC.

0394   REF  24  LAST 1122    6437  50 116 1  TLOAD    INDEX  ADDRWD
0395                         6440  3 0002 0           CA     2          LOAD A TRIPLE PRECISION ARGUMENT INTO
0396   REF 294  LAST 1122    6441  54 156 1           TS     MPAC +2    THE FIRST THREE MPAC REGISTERS. WITH THE
0397                         6442  0 0006 1           EXTEND            CONTENTS OF THE OTHER FOUR IRRELEVANT.
0398   REF  25  LAST 1124    6443  5 0116 1           INDEX  ADDRWD
0399                         6444  3 0001 0           DCA    0
0400   REF 295  LAST 1124    6445  52 155 1           DXCH   MPAC
0401   REF 135  LAST 1088    6446  3 5017 1  TMODE    CAF    ONE
0402   REF   1               6447  1 6027 0           TCF    NEWMODE    DECLARE TRIPLE PRECISION MODE.

0403                         6450  22 007 0  SLOAD    ZL                LOAD A SINGLE PRECISION NUMBER INTO
0404   REF  26  LAST 1124    6451  50 116 1           INDEX  ADDRWD     MPAC, SETTING MPAC+1,2 TO ZERO. THE
0405                         6452  3 0000 1           CA     0          CONTENTS OF THE REMAINING MPAC REGISTERS
0406   REF   1               6453  1 6024 0           TCF    SLOAD2     ARE IRRELEVANT.

0407                         6454  0 0006 1  VLOAD    EXTEND            LOAD A DOUBLE PRECISION VECTOR INTO
0408   REF  27  LAST 1124    6455  5 0116 1           INDEX  ADDRWD     MPAC,+1, MPAC+3,4, AND MPAC+5,6. THE
0409                         6456  3 0001 0           DCA    0          CONTENTS OF MPAC +2 ARE IRRELEVANT.
0410   REF 296  LAST 1124    6457  52 155 1           DXCH   MPAC

0411                         6460  0 0006 1  ENDVLOAD EXTEND            PDVL COMES HERE TO FINISH UP FOR DP, TP.
0412   REF  28  LAST 1124    6461  5 0116 1           INDEX  ADDRWD
0413                         6462  3 0003 1           DCA    2
0414   REF 297  LAST 1124    6463  52 160 1           DXCH   MPAC +3

0415                         6464  0 0006 1  +4       EXTEND            TPDVL FINISHES HERE.
0416   REF  29  LAST 1124    6465  5 0116 1           INDEX  ADDRWD
0417                         6466  3 0005 1           DCA    4
0418   REF 298  LAST 1124    6467  52 162 0           DXCH   MPAC +5

0419   REF 136  LAST 1124    6470  4 5017 0  VMODE    CS     ONE        DECLARE VECTOR MODE.
0420   REF   2  LAST 1124    6471  1 6027 0           TCF    NEWMODE
```

```
P0421           THE FOLLOWING INSTRUCTIONS ARE PROVIDED FOR STORING OPERANDS IN THE PUSHDOWN LIST:

R0423           1.  PUSH            PUSHDOWN AND NO LOAD.
R0424           2.  PDDL            PUSHDOWN AND DOUBLE PRECISION LOAD.
R0425           3.  PDVL            PUSHDOWN AND VECTOR LOAD.

 0426                               6472  0 0006 1  PDDL     EXTEND
 0427  REF  30  LAST 1124          6473  5 0116 1            INDEX   ADDRWD      LOAD MPAC.+1. PUSHING THE FORMER
 0428                               6474  3 0001 0            DCA     0           CONTENTS DOWN.
 0429  REF 299  LAST 1124          6475  52 155 1            DXCH    MPAC
 0430  REF   2  LAST 1113          6476  50 166 0            INDEX   PUSHLOC
 0431                               6477  52 001 1            DXCH    0

 0432  REF   9  LAST 1122          6500  50 163 0            INDEX   MODE        ADVANCE THE PUSHDOWN POINTER APPRO-
 0433  REF   3  LAST 1113          6501  3 6213 1            CAF     NO.WDS      PRIATELY.
 0434  REF   3  LAST 1125          6502  26 166 1            ADS     PUSHLOC

 0435  REF  10  LAST 1125          6503  10 163 1            CCS     MODE
 0436  REF   1                     6504  1 6521 0            TCF     ENDTPUSH
 0437  REF   1                     6505  1 6517 0            TCF     ENDDPUSH

 0438  REF  11  LAST 1125          6506  54 163 1            TS      MODE        NOW DP.
 0439  REF 300  LAST 1125          6507  54 156 1  ENDVPUSH  TS      MPAC +2
 0440  REF 301  LAST 1125          6510  52 160 1            DXCH    MPAC +3     PUSH DOWN THE REST OF THE VECTOR HERE.
 0441  REF   4  LAST 1125          6511  50 166 0            INDEX   PUSHLOC
 0442                               6512  51'775 0            DXCH    0 -4

 0443  REF 302  LAST 1125          6513  52 162 0            DXCH    MPAC +5
 0444  REF   5  LAST 1125          6514  50 166 0            INDEX   PUSHLOC
 0445                               6515  51'777 1            DXCH    0 -2

 0446  REF  12  LAST 1120          6516  1 6030 0            TCF     DANZIG

 0447  REF 303  LAST 1125          6517  54 156 1  ENDDPUSH  TS      MPAC +2     SET MPAC +2 TO ZERO AND EXIT ON DP.
 0448  REF  13  LAST 1125          6520  1 6030 0            TCF     DANZIG

 0449  REF  12  LAST 1125          6521  54 163 1  ENDTPUSH  TS      MODE
 0450  REF 304  LAST 1125          6522  56 156 0            XCH     MPAC +2     ON TRIPLE, SET MPAC +2 TO ZERO, PUSHING
 0451  REF   6  LAST 1125          6523  50 166 0  +2        INDEX   PUSHLOC     DOWN THE OLD CONTENTS
 0452                               6524  53'777 0            TS      0 -1
 0453  REF  14  LAST 1125          6525  1 6030 0            TCF     DANZIG
```

```
P0454                PDVL - PUSHDOWN AND VECTOR LOAD.

 0455                                6526  0 0006 1  PDVL    EXTEND              RELOAD MPAC AND PUSH DOWN ITS CONTENTS.
 0456  REF  31  LAST 1125           6527  5 0116 1          INDEX   ADDRWD
 0457                                6530  3 0001 0          DCA     0
 0458  REF 305  LAST 1125           6531  52 155 1          DXCH    MPAC
 0459  REF   7  LAST 1125           6532  50 166 0          INDEX   PUSHLOC
 0460                                6533  52 001 1          DXCH    0

 0461  REF  13  LAST 1125           6534  50 163 0          INDEX   MODE          ADVANCE THE PUSHDOWN POINTER.
 0462  REF   4  LAST 1125           6535  3 6213 1          CAF     NO.WDS
 0463  REF   8  LAST 1126           6536  26 166 1          ADS     PUSHLOC

 0464  REF  14  LAST 1126           6537  10 163 1          CCS     MODE          TEST PAST MODE.
 0465  REF   1                     6540  1 6557 1          TCF     TPDVL
 0466  REF   1                     6541  1 6460 1          TCF     ENDVLOAD      JUST LOAD LAST FOUR REGISTERS ON DP.

 0467                                6542  0 0006 1  VPDVL   EXTEND              PUSHDOWN AND RE-LOAD LAST TWO COMPONENTS
 0468  REF  32  LAST 1126           6543  5 0116 1          INDEX   ADDRWD
 0469                                6544  3 0003 1          DCA     2
 0470  REF 306  LAST 1126           6545  52 160 1          DXCH    MPAC +3
 0471  REF   9  LAST 1126           6546  50 166 0          INDEX   PUSHLOC
 0472                                6547  51'775 0          DXCH    0 -4

 0473                                6550  0 0006 1          EXTEND
 0474  REF  33  LAST 1126           6551  5 0116 1          INDEX   ADDRWD
 0475                                6552  3 0005 1          DCA     4
 0476  REF 307  LAST 1126           6553  52 162 0          DXCH    MPAC +5
 0477  REF  10  LAST 1126           6554  50 166 0          INDEX   PUSHLOC
 0478                                6555  51'777 1          DXCH    0 -2

 0479  REF  15  LAST 1125           6556  1 6030 0          TCF     DANZIG

 0480                                6557  0 0006 1  TPDVL   EXTEND              ON TP, WE MUST LOAD THE Y COMPONENT
 0481  REF  34  LAST 1126           6560  5 0116 1          INDEX   ADDRWD        BEFORE STORING MPAC +2 INCASE THIS IS A
 0482                                6561  3 0003 1          DCA     2             PUSHUP.
 0483  REF 308  LAST 1126           6562  52 160 1          DXCH    MPAC +3

 0484  REF 309  LAST 1126           6563  3 0156 0          CA      MPAC +2
 0485  REF  11  LAST 1126           6564  50 166 0          INDEX   PUSHLOC       IN DP.
 0486                                6565  53'777 0          TS      0 -1
 0487  REF   2  LAST 1126           6566  1 6464 0          TCF     ENDVLOAD +4

R0488                SSP (STORE SINGLE PRECISION) IS EXECUTED HERE.

 0489  REF  19  LAST 1119           6567  24 164 1  SSP     INCR    LOC           PICK UP THE WORD FOLLOWING THE GIVEN
 0490  REF  20  LAST 1126           6570  50 164 1          INDEX   LOC           ADDRESS AND STORE IT AT X.
 0491                                6571  3 0000 1          CA      0
 0492  REF  35  LAST 1126           6572  50 116 1  STORE1  INDEX   ADDRWD        SOME INDEX AND MISCELLANEOUS OPS END
 0493                                6573  54 000 0          TS      0             HERE.
```

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0494 REF 16 LAST 1126 6574 1 6030 0 TCF DANZIG

P0495 SEQUENCE CHANGING AND SUBROUTINE CALLING OPTIONS.

R0496 THE FOLLOWING OPERATIONS ARE AVAILABLE FOR SEQUENCING CHANGING, BRANCHING, AND CALLING SUBROUTINES:

R0498 1. GOTO GO TO.
R0499 2. CALL CALL SUBROUTINE SETTING QPRET.
R0500 3. CGOTO COMPUTED GO TO.
R0501 4. CCALL COMPUTED CALL.
R0502 7. BPL BRANCH IF MPAC POSITIVE OR ZERO.
R0503 8. BZE BRANCH IF MPAC ZERO.
R0504 9. BMN BRANCH IF MPAC NEGATIVE NON-ZERO.

```
0505  REF  21  LAST 1126    6575  24 164 1  CCALL   INCR    LOC       MAINTAIN LOC FOR QPRET COMPUTATION.
0506  REF  22  LAST 1128    6576  50 164 1          INDEX   LOC
0507                        6577  3 0000 1           CAF     0         GET BASE ADDRESS OF CADR LIST.
0508  REF  36  LAST 1126    6600  50 116 1          INDEX   ADDRWD
0509                        6601  6 0000 1           AD      0         ADD INCREMENT.
0510  REF  18  LAST 1119    6602  54 004 1           TS      FBANK     SELECT DESIRED CADR.
0511  REF  16  LAST 1111    6603  7 5054 1           MASK    LOWIO
0512  REF 284  LAST 1121    6604  50 000 1           INDEX   A
0513                        6605  3 2000 0           CAF     10000
0514  REF   6  LAST 1114    6606  54 117 1           TS      POLISH

0515  REF   5  LAST 1119    6607  3 0165 0  CALL     CA      BANKSET   FOR ANY OF THE CALL OPTIONS, MAKE UP THE
0516  REF   2  LAST 1115    6610  7 4364 0           MASK    BANKMASK  ADDRESS OF THE NEXT OP-CODE PAIR/STORE
0517  REF   3  LAST 1128    6611  6 4364 1           AD      BANKMASK  CODE AND LEAVE IT IN QPRET.  NOTE THAT
0518  REF  23  LAST 1128    6612  6 0164 1           AD      LOC       BANKMASK = -(2000 - 1).
0519  REF  24  LAST 1121    6613  50 120 1           INDEX   FIXLOC
0520  REF  16  LAST  794    6614  54 052 1           TS      QPRET

0521  REF   7  LAST 1128    6615  3 0117 0  GOTO     CA      POLISH    BASIC BRANCHING SEQUENCE.
0522  REF   4  LAST 1111    6616  7 7711 0   +1      MASK    HIGH4
0523                        6617  0 0006 1           EXTEND
0524  REF   1               6620  1 6631 1           BZF     GOTOERS   SEE IF ADDRESS POINTS TO FIXED OR ERAS.
0525  REF   6  LAST 1128    6621  3 0165 0   +4      CA      BANKSET   SET EBANK PART OF BBANK. NEXT, SET UP
0526  REF  18  LAST 1108    6622  54 006 0           TS      BBANK     FBANK. THE COMBINATION IS PICKED UP &
0527  REF   8  LAST 1128    6623  3 0117 0           CA      POLISH    PUT INTO BANKSET AT INTPRET +2.
0528  REF  19  LAST 1128    6624  54 004 1           TS      FBANK
0529  REF  17  LAST 1128    6625  7 5054 1           MASK    LOWIO
0530  REF   2  LAST 1111    6626  6 5005 1           AD      2K
0531  REF  24  LAST 1128    6627  54 164 0           TS      LOC
0532  REF 228  LAST 1107    6630  1 6011 0           TCF     INTPRET +3

0533                  E3,1400                       EBANK= 1400       SO YUL DOESN'T CUSS THE "CA 1400" BELOW.

0534  REF   9  LAST 1128    6631  3 0117 0  GOTOERS  CA      POLISH    THE GIVEN ADDRESS IS IN ERASABLE - SEE
0535  REF   2  LAST 1110    6632  6 6220 1           AD      -ENDVAC   IF RELATIVE TO THE WORK AREA.
0536  REF 285  LAST 1128    6633  10 000 0           CCS     A
0537  REF  10  LAST 1128    6634  3 0117 0           CA      POLISH    GENERAL ERASABLE.
0538  REF   1               6635  1 6644 0           TCF     GOTOGE
```

```
0539   REF  25  LAST 1128     6636  3 0120 1          CA      FIXLOC      WORK AREA.
0540   REF  11  LAST 1128     6637  6 0117 0          AD      POLISH
0541   REF 286  LAST 1128     6640  50 000 1          INDEX   A           USE THE GIVEN ADDRESS AS THE ADDRESS OF
0542                          6641  3 0000 1          CA      0           THE BRANCH ADDRESS.
0543   REF  12  LAST 1129     6642  54 117 1          TS      POLISH
0544   REF   1                6643  1 6616 1          TCF     GOTO +1     ALLOWS ARBITRARY INDIRECTNESS LEVELS.

0545   REF  50  LAST 1121     6644  54 003 0  GOTOGE  TS      EBANK
0546   REF  11  LAST 1121     6645  7 4373 0          MASK    LOW8
0547   REF 287  LAST 1129     6646  50 000 1          INDEX   A           USE THE GIVEN ADDRESS AS THE ADDRESS OF
0548                          6647  3 1400 1          CA      1400        THE BRANCH ADDRESS.
0549   REF  13  LAST 1129     6650  54 117 1          TS      POLISH
0550   REF   2  LAST 1129     6651  1 6616 1          TCF     GOTO +1

0551   REF  25  LAST 1128     6652  50 164 1  CGOTO   INDEX   LOC         COMPUTED GO TO. PICK UP ADDRESS OF CADR
0552                          6653  3 0001 0          CA      1           LIST.
0553   REF  37  LAST 1128     6654  50 116 1          INDEX   ADDRWD      ADD MODIFIER.
0554                          6655  6 0000 1          AD      0
0555   REF  20  LAST 1128     6656  54 004 1          TS      FBANK       SELECT GOTO ADDRESS.
0556   REF  18  LAST 1128     6657  7 5054 1          MASK    LOW10
0557   REF 288  LAST 1129     6660  50 000 1          INDEX   A
0558                          6661  3 2000 0          CA      10000
0559   REF  14  LAST 1129     6662  54 117 1          TS      POLISH
0560   REF   3  LAST 1129     6663  1 6616 1          TCF     GOTO +1     WITH ADDRESS IN A.

0561   REF   7  LAST 1128     6664  3 0165 0  SWBRANCH CA     BANKSET     SWITCH INSTRUCTIONS WHICH ELECT TO
0562   REF  21  LAST 1129     6665  54 004 1          TS      FBANK       BRANCH COME HERE TO DO SO.
0563   REF  26  LAST 1129     6666  50 164 1          INDEX   LOC
0564                          6667  3 0001 0          CA      1
0565   REF  15  LAST 1129     6670  54 117 1          TS      POLISH
0566   REF   4  LAST 1129     6671  1 6616 1          TCF     GOTO +1
```

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P0567 TRIPLE PRECISION BRANCHING ROUTINE. IF CALLING TC IS AT L, RETURN IS AS FOLLOWS:

R0569 L+1 IF MPAC IS GREATER THAN ZERO.
R0570 L+2 IF MPAC IS EQUAL TO +0 OR -0.
R0571 L+3 IF MPAC IS LESS THAN ZERO.

```
0572  REF 310  LAST 1126    6672  10 154 0  BRANCH  CCS    MPAC
0573  REF 236  LAST 1122    6673  0 0002 0          TC     Q
0574                        6674  1 6676 1          TCF    +2              ON ZERO.
0575  REF   1               6675  1 6710 0          TCF    NEG

0576  REF 311  LAST 1130    6676  10 155 1          CCS    MPAC +1
0577  REF 237  LAST 1130    6677  0 0002 0          TC     Q
0578                        6700  1 6702 0          TCF    +2
0579  REF   2  LAST 1130    6701  1 6710 0          TCF    NEG

0580  REF 312  LAST 1130    6702  10 156 1          CCS    MPAC +2
0581  REF 238  LAST 1130    6703  0 0002 0          TC     Q
0582                        6704  1 6706 1          TCF    +2
0583  REF   3  LAST 1130    6705  1 6710 0          TCF    NEG

0584  REF 239  LAST 1130    6706  50 002 0  Q+1     INDEX  Q
0585                        6707  0 0001 0          TC     1
0586  REF 240  LAST 1130    6710  50 002 0  NEG     INDEX  Q               IF FIRST NON-ZERO REGISTER WAS NEGATIVE.
0587                        6711  0 0002 0          TC     2

0588  REF   4  LAST 1130    6710              Q+2     =      NEG

R0589                ITRACE (3) REFERS TO "EXIT".
0590  REF   8  LAST 1129    6712  3 0165 0  EXIT    CA     BANKSET         RESTORE USER'S BANK SETTING. AND LEAVE
0591  REF  19  LAST 1128    6713  54 006 0          TS     BBANK           INTERPRETIVE MODE.
0592  REF  27  LAST 1129    6714  50 164 1          INDEX  LOC
0593                        6715  0 0001 0          TC     1
```

P0594 SECTION 3 - ADD/SUBTRACT PACKAGE.

R0595 THE FOLLOWING OPERATIONS ARE PROVIDED FOR ADDING TO AND SUBTRACTING FROM THE MULTI-PURPOSE ACCUMULATOR
R0597 MPAC:

R0598 1. DAD DOUBLE PRECISION ADD.
R0599 2. DSU DOUBLE PRECISION SUBTRACT.
R0600 3. BDSU DOUBLE PRECISION SUBTRACT FROM.

R0601 4. TAD TRIPLE PRECISION ADD.

R0602 5. VAD VECTOR ADD.
R0603 6. VSU VECTOR SUBTRACT.
R0604 7. BVSU VECTOR SUBTRACT FROM.

R0605 THE INTERPRETIVE OVERFLOW INDICATOR OVFIND IS SET NON-ZERO IF OVERFLOW OCCURS IN ANY OF THE ABOVE.

```
0607  REF  44  LAST 1107    6716  3 5001 0  VSU     CAF    BIT15          CHANGES 0 TO DCS.
0608                        6717  1 6721 1          TCF    +2

0609  REF  12  LAST  990    6720  3 4371 0  VAD     CAF    PRIO30         CHANGES 0 TO DCA.
0610  REF  38  LAST 1129    6721  26 116 0          ADS    ADDRWD
0611                        6722  0 0006 1          EXTEND
0612  REF  39  LAST 1131    6723  5 0116 1          INDEX  ADDRWD
0613  REF   2  LAST  431    6724  00 003 1          READ   HISCALAR        DCA  2  OR  DCS  2
0614  REF 313  LAST 1130    6725  20 160 1          DAS    MPAC +3
0615                        6726  0 0006 1          EXTEND                 CHECK OVERFLOW.
0616                        6727  1 6731 0          BZF    +2
0617  REF   1               6730  0 6763 0          TC     OVERFLWY

0618                        6731  0 0006 1          EXTEND
0619  REF  40  LAST 1131    6732  5 0116 1          INDEX  ADDRWD
0620  REF   8  LAST 1062    6733  00 005 1          READ   CHAN5           DCA  4  OR  DCS  4
0621  REF 314  LAST 1131    6734  20 162 0          DAS    MPAC +5
0622                        6735  0 0006 1          EXTEND
0623                        6736  1 6740 0          BZF    +2
0624  REF   1               6737  0 6760 0          TC     OVERFLWZ

0625                        6740  0 0006 1          EXTEND
0626  REF  41  LAST 1131    6741  5 0116 1          INDEX  ADDRWD
0627  REF  14  LAST 1079    6742  00 001 0          READ   LCHAN           DCA  0  OR  DCS  0
0628  REF   1               6743  1 6747 1          TCF    ENDVXV

0629                        6744  0 0006 1  DAD     EXTEND
0630  REF  42  LAST 1131    6745  5 0116 1          INDEX  ADDRWD
0631                        6746  3 0001 0          DCA    0
0632  REF 315  LAST 1131    6747  20 155 1  ENDVXV  DAS    MPAC           VXV FINISHES HERE.
0633                        6750  0 0006 1          EXTEND
0634  REF  17  LAST 1127    6751  1 6030 0          BZF    DANZIG
```

```
0635   REF   1                  6752  0 6766 0  SETOVF   TC      OVERFLOW
0636   REF  18  LAST 1131       6753  1 6030 0           TCF     DANZIG
```

```
0637                                6754  0 0006 1  DSU       EXTEND
0638   REF  43  LAST 1131          6755  5 0116 1            INDEX   ADDRWD
0639                                6756  4 0001 1            DCS     0
0640   REF   2  LAST 1131          6757  1 6747 1            TCF     ENDVXV

0641   REF 130  LAST 1105          6760  54 001 1  OVERFLWZ  TS      L         ENTRY FOR THIRD COMPONENT.
0642   REF  24  LAST 1068          6761  3 5022 1            CAF     FIVE
0643                                6762  1 6765 1            TCF     +3

0644   REF 131  LAST 1133          6763  54 001 1  OVERFLWY  TS      L         ENTRY FOR SECOND COMPONENT.
0645   REF  42  LAST 1090          6764  3 6214 0            CAF     THREE
0646   REF 132  LAST 1133          6765  56 001 0            XCH     L

0647   REF 289  LAST 1129          6766  50 000 1  OVERFLOW  INDEX   A         ENTRY FOR 1ST COMP OR DP (L=0).
0648   REF   5  LAST 1065          6767  4 5000 0            CS      LIMITS    PICK UP POSMAX OR NEGMAX.
0649   REF  44  LAST  375          6770  54 130 1            TS      BUF
0650                                6771  0 0006 1            EXTEND
0651   REF 290  LAST 1133          6772  24 000 1            AUG     A         FORCE OVERFLOW.
0652   REF 133  LAST 1133          6773  50 001 0            INDEX   L
0653   REF 316  LAST 1131          6774  26 155 1            ADS     MPAC +1
0654                                6775  54 007 1            TS      7
0655   REF 219  LAST 1107          6776  3 5021 1            CAF     ZERO
0656   REF  45  LAST 1133          6777  6 0130 0            AD      BUF
0657   REF 134  LAST 1133          7000  50 001 0            INDEX   L
0658   REF 317  LAST 1133          7001  26 154 0            ADS     MPAC
0659                                7002  54 007 1            TS      7
0660   REF 241  LAST 1130          7003  0 0002 0            TC      Q         NO OVERFLOW EXIT.
0661   REF   1                     7004  1 7121 0            TCF     SETOVF2   SET OVFIND AND EXIT.

0662                                7005  0 0006 1  BVSU      EXTEND
0663   REF  44  LAST 1133          7006  5 0116 1            INDEX   ADDRWD
0664                                7007  3 0003 1            DCA     2
0665   REF 318  LAST 1133          7010  52 160 1            DXCH    MPAC +3
0666                                7011  0 0006 1            EXTEND
0667                                7012  4 0001 1            DCOM
0668   REF 319  LAST 1133          7013  20 160 1            DAS     MPAC +3
0669                                7014  0 0006 1            EXTEND
0670                                7015  1 7017 1            BZF     +2
0671   REF   2  LAST 1131          7016  0 6763 0            TC      OVERFLWY

0672                                7017  0 0006 1            EXTEND
0673   REF  45  LAST 1133          7020  5 0116 1            INDEX   ADDRWD
0674                                7021  3 0005 1            DCA     4
0675   REF 320  LAST 1133          7022  52 162 0            DXCH    MPAC +5
0676                                7023  0 0006 1            EXTEND
0677                                7024  4 0001 1            DCOM
0678   REF 321  LAST 1133          7025  20 162 0            DAS     MPAC +5
0679                                7026  0 0006 1            EXTEND
0680                                7027  1 7031 0            BZF     +2
0681   REF   2  LAST 1131          7030  0 6760 0            TC      OVERFLWZ
```

```
0682                                7031  0 0006 1  BDSU     EXTEND
0683   REF  46  LAST 1133          7032  5 0116 1           INDEX   ADDRWD
0684                                7033  3 0001 0           DCA     0
0685   REF 322  LAST 1133          7034  52 155 1           DXCH    MPAC
0686                                7035  0 0006 1           EXTEND
0687                                7036  4 0001 1           DCOM
0688   REF   3  LAST 1133          7037  1 6747 1           TCF     ENDVXV
```

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P0639 TRIPLE PRECISION ADD ROUTINE.

```
0690                                7040  0 0006 1  TAD     EXTEND
0691  REF  47  LAST 1134           7041  5 0116 1          INDEX   ADDRWD
0692                                7042  3 0002 0          DCA     1           ADD MINOR PARTS FIRST.
0693  REF 323  LAST 1134           7043  20 156 1          DAS     MPAC +1
0694  REF  48  LAST 1135           7044  50 116 1          INDEX   ADDRWD
0695                                7045  6 0000 1          AD      0
0696  REF 324  LAST 1135           7046  6 0154 1          AD      MPAC
0697  REF 325  LAST 1135           7047  54 154 0          TS      MPAC
0698  REF  19  LAST 1132           7050  1 6030 0          TCF     DANZIG

0699  REF   1                      7051  1 6752 0          TCF     SETOVF      SET OVFIND IF SUCH OCCURS.
```

P0700 ARITHMETIC SUBROUTINES REQUIRED IN FIXED-FIXED.

R0701 1. DMPSUB DOUBLE PRECISION MULTIPLY. MULTIPLY THE CONTENTS OF MPAC,+1 BY THE DP WORD WHOSE ADDRESS
R0703 IS IN ADDRWD AND LEAVE A TRIPLE PRECISION RESULT IN MPAC.
R0705 2. ROUNDSUB ROUND THE TRIPLE PRECISON CONTENTS OF MPAC TO DOUBLE PRECISION.
R0707 3. DOTSUB TAKE THE DOT PRODUCT OF THE VECTOR IN MPAC AND THE VECTOR WHOSE ADDRESS IS IN ADDRWD
R0709 AND LEAVE THE TRIPLE PRECISION RESULT IN MPAC.
R0710 4. POLY USING THE CONTENTS OF MPAC AS A DP ARGUMENT, EVALUATE THE POLYNOMIAL WHOSE DEGREE AND
R0712 COEFFICIENTS IMMEDIATELY FOLLOW THE TC POLY INSTRUCTION (SEE ROUTINE FOR DETAILS.)

```
0714  REF 242  LAST 1133   7052  50 002 0  DMP      INDEX  Q          BASIC SUBROUTINE FOR USE BY PINBALL, ETC
0715                       7053  3 0000 1           CAF    0          ADRES OF ARGUMENT FOLLOWS  TC DMP  .
0716  REF 243  LAST 1136   7054  24 002 0           INCR   Q
0717  REF  49  LAST 1135   7055  54 116 0  -1       TS     ADDRWD     (PROLOGUE FOR SETTING ADDRWD.)

0718  REF  50  LAST 1136   7056  50 116 1  DMPSUB   INDEX  ADDRWD     GET MINOR PART OF OPERAND AT C(ADDRWD).
0719                       7057  3 0001 0           CA     1
0720  REF 326  LAST 1135   7060  54 156 1           TS     MPAC +2    THIS WORKS FOR SQUARING MPAC AS WELL.
0721  REF 220  LAST 1133   7061  3 5021 1           CAF    ZERO       SET MPAC +1 TO ZERO SO WE CAN ACCUMULATE
0722  REF 327  LAST 1136   7062  56 155 0           XCH    MPAC +1    THE PARTIAL PRODUCTS WITH DAS
0723  REF   8  LAST 1104   7063  54 135 1           TS     MPTEMP     INSTRUCTIONS.
0724                       7064  0 0006 1           EXTEND
0725  REF 328  LAST 1136   7065  7 0156 1           MP     MPAC +2    MINOR OF MPAC X MINOR OF C(ADDRWD).

0726  REF 329  LAST 1136   7066  56 156 0           XCH    MPAC +2    DISCARD MINOR PART OF ABOVE RESULT AND
0727                       7067  0 0006 1           EXTEND            FORM MAJOR OF MPAC X MINOR OF C(ADDRWD).
0728  REF 330  LAST 1136   7070  7 0154 0           MP     MPAC
0729  REF 331  LAST 1136   7071  20 156 1           DAS    MPAC +1    GUARANTEED NO OVERFLOW.

0730  REF  51  LAST 1136   7072  50 116 1           INDEX  ADDRWD     GET MAJOR PART OF ARGUMENT AT C(ADDRWD).
0731                       7073  3 0000 1           CA     0
0732  REF   9  LAST 1136   7074  56 135 0           XCH    MPTEMP     SAVE AND BRING OUT MINOR OF MPAC.
0733                       7075  0 0006 1  DMPSUB2  EXTEND
0734  REF  10  LAST 1136   7076  7 0135 1           MP     MPTEMP     MAJOR OF C(ADDRWD) X MINOR OF MPAC.
0735  REF 332  LAST 1136   7077  20 156 1           DAS    MPAC +1    ACCUMULATE, SETTING A TO NET OVERFLOW.

0736  REF 333  LAST 1136   7100  56 154 1           XCH    MPAC       SETTING MPAC TO 0 OR +-1.
0737                       7101  0 0006 1           EXTEND
0738  REF  11  LAST 1136   7102  7 0135 1           MP     MPTEMP     MAJOR OF MPAC X MAJOR OF C(ADDRWD).
0739  REF 334  LAST 1136   7103  20 155 1           DAS    MPAC       GUARANTEED NO OVERFLOW.
0740  REF 244  LAST 1136   7104  0 0002 0           TC     Q          49 MCT = .573 MS. INCLUDING RETURN.
```

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P0741 ROUND MPAC TO DOUBLE PRECISION. SETTING OVFIND ON THE RARE EVENT OF OVERFLOW.

```
0743   REF 221  LAST 1136    7105  3 5021 1  ROUNDSUB CAF    ZERO      SET MPAC +2 = 0 FOR SCALARS AND CHANGE
0744   REF  15  LAST 1126    7106  54 163 1   +1       TS     MODE      MODE TO DP.

0745   REF 335  LAST 1136    7107  56 156 0  VROUND   XCH    MPAC +2   BUT WE NEEDNT TAKE THE TIME FOR VECTORS.
0746                         7110  6 0000 1            DOUBLE
0747   REF 135  LAST 1133    7111  54 001 1            TS     L
0748   REF 245  LAST 1136    7112  0 0002 0            TC     Q

0749   REF 336  LAST 1137    7113  6 0155 0            AD     MPAC +1   ADD ROUNDING BIT IF MPAC +2 WAS GREATER
0750   REF 337  LAST 1137    7114  54 155 1            TS     MPAC +1   THAN .5 IN MAGNITUDE.
0751   REF 246  LAST 1137    7115  0 0002 0            TC     Q

0752   REF 338  LAST 1137    7116  6 0154 1            AD     MPAC      PROPAGATE INTERFLOW.
0753   REF 339  LAST 1137    7117  54 154 0            TS     MPAC
0754   REF 247  LAST 1137    7120  0 0002 0            TC     Q

0755   REF   2  LAST  891    7121  54 121 1  SETOVF2  TS     OVFIND    (RARE).
0756   REF 248  LAST 1137    7122  0 0002 0            TC     Q
```

```
P0757           THE DOT PRODUCT SUBROUTINE USUALLY FORMS THE DOT PRODUCT OF THE VECTOR IN MPAC WITH A STANDARD SIX
R0759   REGISTER VECTOR WHOSE ADDRESS IS IN ADDRWD. IN THIS CASE C(DOTINC) ARE SET TO 2. VXM, HOWEVER, SETS C(DOTINC) TO
R0761   6 SO THAT DOTSUB DOTS MPAC WITH A COLUMN VECTOR OF THE MATRIX IN QUESTION IN THIS CASE.

0763   REF  54  LAST 1101    7123  3 5016 0  PREDOT   CAF    TWO          PROLOGUE TO SET DOTINC TO 2.
0764   REF   4  LAST   70    7124  54 136 1           TS     DOTINC

0765                         7125  0 0006 1  DOTSUB   EXTEND
0766   REF   5  LAST   70    7126  22 137 1           QXCH   DOTRET       SAVE RETURN.
0767   REF   1               7127  0 7056 0           TC     DMPSUB       DOT X COMPONENTS.
0768   REF 340  LAST 1137    7130  52 160 1           DXCH   MPAC +3      POSITION Y COMPONENT OF MPAC FOR
0769   REF 341  LAST 1138    7131  52 155 1           DXCH   MPAC         MULTIPLICATION WHILE SAVING RESULT IN
0770   REF  46  LAST 1133    7132  52 131 0           DXCH   BUF          THREE WORD BUFFER, BUF.
0771   REF 342  LAST 1138    7133  3 0156 0           CA     MPAC +2
0772   REF  47  LAST 1138    7134  54 132 0           TS     BUF +2

0773   REF   5  LAST 1138    7135  3 0136 0           CA     DOTINC       ADVANCE ADDRWD TO Y COMPONENT OF
0774   REF  52  LAST 1136    7136  26 116 0           ADS    ADDRWD       OTHER ARGUMENT.
0775   REF   2  LAST 1138    7137  0 7056 0           TC     DMPSUB
0776   REF 343  LAST 1138    7140  52 156 1           DXCH   MPAC +1      ACCUMULATE PARTIAL PRODUCTS.
0777   REF  48  LAST 1138    7141  20 132 0           DAS    BUF +1
0778   REF 344  LAST 1138    7142  6 0154 1           AD     MPAC
0779   REF  49  LAST 1138    7143  6 0130 0           AD     BUF
0780   REF  50  LAST 1138    7144  54 130 1           TS     BUF
0781                         7145  1 7147 0           TCF    +2
0782   REF   3  LAST 1137    7146  54 121 1           TS     OVFIND       IF OVERFLOW OCCURS.

0783   REF 345  LAST 1138    7147  52 162 0           DXCH   MPAC +5      MULTIPLY Z COMPONENTS.
0784   REF 346  LAST 1138    7150  52 155 1           DXCH   MPAC
0785   REF   6  LAST 1138    7151  3 0136 0           CA     DOTINC
0786   REF  53  LAST 1138    7152  26 116 0           ADS    ADDRWD
0787   REF   3  LAST 1138    7153  0 7056 0           TC     DMPSUB
0788   REF  51  LAST 1138    7154  52 132 0  ENDDOT   DXCH   BUF +1        LEAVE FINAL ACCUMULATION IN MPAC.
0789   REF 347  LAST 1138    7155  20 156 1           DAS    MPAC +1
0790   REF 348  LAST 1138    7156  6 0154 1           AD     MPAC
0791   REF  52  LAST 1138    7157  6 0130 0           AD     BUF
0792   REF 349  LAST 1138    7160  54 154 0           TS     MPAC
0793   REF   6  LAST 1138    7161  0 0137 1           TC     DOTRET

0794   REF   2  LAST 1132    7162  0 6766 0           TC     OVERFLOW     ON OVERFLOW HERE.
0795   REF   7  LAST 1138    7163  0 0137 1           TC     DOTRET
```

```
P0796   DOUBLE PRECISION POLYNOMIAL EVALUATOR

R0797                                          N       N-1
R0798           THIS ROUTINE EVALUATES A X  + A   X    + ... + A X + A  LEAVING THE DP RESULT IN MPAC ON EXIT.
R0800                                   N      N-1              1     0

R0801   THE ROUTINE HAS TWO ENTRIES

R0802           1. ENTRY THRU POWRSERS. THE COEFFICIENTS MAY BE EITHER IN FIXED OR ERASABLE. THE CALL IS BY
R0804              TC POWRSERS. AND THE RETURN IS TO LOC(TC POWRSERS)+1. THE ENTERING DATA MUST BE AS FOLLOWS

A0806                                   A       SP      LOC-3           ADDRESS FOR REFERENCING COEF TABLE
A0807                                   L       SP      N-1             N IS THE DEGREE OF THE POWER SERIES
A0808                                   MPAC    DP      X               ARGUMENT

A0809                                   LOC-2N  DP      A(0)
A0810                                           ...
A0811                                   LOC     DP      A(N)

R0812           2. ENTRY THRU POLY. THE CALL TO POLY AND THE ENTERING DATA MUST BE AS FOLLOWS

A0814                                   MPAC    DP      X               ARGUMENT

A0815                                   LOC     TC      POLY
A0816                                   LOC+1   SP      N-1
A0817                                   LOC+2   DP      A(0)
A0818                                           ...
A0819                                   LOC+2N+2 DP     A(N)            RETURN IS TO LOC+2N+4

 0820                           7164  0 0006 1  POWRSERS EXTEND
 0821   REF   1                7165  22 141 0           QXCH    POLYRET         RETURN ADDRESS
 0822   REF  16  LAST 1129     7166  54 117 1           TS      POLISH          POWER SERIES ADDRESS
 0823   REF   1                7167  22 140 1           LXCH    POLYCNT         N-1 TO COUNTER
 0824   REF   1                7170  1 7201 1           TCF     POLYCOM         SKIP SET UP BY POLY

 0825   REF 249  LAST 1137     7171  50 002 0  POLY     INDEX   Q
 0826                          7172  3 0000 1           CAF     0
 0827   REF   2  LAST 1139     7173  54 140 0           TS      POLYCNT         N-1 TO COUNTER
 0828                          7174  6 0000 1           DOUBLE
 0829   REF 250  LAST 1139     7175  6 0002 0           AD      Q
 0830   REF  17  LAST 1139     7176  54 117 1           TS      POLISH          L(A(N))-3 TO POLISH
 0831   REF  25  LAST 1133     7177  6 5022 1           AD      FIVE
 0832   REF   2  LAST 1139     7200  54 141 1           TS      POLYRET         STORE RETURN ADDRESS

 0833   REF   1                7201  3 6242 0  POLYCOM  CAF     LVBUF           INCOMING X WILL BE MOVED TO VBUF, SO
 0834   REF  54  LAST 1138     7202  54 116 0           TS      ADDRWD          SET ADDRWD SO DMPSUB WILL MPY BY VBUF.

 0835                          7203  0 0006 1           EXTEND
 0836   REF  18  LAST 1139     7204  5 0117 0           INDEX   POLISH
 0837                          7205  3 0004 0           DCA     3
```

```
0838   REF 350  LAST 1138     7206  52 155 1            DXCH   MPAC      LOAD A(N) INTO MPAC,
0839   REF  23  LAST 1115     7207  52 123 0            DXCH   VBUF      SAVING X IN VBUF
0840   REF   1                7210  1 7214 0            TCF    POLY2

0841   REF   3  LAST 1139     7211  54 140 0  POLYLOOP  TS     POLYCNT   SAVE DECREMENTED LOOP COUNTER
0842   REF  55  LAST 1138     7212  4 5016 1            CS     TWO
0843   REF  19  LAST 1139     7213  26 117 1            ADS    POLISH    REGRESS COEFFICIENT POINTER

0844   REF   4  LAST 1138     7214  0 7056 0  POLY2     TC     DMPSUB    MULTIPLY BY X
0845                          7215  0 0006 1            EXTEND
0846   REF  20  LAST 1140     7216  5 0117 0            INDEX  POLISH
0847                          7217  3 0002 0            DCA    1          ADD IN NEXT COEFFICIENT
0848   REF 351  LAST 1140     7220  20 155 1            DAS    MPAC      USERS RESPONSIBILITY TO ASSURE NO OVFLOW

0849   REF   4  LAST 1140     7221  10 140 0            CCS    POLYCNT
0850   REF   1                7222  1 7211 0            TCF    POLYLOOP
0851   REF   3  LAST 1139     7223  0 0141 0            TC     POLYRET   RETURN CALLER
```

P0852 MISCELLANEOUS MULTI-PRECISION ROUTINES REQUIRED IN FIXED-FIXED BUT NOT USED BY THE INTERPRETER.

```
085398 REF 222  LAST 1137      7224  3 5021 1  DPAGREE  CAF    ZERO       DOUBLE PRECISION ENTRY -
085399 REF 352  LAST 1140      7225  54 156 1           TS     MPAC +2    ZERO LOW-ORDER WORD

0854   REF 251  LAST 1139      7226  22 002 0  TPAGREE  LXCH   Q          FORCE SIGN AGREEMENT AMONG THE TRIPLE
0855   REF   1                7227  0 6672 1           TC     BRANCH     PRECISION CONTENTS OF MPAC.  RETURNING
0856   REF   1                7230  1 7234 1           TCF    ARG+       WITH SIGNUM OF THE INPUT IN A.
0857   REF   1                7231  1 7254 1           TCF    ARGZERO

0858   REF  28  LAST 1072     7232  4 4777 0           CS     POSMAX     IF NEGATIVE.
0859                          7233  1 7235 0           TCF    +2

0860   REF  29  LAST 1141     7234  3 4777 1  ARG+     CAF    POSMAX
0861   REF 252  LAST 1141     7235  54 002 1           TS     Q
0862                          7236  0 0006 1           EXTEND
0863   REF 291  LAST 1133     7237  24 000 1           AUG    A          FORMS +-1.0.
0864   REF 353  LAST 1141     7240  6 0156 0           AD     MPAC +2
0865   REF 354  LAST 1141     7241  54 156 1           TS     MPAC +2
0866   REF 223  LAST 1141     7242  3 5021 1           CAF    ZERO
0867   REF 253  LAST 1141     7243  6 0002 0           AD     Q
0868   REF 355  LAST 1141     7244  6 0155 0           AD     MPAC +1
0869   REF 356  LAST 1141     7245  54 155 1           TS     MPAC +1
0870   REF 224  LAST 1141     7246  3 5021 1           CAF    ZERO
0871   REF 254  LAST 1141     7247  6 0002 0           AD     Q          Q STILL HAS POSMAX OR NEGMAX IN IT.
0872   REF 357  LAST 1141     7250  6 0154 1           AD     MPAC
0873   REF 358  LAST 1141     7251  54 154 0  ARGZERO2 TS     MPAC       ALWAYS SKIPPING UNLESS ARGZERO.
0874   REF 359  LAST 1141     7252  54 155 1           TS     MPAC +1
0875   REF 136  LAST 1137     7253  0 0001 0           TC     L          RETURN VIA L.

0876   REF 360  LAST 1141     7254  54 156 1  ARGZERO  TS     MPAC +2    SET ALL THREE MPAC REGISTERS TO ZERO.
0877   REF   1                7255  1 7251 1           TCF    ARGZERO2
```

R0878 SHORTMP MULTIPLIES THE TP CONTENTS OF MPAC BY THE SINGLE PRECISION NUMBER ARRIVING IN A.

```
0880   REF  12  LAST 1136     7256  54 135 1  SHORTMP  TS     MPTEMP
0881                          7257  0 0006 1           EXTEND
0882   REF 361  LAST 1141     7260  7 0156 1           MP     MPAC +2
0883   REF 362  LAST 1141     7261  54 156 1           TS     MPAC +2
0884   REF 225  LAST 1141     7262  3 5021 1  SHORTMP2 CAF    ZERO       SO SUBSEQUENT DAS WILL WORK.
0885   REF 363  LAST 1141     7263  56 155 0           XCH    MPAC +1
0886   REF   1                7264  1 7075 0           TCF    DMPSUB2
```

```
P0887          DMPNSUB MULTIPLIES THE DP FRACTION ARRIVING IN MPAC BY THE SP
R0888    INTEGER ARRIVING IN A.  THE DP PRODUCT DEPARTS BOTH IN MPAC AND IN
R0889    A AND L.  NOTE THAT DMPNSUB NORMALLY INCREASES THE MAGNITUDE OF THE
R0890    CONTENTS OF MPAC.  THE CUSTOMER MUST INSURE THAT B(A) X B(MPAC,MPAC+1)
R0891    AND B(A) X B(MPAC) ARE LESS THAN 1 IN MAGNITUDE. WHERE B. AS IS OBVIOUS.
R0892    INDICATES THE ARRIVING CONTENTS.

 0893    REF   1                 7265  54 135 1  DMPNSUB  TS      DMPNTEMP
 0894                            7266  0 0006 1            EXTEND
 0895    REF 364  LAST 1141      7267  7 0155 1            MP      MPAC +1
 0896    REF 365  LAST 1142      7270  52 155 1            DXCH    MPAC          LOW PRODUCT TO MPAC. HIGH FACTOR TO A
 0897                            7271  0 0006 1            EXTEND
 0898    REF   2  LAST 1142      7272  7 0135 1            MP      DMPNTEMP
 0899    REF 137  LAST 1141      7273  3 0001 0            CA      L
 0900    REF 366  LAST 1142      7274  26 154 0            ADS     MPAC          COMPLETING THE PRODUCT IN MPAC
 0901                            7275  0 0006 1            EXTEND
 0902    REF 367  LAST 1142      7276  3 0155 0            DCA     MPAC          BRINGING THE PRODUCT INTO A AND L
 0903    REF 255  LAST 1141      7277  0 0002 0            TC      Q
```

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P0904 MISCELLANEOUS VECTOR OPERATIONS. INCLUDED HERE ARE THE FOLLOWING:

R0905	1.	DOT	DP VECTOR DOT PRODUCT.
R0906	2.	VXV	DP VECTOR CROSS PRODUCT.
R0907	3.	VXSC	DP VECTOR TIMES SCALAR.
R0908	4.	V/SC	DP VECTOR DIVIDED BY SCALAR.
R0909	5.	VPROJ	DP VECTOR PROJECTION. ((MPAC.X)MPAC).
R0910	6.	VXM	DP VECTOR POST-MULTIPLIED BY MATRIX.
R0911	7.	MXV	DP VECTOR PRE-MULTIPLIED BY MATRIX.

```
0912  REF   1                  7300  0 7123 0  DOT     TC    PREDOT     DO THE DOT PRODUCT AND EXIT, CHANGING
0913  REF 226  LAST 1141       7301  3 5021 1  DMODE   CAF   ZERO       THE MODE TO DP SCALAR.
0914  REF   3  LAST 1124       7302  1 6027 0           TCF   NEWMODE

0915  REF  56  LAST 1140       7303  3 5016 0  MXV     CAF   TWO        SET UP MATINC AND DOTINC FOR ROW
0916  REF   5  LAST   70       7304  54 140 0           TS    MATINC     VECTORS.
0917  REF   1                  7305  1 7311 1           TCF   VXM/MXV    GO TO COMMON PORTION.

0918  REF   9  LAST 1069       7306  4 4377 1  VXM     CS    TEN        SET MATINC AND DOTINC TO REFER TO MATRIX
0919  REF   6  LAST 1143       7307  54 140 0           TS    MATINC     AS THREE COLUMN VECTORS.
0920  REF  34  LAST 1057       7310  3 6211 0           CAF   SIX
```

```
P0921           COMMON PORTION OF MXV AND VXM.

 0922  REF   7  LAST 1138     7311  54 136 1  VXM/MXV  TS      DOTINC
R0923           ITRACE (2) REFERS TO "VXM/MXV".
 0924  REF   1                7312  0 7501 1           TC      MPACVBUF      SAVE VECTOR IN MPAC FOR FURTHER USE.

 0925  REF   1                7313  0 7125 0           TC      DOTSUB        GO DOT TO GET X COMPONENT OF ANSWER.
 0926                         7314  0 0006 1           EXTEND
 0927  REF  24  LAST 1140     7315  3 0123 1           DCA     VBUF          MOVE MPAC VECTOR BACK INTO MPAC, SAVING
 0928  REF 368  LAST 1142     7316  52 155 1           DXCH    MPAC          NEW X COMPONENT IN BUF2.
 0929  REF  11  LAST 1104     7317  52 134 0           DXCH    BUF2
 0930                         7320  0 0006 1           EXTEND
 0931  REF  25  LAST 1144     7321  3 0125 1           DCA     VBUF +2
 0932  REF 369  LAST 1144     7322  52 160 1           DXCH    MPAC +3
 0933                         7323  0 0006 1           EXTEND
 0934  REF  26  LAST 1144     7324  3 0127 0           DCA     VBUF +4
 0935  REF 370  LAST 1144     7325  52 162 0           DXCH    MPAC +5
 0936  REF   7  LAST 1143     7326  3 0140 1           CA      MATINC        INITIALIZE ADDRWD FOR NEXT DOT PRODUCT.
 0937  REF  55  LAST 1139     7327  26 116 0           ADS     ADDRWD        FORMS BASE ADDRESS OF NEXT COLUMN(ROW).

 0938  REF   2  LAST 1144     7330  0 7125 0           TC      DOTSUB
 0939  REF  27  LAST 1144     7331  52 123 0           DXCH    VBUF          MOVE GIVEN VECTOR BACK TO MPAC, SAVING Y
 0940  REF 371  LAST 1144     7332  52 155 1           DXCH    MPAC          COMPONENT OF ANSWER IN VBUF +2.
 0941  REF  28  LAST 1144     7333  52 125 0           DXCH    VBUF +2
 0942  REF 372  LAST 1144     7334  52 160 1           DXCH    MPAC +3
 0943  REF  29  LAST 1144     7335  52 127 1           DXCH    VBUF +4
 0944  REF 373  LAST 1144     7336  52 162 0           DXCH    MPAC +5
 0945  REF   8  LAST 1144     7337  3 0140 1           CA      MATINC        FORM ADDRESS OF LAST COLUMN OR ROW.
 0946  REF  56  LAST 1144     7340  26 116 0           ADS     ADDRWD

 0947  REF   3  LAST 1144     7341  0 7125 0           TC      DOTSUB
 0948  REF  12  LAST 1144     7342  52 134 0           DXCH    BUF2          ANSWER NOW COMPLETE. PUT COMPONENTS INTO
 0949  REF 374  LAST 1144     7343  52 155 1           DXCH    MPAC          PROPER MPAC REGISTERS.
 0950  REF 375  LAST 1144     7344  52 162 0           DXCH    MPAC +5
 0951  REF  30  LAST 1144     7345  52 125 0           DXCH    VBUF +2
 0952  REF 376  LAST 1144     7346  52 160 1           DXCH    MPAC +3
 0953  REF  20  LAST 1135     7347  1 6030 0           TCF     DANZIG        EXIT.
```

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P0954 VXSC - VECTOR TIMES SCALAR.

```
0955   REF  16  LAST 1137     7350  10 163 1  VXSC     CCS    MODE      TEST PRESENT MODE.
0956   REF   1                7351  1 7377 1           TCF    DVXSC     SEPARATE ROUTINE WHEN SCALAR IS IN MPAC.
0957   REF   2  LAST 1145     7352  1 7377 1           TCF    DVXSC

0958   REF   5  LAST 1140     7353  0 7056 0  VVXSC    TC     DMPSUB    COMPUTE X COMPONENT
0959   REF   1                7354  0 7107 0           TC     VROUND    AND ROUND IT.
0960   REF 377  LAST 1144     7355  52 160 1           DXCH   MPAC +3   PUT Y COMPONENT INTO MPAC SAVING MPAC IN
0961   REF 378  LAST 1145     7356  52 155 1           DXCH   MPAC      MPAC +3.
0962   REF 379  LAST 1145     7357  52 160 1           DXCH   MPAC +3

0963   REF   6  LAST 1145     7360  0 7056 0           TC     DMPSUB    DO SAME FOR Y AND Z COMPONENTS.
0964   REF   2  LAST 1145     7361  0 7107 0           TC     VROUND
0965   REF 380  LAST 1145     7362  52 162 0           DXCH   MPAC +5
0966   REF 381  LAST 1145     7363  52 155 1           DXCH   MPAC
0967   REF 382  LAST 1145     7364  52 162 0           DXCH   MPAC +5

0968   REF   7  LAST 1145     7365  0 7056 0           TC     DMPSUB
0969   REF   3  LAST 1145     7366  0 7107 0           TC     VROUND
0970   REF 383  LAST 1145     7367  52 155 1  VROTATEX DXCH   MPAC      EXIT USED TO RESTORE MPAC AFTER THIS
0971   REF 384  LAST 1145     7370  52 162 0           DXCH   MPAC +5    TYPE OF ROTATION. CALLED BY VECTOR SHIFT
0972   REF 385  LAST 1145     7371  52 160 1           DXCH   MPAC +3    RIGHT, V/SC, ETC.
0973   REF 386  LAST 1145     7372  52 155 1           DXCH   MPAC

0974   REF  21  LAST 1144     7373  1 6030 0           TCF    DANZIG
```

P0975 DP VECTOR PROJECTION ROUTINE.

0976	REF 2	LAST 1143	7374	0 7123 0	VPROJ	TC	PREDOT		(MPAC.X)MPAC IS COMPUTED AND LEFT IN
0977	REF 15	LAST 1059	7375	4 5015 1		CS	FOUR		MPAC. DO DOT AND FALL INTO DVXSC.
0978	REF 57	LAST 1144	7376	26 116 0		ADS	ADDRWD		
R0979			VXSC WHEN SCALAR ARRIVES IN MPAC AND VECTOR IS AT X.						
0980			7377	0 0006 1	DVXSC	EXTEND			SAVE SCALAR IN MPAC +3 AND GET X
0981	REF 387	LAST 1145	7400	3 0155 0		DCA	MPAC		COMPONENT OF ANSWER.
0982	REF 388	LAST 1146	7401	52 160 1		DXCH	MPAC +3		
0983	REF 8	LAST 1145	7402	0 7056 0		TC	DMPSUB		
0984	REF 4	LAST 1145	7403	0 7107 0		TC	VROUND		
0985	REF 57	LAST 1143	7404	3 5016 0		CAF	TWO		ADVANCE ADDRWD TO Y COMPONENT OF X.
0986	REF 58	LAST 1146	7405	26 116 0		ADS	ADDRWD		
0987			7406	0 0006 1		EXTEND			
0988	REF 389	LAST 1146	7407	3 0160 0		DCA	MPAC +3		PUT SCALAR BACK INTO MPAC AND SAVE
0989	REF 390	LAST 1146	7410	52 155 1		DXCH	MPAC		X RESULT IN MPAC +5.
0990	REF 391	LAST 1146	7411	52 162 0		DXCH	MPAC +5		
0991	REF 9	LAST 1146	7412	0 7056 0		TC	DMPSUB		
0992	REF 5	LAST 1146	7413	0 7107 0		TC	VROUND		
0993	REF 58	LAST 1146	7414	3 5016 0		CAF	TWO		
0994	REF 59	LAST 1146	7415	26 116 0		ADS	ADDRWD		TO Z COMPONENT.
0995	REF 392	LAST 1146	7416	52 160 1		DXCH	MPAC +3		BRING SCALAR BACK, PUTTING Y RESULT IN
0996	REF 393	LAST 1146	7417	52 155 1		DXCH	MPAC		THE PROPER PLACE.
0997	REF 394	LAST 1146	7420	52 160 1		DXCH	MPAC +3		
0998	REF 10	LAST 1146	7421	0 7056 0		TC	DMPSUB		
0999	REF 6	LAST 1146	7422	0 7107 0		TC	VROUND		
1000	REF 395	LAST 1146	7423	52 155 1		DXCH	MPAC		PUT Z COMPONENT IN PROPER PLACE, ALSO
1001	REF 396	LAST 1146	7424	52 162 0		DXCH	MPAC +5		POSITIONING X.
1002	REF 397	LAST 1146	7425	52 155 1		DXCH	MPAC		
1003	REF 1		7426	1 6470 0		TCF	VMODE		MODE HAS CHANGED TO VECTOR.

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P1004 THE VECTOR CROSS PRODUCT ROUTINE CALCULATES (X M -X M ,X M -X M ,X M -X M) WHERE M IS THE VECTOR IN
R1006 3 2 2 3 1 3 3 1 2 1 1 2
R1008 MPAC AND X THE VECTOR AT THE GIVEN ADDRESS.

```
1009                                7427  0 0006 1  VXV     EXTEND
1010  REF 398  LAST 1146           7430  3 0162 1          DCA     MPAC +5         FORM UP M3X1, LEAVING M1 IN VBUF.
1011  REF 399  LAST 1147           7431  52 155 1          DXCH    MPAC
1012  REF  31  LAST 1144           7432  52 123 0          DXCH    VBUF
1013  REF  11  LAST 1146           7433  0 7056 0          TC      DMPSUB          BY X1.

1014                                7434  0 0006 1          EXTEND
1015  REF 400  LAST 1147           7435  4 0160 1          DCS     MPAC +3         CALCULATE -X1M2, SAVING X1M3 IN VBUF +2.
1016  REF 401  LAST 1147           7436  52 155 1          DXCH    MPAC
1017  REF  32  LAST 1147           7437  52 125 0          DXCH    VBUF +2
1018  REF  12  LAST 1147           7440  0 7056 0          TC      DMPSUB

1019  REF  59  LAST 1146           7441  3 5016 0          CAF     TWO             ADVANCE ADDRWD TO X2.
1020  REF  60  LAST 1146           7442  26 116 0          ADS     ADDRWD
1021                                7443  0 0006 1          EXTEND
1022  REF 402  LAST 1147           7444  4 0162 0          DCS     MPAC +5         PREPARE TO GET -X2M3. SAVING -X1M2 IN
1023  REF 403  LAST 1147           7445  52 155 1          DXCH    MPAC            MPAC +5.
1024  REF 404  LAST 1147           7446  52 162 0          DXCH    MPAC +5
1025  REF  13  LAST 1147           7447  0 7056 0          TC      DMPSUB

1026                                7450  0 0006 1          EXTEND
1027  REF  33  LAST 1147           7451  3 0123 1          DCA     VBUF            GET X2M1, SAVING -X2M3 IN VBUF +4.
1028  REF 405  LAST 1147           7452  52 155 1          DXCH    MPAC
1029  REF  34  LAST 1147           7453  52 127 1          DXCH    VBUF +4
1030  REF  14  LAST 1147           7454  0 7056 0          TC      DMPSUB

1031  REF  60  LAST 1147           7455  3 5016 0          CAF     TWO             ADVANCE ADDRWD TO X3.
1032  REF  61  LAST 1147           7456  26 116 0          ADS     ADDRWD
1033                                7457  0 0006 1          EXTEND
1034  REF  35  LAST 1147           7460  4 0123 0          DCS     VBUF            GET -X3M1, ADDING X2M1 TO MPAC +5 TO
1035  REF 406  LAST 1147           7461  52 155 1          DXCH    MPAC            COMPLETE THE Z COMPONENT OF THE ANSWER.
1036  REF 407  LAST 1147           7462  20 162 0          DAS     MPAC +5

1037                                7463  0 0006 1          EXTEND
1038                                7464  1 7466 0          BZF     +2
1039  REF   3  LAST 1133           7465  0 6760 0          TC      OVERFLWZ

1040  REF  15  LAST 1147           7466  0 7056 0          TC      DMPSUB
1041  REF  36  LAST 1147           7467  52 125 0          DXCH    VBUF +2         MOVE X1M3 TO MPAC +3 SETTING UP FOR X3M2
1042  REF 408  LAST 1147           7470  52 160 1          DXCH    MPAC +3         AND ADD -X3M1 TO MPAC +3 TO COMPLETE THE
1043  REF 409  LAST 1147           7471  52 155 1          DXCH    MPAC            Y COMPONENT OF THE RESULT.
1044  REF 410  LAST 1147           7472  20 160 1          DAS     MPAC +3

1045                                7473  0 0006 1          EXTEND
1046                                7474  1 7476 1          BZF     +2
```

```
1047   REF   3  LAST 1133     7475  0 6763 0          TC     OVERFLWY

1048   REF  16  LAST 1147     7476  0 7056 0          TC     DMPSUB
1049   REF  37  LAST 1147     7477  52 127 1          DXCH   VBUF +4          GO ADD -X2M3 TO X3M2 TO COMPLETE THE X
1050   REF   4  LAST 1134     7500  1 6747 1          TCF    ENDVXV           COMPONENT (TAIL END OF DAD).

R1051          THE MPACVBUF SUBROUTINE SAVES THE VECTOR IN MPAC IN VBUF WITHOUT CLOBBERING MPAC.

1053                           7501  0 0006 1  MPACVBUF EXTEND                CALLED BY MXV, VXM, AND UNIT.
1054   REF 411  LAST 1147     7502  3 0155 0          DCA    MPAC
1055   REF  38  LAST 1148     7503  52 123 0          DXCH   VBUF
1056                           7504  0 0006 1          EXTEND
1057   REF 412  LAST 1148     7505  3 0160 0          DCA    MPAC +3
1058   REF  39  LAST 1148     7506  52 125 0          DXCH   VBUF +2
1059                           7507  0 0006 1          EXTEND
1060   REF 413  LAST 1148     7510  3 0162 1          DCA    MPAC +5
1061   REF  40  LAST 1148     7511  52 127 1          DXCH   VBUF +4
1062   REF 256  LAST 1142     7512  0 0002 0          TC     Q                RETURN TO CALLER.

R1063          DOUBLE PRECISION SIGN AGREE ROUTINE. ARRIVE WITH INPUT IN A+L. OUTPUT IS IN A + L.

1065   REF 292  LAST 1141     7513  10 000 0  ALSIGNAG CCS    A                TEST UPPER PART.
1066   REF   1                7514  1 7520 0          TCF    UPPOS            IT IS POSITIVE
1067   REF 257  LAST 1148     7515  0 0002 0          TC     Q                ZERO
1068   REF   1                7516  1 7530 1          TCF    UPNEG            NEGATIVE
1069   REF 258  LAST 1148     7517  0 0002 0          TC     Q                ZERO

1070   REF 138  LAST 1142     7520  56 001 0  UPPOS    XCH    L                SAVE DECREMENTED UPPER PART.
1071   REF   9  LAST 1092     7521  6 5002 0          AD     HALF
1072   REF  10  LAST 1148     7522  6 5002 0          AD     HALF
1073   REF 293  LAST 1148     7523  54 000 0          TS     A                SKIPS ON OVERFLOW
1074                           7524  1 7526 0          TCF    +2
1075   REF 139  LAST 1148     7525  24 001 0          INCR   L                RESTORE UPPER TO ROIGINAL VALUE
1076   REF 140  LAST 1148     7526  56 001 0          XCH    L                SWAP A + L BACK.
1077   REF 259  LAST 1148     7527  0 0002 0          TC     Q

1078   REF 141  LAST 1148     7530  56 001 0  UPNEG    XCH    L                SAVE COMPLEMENTED + DECREMENTED UPPER PT
1079   REF  11  LAST 1062     7531  6 5001 0          AD     NEGMAX
1080   REF  22  LAST 1119     7532  6 7716 0          AD     NEGONE
1081   REF 294  LAST 1148     7533  54 000 0          TS     A
1082                           7534  1 7536 1          TCF    +2               DONT INCREMENT IF NO OVERFLOW.
1083   REF 142  LAST 1148     7535  24 001 0          INCR   L
1084   REF 143  LAST 1148     7536  56 001 0          XCH    L
1085                           7537  4 0000 0          COM                     MAKE NEGATIVE AGAIN.
1086   REF 260  LAST 1148     7540  0 0002 0          TC     Q
```

P1087 INTERPRETIVE INSTRUCTIONS WHOSE EXECUTION CONSISTS OF PRINCIPALLY CALLING SUBROUTINES.

```
1089   REF  17  LAST 1148    7541  0 7056 0  DMP1    TC      DMPSUB          DMP INSTRUCTION.
1090   REF  22  LAST 1145    7542  1 6030 0           TCF     DANZIG

1091   REF  18  LAST 1149    7543  0 7056 0  DMPR    TC      DMPSUB
1092   REF   1               7544  0 7106 1           TC      ROUNDSUB +1     (C(A) = +0).
1093   REF  23  LAST 1149    7545  1 6030 0           TCF     DANZIG

1094                         7546  0 0006 1  DDV     EXTEND
1095   REF  62  LAST 1147    7547  5 0116 1           INDEX   ADDRWD          MOVE DIVIDEND INTO BUF.
1096                         7550  3 0001 0           DCA     0
1097   REF   2  LAST 1116    7551  1 7556 1           TCF     BDDV +4

1098                         7552  0 0006 1  BDDV    EXTEND                  MOVE DIVISOR INTO MPAC SAVING MPAC. THE
1099   REF  63  LAST 1149    7553  5 0116 1           INDEX   ADDRWD          DIVIDEND. IN BUF.
1100                         7554  3 0001 0           DCA     0
1101   REF 414  LAST 1148    7555  52 155 1           DXCH    MPAC
1102   REF  53  LAST 1138    7556  52 131 0    +4     DXCH    BUF
1103   REF 227  LAST 1143    7557  3 5021 1           CAF     ZERO            DIVIDE ROUTINES IN BANK 0.
1104   REF  22  LAST 1129    7560  54 004 1           TS      FBANK
1105   REF   1               7561  1 2353 1           TCF     DDV/BDDV

1106   REF  64  LAST 1149    7562  3 0116 1  SETPD   CA      ADDRWD          MUST SET TO WORK AREA, OR EBANK TROUBLE.
1107   REF  12  LAST 1126    7563  54 166 1           TS      PUSHLOC
1108   REF   1               7564  1 6032 1           TCF     NOIBNKSW        NO FBANK SWITCH REQUIRED.

1109   REF 228  LAST 1149    7565  3 5021 1  TSLC    CAF     ZERO            SHIFTING ROUTINES LOCATED IN BANK 00.
1110   REF  23  LAST 1149    7566  54 004 1           TS      FBANK
1111   REF   1               7567  1 2172 0           TCF     TSLC2

1112   REF   7  LAST 1108    7570  3 6043 0  GSHIFT  CAF     LOW7            USED AS MASK AT GENSHIFT. THIS PROCESSES
1113   REF  24  LAST 1149    7571  54 004 1           TS      FBANK           ANY SHIFT INSTRUCTION (EXCEPT TSLC) WITH
1114   REF   1               7572  1 2214 0           TCF     GENSHIFT        AN ADDRESS (ROUTINES IN BANK 0).
```

P1115 THE FOLLOWING IS THE PROLOGUE TO V/SC. IF THE PRESENT MODE IS VECTOR, IT SAVES THE SCALAR AT X IN BUF
R1117 AND CALLS THE V/SC ROUTINE IN BANK 0. IF THE PRESENT MODE IS SCALAR, IT MOVES THE VECTOR AT X INTO MPAC, SAVING
R1119 THE SCALAR IN MPAC IN BUF BEFORE CALLING THE V/SC ROUTINE IN BANK 0.

```
1120  REF  17  LAST 1145    7573  10 163 1  V/SC    CCS     MODE
1121  REF   1               7574  1 7605 1           TCF     DV/SC          MOVE VECTOR INTO MPAC.
1122  REF   2  LAST 1150    7575  1 7605 1           TCF     DV/SC

1123                         7576  0 0006 1  VV/SC   EXTEND
1124  REF  65  LAST 1149    7577  5 0116 1           INDEX   ADDRWD
1125                         7600  3 0001 0           DCA     0
1126  REF  54  LAST 1149    7601  52 131 0  V/SC1   DXCH    BUF            IN BOTH CASES, VECTOR IS NOW IN MPAC AND
1127  REF 229  LAST 1149    7602  3 5021 1           CAF     ZERO           SCALAR IN BUF.
1128  REF  25  LAST 1149    7603  54 004 1           TS      FBANK
1129  REF   1               7604  1 2654 0           TCF     V/SC2

1130                         7605  0 0006 1  DV/SC   EXTEND
1131  REF  66  LAST 1150    7606  5 0116 1           INDEX   ADDRWD
1132                         7607  3 0003 1           DCA     2
1133  REF 415  LAST 1149    7610  52 160 1           DXCH    MPAC +3
1134                         7611  0 0006 1           EXTEND
1135  REF  67  LAST 1150    7612  5 0116 1           INDEX   ADDRWD
1136                         7613  3 0005 1           DCA     4
1137  REF 416  LAST 1150    7614  52 162 0           DXCH    MPAC +5

1138  REF 137  LAST 1124    7615  4 5017 0           CS      ONE            CHANGE MODE TO VECTOR.
1139  REF  18  LAST 1150    7616  54 163 1           TS      MODE

1140                         7617  0 0006 1           EXTEND
1141  REF  68  LAST 1150    7620  5 0116 1           INDEX   ADDRWD
1142                         7621  3 0001 0           DCA     0
1143  REF 417  LAST 1150    7622  52 155 1           DXCH    MPAC
1144  REF   1               7623  1 7601 0           TCF     V/SC1          FINISH PROLOGUE AT COMMON SECTION.
```

P1145 SIGN AND COMPLEMENT INSTRUCTIONS.

```
1146   REF  69  LAST 1150    7624  50 116 1  SIGN    INDEX  ADDRWD    CALL COMP INSTRUCTION IF WORD AT X IS
1147                         7625  10 000 0           CCS    0         NEGATIVE NON-ZERO.
1148   REF  24  LAST 1149    7626  1 6030 0           TCF    DANZIG
1149                         7627  1 7631 0           TCF    +2
1150   REF   2  LAST 1118    7630  1 7637 0           TCF    COMP      DO THE COMPLEMENT.

1151   REF  70  LAST 1151    7631  50 116 1           INDEX  ADDRWD
1152                         7632  10 001 1  CCSL     CCS    1
1153   REF  25  LAST 1151    7633  1 6030 0           TCF    DANZIG
1154   REF  26  LAST 1151    7634  1 6030 0           TCF    DANZIG
1155   REF   3  LAST 1151    7635  1 7637 0           TCF    COMP
1156   REF  27  LAST 1151    7636  1 6030 0           TCF    DANZIG
1157                         7637  0 0006 1  COMP     EXTEND            COMPLEMENT DP MPAC IN EVERY CASE.
1158   REF 418  LAST 1150    7640  4 0155 1           DCS    MPAC
1159   REF 419  LAST 1151    7641  52 155 1           DXCH   MPAC

1160   REF  19  LAST 1150    7642  10 163 1           CCS    MODE      EITHER COMPLEMENT MPAC +3 OR THE REST OF
1161   REF   1               7643  1 7654 0           TCF    DCOMP     THE VECTOR ACCUMULATOR.
1162   REF   2  LAST 1151    7644  1 7654 0           TCF    DCOMP

1163                         7645  0 0006 1           EXTEND            VECTOR COMPLEMENT.
1164   REF 420  LAST 1151    7646  4 0160 1           DCS    MPAC +3
1165   REF 421  LAST 1151    7647  52 160 1           DXCH   MPAC +3
1166                         7650  0 0006 1           EXTEND
1167   REF 422  LAST 1151    7651  4 0162 0           DCS    MPAC +5
1168   REF 423  LAST 1151    7652  52 162 0           DXCH   MPAC +5
1169   REF  28  LAST 1151    7653  1 6030 0           TCF    DANZIG

1170   REF 424  LAST 1151    7654  4 0156 1  DCOMP    CS     MPAC +2
1171   REF 425  LAST 1151    7655  54 156 1           TS     MPAC +2
1172   REF  29  LAST 1151    7656  1 6030 0           TCF    DANZIG
```

P1173 THE FOLLOWING SHORT SHIFT CODES REQUIRE NO ADDRESS WORD:

R1174 1. SR1 TO SR4 SCALAR SHIFT RIGHT.
R1175 2. SR1R TO SR4R SCALAR SHIFT RIGHT AND ROUND.
R1176 3. SL1 TO SL4 SCALAR SHIFT LEFT.
R1177 4. SL1R TO SL4R SCALAR SHIFT LEFT AND ROUND.

R1178 5. VSR1 TO VSR8 VECTOR SHIFT RIGHT (ALWAYS ROUNDS).
R1179 6. VSL1 TO VSL8 VECTOR SHIFT LEFT (NEVER ROUNDS).

R1180 THE FOLLOWING CODES REQUIRE AN ADDRESS WHICH MAY BE INDEXED:*

R1181 1. SR SCALAR SHIFT RIGHT.
R1182 2. SRR SCALAR SHIFT RIGHT AND ROUND.
R1183 3. SL SCALAR SHIFT LEFT.
R1184 4. SLR SCALAR SHIFT LEFT AND ROUND.

R1185 5. VSR VECTOR SHIFT RIGHT.
R1186 6. VSL VECTOR SHIFT LEFT.

R1187 * IF THE ADDRESS IS INDEXED, AND THE INDEX MODIFICATION RESULTS IN A NEGATIVE SHIFT COUNT, A SHIFT OF THE
R1189 ABSOLUTE VALUE OF THE COUNT IS DONE IN THE OPPOSITE DIRECTION.

```
1190                                00,2017                         BANK    00

1191  REF   2 LAST 1118 TO 1119:     15    15*                       COUNT   00/INTER

1192  REF  35  LAST 1143   00,2017  3 6211 0  SHORTT   CAF     SIX     SCALAR SHORT SHIFTS COME HERE. THE SHIFT
1193  REF  29  LAST 1123   00,2020  7 0020 1            MASK    CYR     COUNT-1 IS NOW IN BITS 2-3 OF CYR. THE
1194  REF  20  LAST 1091   00,2021  54 021 0            TS      SR      ROUNDING BIT IS IN BIT1 AT THIS POINT.

1195  REF  30  LAST 1152   00,2022  10 020 1            CCS     CYR     SEE IF RIGHT OR LEFT SHIFT DESIRED.
1196  REF   1              00,2023  1 2101 1            TCF     TSSL    SHIFT LEFT.

1197                       00,2024   00024 1  SRODV     DEC     20      MPTEMP SETTING FOR SR BEFORE ODV.

1198  REF  21  LAST 1152   00,2025  50 021 1  TSSR      INDEX   SR      GET SHIFTING BIT.
1199  REF  61  LAST 1039   00,2026  3 5002 0            CAF     BIT14
1200  REF  13  LAST 1141   00,2027  54 135 1            TS      MPTEMP

1201  REF  31  LAST 1152   00,2030  10 020 1            CCS     CYR     SEE IF A ROUND IS DESIRED.
1202  REF   1              00,2031  0 2050 0  RIGHTR    TC      MPACSRND  YES - SHIFT RIGHT AND ROUND.
1203  REF   4  LAST 1143   00,2032  1 6027 0            TCF     NEWMODE SET MODE TO DP (C(A) = 0).
1204  REF  14  LAST 1152   00,2033  3 0135 0  MPACSHR   CA      MPTEMP  DO A TRIPLE PRECISION SHIFT RIGHT.
1205                       00,2034  0 0006 1            EXTEND
1206  REF 426  LAST 1151   00,2035  7 0156 1            MP      MPAC +2
1207  REF 427  LAST 1152   00,2036  54 156 1  +3        TS      MPAC +2 (EXIT FROM SQRT AND ABVAL).
1208  REF  15  LAST 1152   00,2037  3 0135 0            CA      MPTEMP
1209                       00,2040  0 0006 1            EXTEND
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```
1210   REF 428  LAST 1152   00,2041  7 0154 0            MP      MPAC       SHIFT MAJOR PART INTO A,L AND PLACE IN
1211   REF 429  LAST 1153   00,2042  52 155 1            DXCH    MPAC       MPAC,+1.
1212   REF  16  LAST 1152   00,2043  3 0135 0            CA      MPTEMP
1213                        00,2044  0 0006 1            EXTEND
1214   REF 144  LAST 1148   00,2045  7 0001 1            MP      L          ORIGINAL C(MPAC +1).
1215   REF 430  LAST 1153   00,2046  20 156 1            DAS     MPAC +1    GUARANTEED NO OVERFLOW.
1216   REF  30  LAST 1151   00,2047  1 6030 0            TCF     DANZIG

R1217                MPAC SHIFT RIGHT AND ROUND SUBROUTINES.

1218   REF 431  LAST 1153   00,2050  3 0156 0  MPACSRND   CA      MPAC +2    WE HAVE TO DO ALL THREE MULTIPLIES SINCE
1219                        00,2051  0 0006 1            EXTEND                MPAC +1 AND MPAC +2 MIGHT HAVE SIGN
1220   REF  17  LAST 1153   00,2052  7 0135 1            MP      MPTEMP     DISAGREEMENT WITH A SHIFT RIGHT OF 1.
1221   REF 432  LAST 1153   00,2053  56 155 0            XCH     MPAC +1
1222                        00,2054  0 0006 1            EXTEND
1223   REF  18  LAST 1153   00,2055  7 0135 1            MP      MPTEMP
1224   REF 433  LAST 1153   00,2056  56 155 0            XCH     MPAC +1    TRIAL MINOR PART.
1225   REF 145  LAST 1153   00,2057  6 0001 0            AD      L

1226                        00,2060  6 0000 1  VSHR2      DOUBLE             (FINISH VECTOR COMPONENT SHIFT RIGHT
1227   REF 434  LAST 1153   00,2061  54 156 1            TS      MPAC +2    AND ROUND.
1228                        00,2062  1 2064 0            TCF     +2
1229   REF 435  LAST 1153   00,2063  26 155 1            ADS     MPAC +1    GUARANTEED NO OVERFLOW.

1230   REF 230  LAST 1150   00,2064  3 5021 1            CAF     ZERO
1231   REF 436  LAST 1153   00,2065  54 156 1            TS      MPAC +2
1232   REF 437  LAST 1153   00,2066  56 154 1            XCH     MPAC       SETTING TO ZERO SO FOLLOWING DAS WORKS.
1233                        00,2067  0 0006 1            EXTEND
1234   REF  19  LAST 1153   00,2070  7 0135 1            MP      MPTEMP
1235   REF 438  LAST 1153   00,2071  20 155 1            DAS     MPAC       AGAIN NO OVERFLOW.
1236   REF 261  LAST 1148   00,2072  0 0002 0            TC      Q

1237   REF  20  LAST 1153   00,2073  3 0135 0  VSHRRND    CA      MPTEMP     ENTRY TO SHIFT RIGHT AND ROUND MPAC WHEN
1238                        00,2074  0 0006 1            EXTEND                MPAC CONTAINS A VECTOR COMPONENT.
1239   REF 439  LAST 1153   00,2075  7 0155 1            MP      MPAC +1
1240   REF 440  LAST 1153   00,2076  54 155 1            TS      MPAC +1
1241   REF 146  LAST 1153   00,2077  56 001 0            XCH     L
1242   REF   1              00,2100  1 2060 1            TCF     VSHR2      GO ADD ONE IF NECESSARY AND FINISH.
```

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P1243 ROUTINE FOR SHORT SCALAR SHIFT LEFT (AND MAYBE ROUND).

```
 1244  REF  22  LAST 1152  00,2101  3 0021 1  TSSL    CA      SR          GET SHIFT COUNT FOR SR.
 1245  REF  21  LAST 1153  00,2102  54 135 1   +1     TS      MPTEMP

 1246                      00,2103  0 0006 1   +2     EXTEND              ENTRY HERE FROM SL FOR SCALARS.
 1247  REF 441  LAST 1153  00,2104  3 0156 0          DCA     MPAC +1     SHIFTING LEFT ONE PLACE AT A TIME IS
 1248  REF 442  LAST 1154  00,2105  20 156 1         DAS     MPAC +1     FASTER THAN DOING THE WHOLE SHIFT WITH
 1249  REF 443  LAST 1154  00,2106  6 0154 1         AD      MPAC        MULTIPLIES ASSUMING THAT FREQUENCY OF
 1250  REF 444  LAST 1154  00,2107  6 0154 1         AD      MPAC        SHIFT COUNTS GOES DOWN RAPIDLY AS A
 1251  REF 445  LAST 1154  00,2110  54 154 0         TS      MPAC        FUNCTION OF THEIR MAGNITUDE.
 1252                      00,2111  1 2113 1         TCF     +2
 1253  REF   4  LAST 113B  00,2112  54 121 1         TS      OVFIND      OVERFLOW. (LEAVES OVERFLOW-CORRECTED
A1254                                                                    RESULT ANYWAY).
 1255  REF  22  LAST 1154  00,2113  10 135 1         CCS     MPTEMP      LOOP ON DECREMENTED SHIFT COUNT.
 1256  REF   2  LAST 1152  00,2114  1 2102 1         TCF     TSSL +1

 1257  REF  32  LAST 1152  00,2115  10 020 1         CCS     CYR         SEE IF ROUND WANTED.
 1258  REF   2  LAST 1149  00,2116  0 7105 1  ROUND  TC      ROUNDSUB    YES - ROUND AND EXIT.
 1259  REF  31  LAST 1153  00,2117  1 6030 0         TCF     DANZIG      SL LEAVES A ZERO IN CYR FOR NO ROUND.
 1260  REF  32  LAST 1154  00,2120  1 6030 0         TCF     DANZIG      NO - EXIT IMMEDIATL
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P1261 VECTOR SHIFTING ROUTINES.

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1262  REF   3  LAST  772   00,2121  3 5023 0  SHORTV   CAF    LOW3       SAVE 3 BIT SHIFT COUNT - 1 WITHOUT
1263  REF  33  LAST 1154   00,2122  7 0020 1            MASK   CYR        EDITING CYR.
1264  REF  23  LAST 1154   00,2123  54 135 1            TS     MPTEMP
1265  REF  34  LAST 1155   00,2124  10 020 1            CCS    CYR        SEE IF LEFT OR RIGHT SHIFT.
1266  REF   1             00,2125  1 2145 1            TCF    VSSL       VECTOR SHIFT LEFT.
1267                      00,2126   00176 1  OCT176    OCT    176        USED IN PROCESSED SHIFTS WITH - COUNT.

1268  REF  24  LAST 1155   00,2127  50 135 0  VSSR      INDEX  MPTEMP     (ENTRY FROM SR). PICK UP SHIFTING BIT.
1269  REF  62  LAST 1152   00,2130  3 5002 0            CAF    BIT14      MPTEMP CONTAINS THE SHIFT COUNT - 1.
1270  REF  25  LAST 1155   00,2131  54 135 1            TS     MPTEMP
1271  REF   1             00,2132  0 2073 1            TC     VSHRRND    SHIFT X COMPONENT.

1272  REF 446  LAST 1154   00,2133  52 155 1            DXCH   MPAC       SWAP X AND Y COMPONENTS.
1273  REF 447  LAST 1155   00,2134  52 160 1            DXCH   MPAC +3
1274  REF 448  LAST 1155   00,2135  52 155 1            DXCH   MPAC
1275  REF   2  LAST 1155   00,2136  0 2073 1            TC     VSHRRND    SHIFT Y COMPONENT.

1276  REF 449  LAST 1155   00,2137  52 155 1            DXCH   MPAC       SWAP Y AND Z COMPONENTS.
1277  REF 450  LAST 1155   00,2140  52 162 0            DXCH   MPAC +5
1278  REF 451  LAST 1155   00,2141  52 155 1            DXCH   MPAC
1279  REF   3  LAST 1155   00,2142  0 2073 1            TC     VSHRRND    SHIFT Z COMPONENT.

1280  REF   1             00,2143  1 7367 0            TCF    VROTATEX   RESTORE COMPONENTS TO PROPER PLACES.
```

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P1281 VECTOR SHIFT LEFT - DONE ONE PLACE AT A TIME.

```
 1282   REF  26  LAST 1155   00,2144  54 135 1   -1      TS      MPTEMP          SHIFTING LOOP.

 1283                        00,2145  0 0006 1   VSSL    EXTEND
 1284   REF 452  LAST 1155   00,2146  3 0155 0           DCA     MPAC
 1285   REF 453  LAST 1156   00,2147  20 155 1           DAS     MPAC
 1286                        00,2150  0 0006 1           EXTEND
 1287                        00,2151  1 2153 0           BZF     +2
 1288   REF   3  LAST 1138   00,2152  0 6766 0           TC      OVERFLOW

 1289                        00,2153  0 0006 1           EXTEND
 1290   REF 454  LAST 1156   00,2154  3 0160 0           DCA     MPAC +3
 1291   REF 455  LAST 1156   00,2155  20 160 1           DAS     MPAC +3
 1292                        00,2156  0 0006 1           EXTEND
 1293                        00,2157  1 2161 1           BZF     +2
 1294   REF   4  LAST 1148   00,2160  0 6763 0           TC      OVERFLWY

 1295                        00,2161  0 0006 1           EXTEND
 1296   REF 456  LAST 1156   00,2162  3 0162 1           DCA     MPAC +5
 1297   REF 457  LAST 1156   00,2163  20 162 0           DAS     MPAC +5
 1298                        00,2164  0 0006 1           EXTEND
 1299                        00,2165  1 2167 1           BZF     +2
 1300   REF   4  LAST 1147   00,2166  0 6760 0           TC      OVERFLWZ

 1301   REF  27  LAST 1156   00,2167  10 135 1           CCS     MPTEMP          LOOP ON DECREMENTED SHIFT COUNTER.
 1302   REF   2  LAST 1155   00,2170  1 2144 0           TCF     VSSL -1
 1303   REF  33  LAST 1154   00,2171  1 6030 0           TCF     DANZIG          EXIT.
```

```
P1304           TSLC - TRIPLE SHIFT LEFT AND COUNT. SHIFTS MPAC LEFT UNTIL GREATER THAN .5 IN MAGNITUDE, LEAVING
R1306   THE COMPLEMENT OF THE NUMBER OF SHIFTS REQUIRED IN X.

 1307   REF  28  LAST 1156   00,2172  54 135 1  TSLC2    TS      MPTEMP      START BY ZEROING SHIFT COUNT (IN A NOW).
 1308   REF   2  LAST 1141   00,2173  0 6672 1           TC      BRANCH      EXIT WITH NO SHIFTING IF ARGUMENT ZERO.
 1309                        00,2174  1 2176 1           TCF     +2
 1310   REF   1              00,2175  1 2212 0           TCF     ENDTSLC     STORES ZERO SHIFT COUNT IN THIS CASE.

 1311   REF   8  LAST  727   00,2176  0 7226 0           TC      TPAGREE     MAY CAUSE UPSHIFT OF ONE EXTRA PLACE.

 1312   REF 458  LAST 1156   00,2177  3 0154 1           CA      MPAC        BEGIN NORMALIZATION LOOP.
 1313   REF   1              00,2200  1 2207 1           TCF     TSLCTEST

 1314   REF  29  LAST 1157   00,2201  24 135 0  TSLCLOOP INCR     MPTEMP      INCREMENT SHIFT COUNTER.
 1315                        00,2202  0 0006 1           EXTEND
 1316   REF 459  LAST 1157   00,2203  3 0156 0           DCA     MPAC +1
 1317   REF 460  LAST 1157   00,2204  20 156 1           DAS     MPAC +1
 1318   REF 461  LAST 1157   00,2205  6 0154 1           AD      MPAC
 1319   REF 462  LAST 1157   00,2206  26 154 0           ADS     MPAC
 1320                        00,2207  6 0000 1  TSLCTEST DOUBLE                SEE IF (ANOTHER) SHIFT IS REQUIRED.
 1321                        00,2210  54 000 0           DVSK
 1322   REF   1              00,2211  1 2201 1           TCF     TSLCLOOP    YES - INCREMENT COUNT AND SHIFT AGAIN.

 1323   REF  30  LAST 1157   00,2212  4 0135 1  ENDTSLC  CS      MPTEMP
 1324   REF   1              00,2213  1 6572 0           TCF     STOREI      STORE SHIFT COUNT AND RETURN TO DANZIG.
```

P1325 THE FOLLOWING ROUTINES PROCESSES THE GENERAL SHIFT INSTRUCTIONS SR, SRR, SL, AND SLR.
R1327 THE GIVEN ADDRESS IS DECODED AS FOLLOWS:

R1328 BITS 1-7 SHIFT COUNT (SUBADDRESS) LESS THAN 125 DECIMAL.
R1329 BIT 8 PSEUDO SIGN BIT (DETECTS CHANGE IN SIGN IN INDEXED SHIFTS).
R1331 BIT 9 0 FOR LEFT SHIFT, AND 1 FOR RIGHT SHIFT.
R1332 BIT 10 1 FOR TERMINAL ROUND ON SCALAR SHIFTS, 0 OTHERWISE.
R1333 BITS 11-13 0.
R1334 BIT 14 1.
R1335 BIT 15 0.

R1336 THE ABOVE ENCODING IS DONE BY THE YUL SYSTEM.

```
1337  REF  71  LAST 1151   00,2214  7 0116 0  GENSHIFT MASK   ADDRWD     GET SHIFT COUNT, TESTING FOR ZERO.
1338  REF 295  LAST 1148   00,2215  10 000 0            CCS    A         (ARRIVES WITH C(A) = LOW7).
1339  REF   1              00,2216  1 2224 0            TCF    GENSHFT2  IF NON-ZERO, PROCEED WITH DECREMENTED CT

1340  REF  33  LAST  746   00,2217  3 5006 1            CAF    BIT10     ZERO SHIFT COUNT. NO SHIFTS NEEDED BUT
1341  REF  72  LAST 1158   00,2220  7 0116 0            MASK   ADDRWD    WE MIGHT HAVE TO ROUND MPAC ON SLR AND
1342  REF 296  LAST 1158   00,2221  10 000 0            CCS    A         SRR (SCALAR ONLY).
1343  REF   3  LAST 1154   00,2222  0 7105 1            TC     ROUNDSUB
1344  REF  34  LAST 1156   00,2223  1 6030 0            TCF    DANZIG

1345  REF  31  LAST 1157   00,2224  54 135 1  GENSHFT2  TS     MPTEMP    DECREMENTED SHIFT COUNT TO MPTEMP.
1346  REF  24  LAST 1105   00,2225  3 5010 0            CAF    BIT8      TEST MEANING OF LOW SEVEN BIT COUNT IN
1347                       00,2226  0 0006 1            EXTEND           MPTEMP NOW.
1348  REF  73  LAST 1158   00,2227  7 0116 0            MP     ADDRWD
1349  REF   1              00,2230  7 6214 1            MASK   LOW2      JUMPS ON SHIFT DIRECTION (BIT8) AND
1350  REF 297  LAST 1158   00,2231  50 000 1            INDEX  A
1351                       00,2232  1 2233 0            TCF    +1        ORIGINAL SHIFT DIRECTION (BIT 9).
1352  REF   1              00,2233  1 2332 0            TCF    RIGHT-    NEGATIVE SHIFT COUNT FOR SL OR SLR.
1353  REF   1              00,2234  1 2342 1            TCF    LEFT      SL OR SLR.
1354  REF   1              00,2235  1 2336 1            TCF    LEFT-     NEGATIVE SHIFT COUNT WITH SR OR SRR.
```

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P1355 GENERAL SHIFT RIGHT.

```
1356   REF  20  LAST 1151   00,2236  10 163 1  RIGHT    CCS    MODE       SEE IF VECTOR OR SCALAR.
1357   REF   1               00,2237  1 2277 0           TCF    GENSCR
1358   REF   2  LAST 1159   00,2240  1 2277 0           TCF    GENSCR

1359   REF  32  LAST 1158   00,2241  3 0135 0           CA     MPTEMP     SEE IF SHIFT COUNT LESS THAN 14D.
1360   REF   1               00,2242  6 3730 0  VRIGHT2  AD     NEG12
1361                        00,2243  0 0006 1           EXTEND
1362   REF   1               00,2244  6 2127 1           BZMF   VSSR       IF SO, BRANCH AND SHIFT IMMEDIATELY.

1363   REF  23  LAST 1148   00,2245  6 7716 0           AD     NEGONE     IF NOT, REDUCE MPTEMP BY A TOTAL OF 14,
1364   REF  33  LAST 1159   00,2246  54 135 1           TS     MPTEMP     AND DO A SHIFT RIGHT AND ROUND BY 14.
1365   REF 231  LAST 1153   00,2247  3 5021 1           CAF    ZERO       THE ROUND AT THIS STAGE MAY INTRODUCE A
1366   REF 147  LAST 1153   00,2250  54 001 1           TS     L          ONE BIT ERROR IN A SHIFT RIGHT 15D.
1367   REF 463  LAST 1157   00,2251  56 154 1           XCH    MPAC
1368   REF 464  LAST 1159   00,2252  56 155 0           XCH    MPAC +1
1369   REF   1               00,2253  0 2272 1           TC     SETROUND   X COMPONENT NOW SHIFTED, SO MAKE UP THE
1370   REF 465  LAST 1159   00,2254  20 155 1           DAS    MPAC       ROUNDING QUANTITY (0 IN A AND 0 OR +-1
A1371                                                                     IN L).
1372   REF 466  LAST 1159   00,2255  56 157 1           XCH    MPAC +3    REPEAT THE ABOVE PROCESS FOR Y AND Z.
1373   REF 467  LAST 1159   00,2256  56 160 0           XCH    MPAC +4
1374   REF   2  LAST 1159   00,2257  0 2272 1           TC     SETROUND
1375   REF 468  LAST 1159   00,2260  20 160 1           DAS    MPAC +3    NO OVERFLOW ON THESE ADDS.

1376   REF 469  LAST 1159   00,2261  56 161 1           XCH    MPAC +5
1377   REF 470  LAST 1159   00,2262  56 162 1           XCH    MPAC +6
1378   REF   3  LAST 1159   00,2263  0 2272 1           TC     SETROUND
1379   REF 471  LAST 1159   00,2264  20 162 0           DAS    MPAC +5

1380   REF  34  LAST 1159   00,2265  10 135 1           CCS    MPTEMP     SEE IF DONE, DOING FINAL DECREMENT.
1381   REF  35  LAST 1159   00,2266  54 135 1           TS     MPTEMP
1382   REF   1               00,2267  1 2242 0           TCF    VRIGHT2
1383                        00,2270   04604 1  BIASLO   DEC    .2974 B-1  SQRT CONSTANT

1384   REF  35  LAST 1158   00,2271  1 6030 0           TCF    DANZIG

1385                        00,2272  6 0000 1  SETROUND DOUBLE             MAKES UP ROUNDING QUANTITY FROM ARRIVING
1386   REF 472  LAST 1159   00,2273  54 156 1           TS     MPAC +2    C(A). L IS ZERO INITIALLY.
1387   REF 232  LAST 1159   00,2274  3 5021 1           CAF    ZERO
1388   REF 148  LAST 1159   00,2275  56 001 0           XCH    L
1389   REF 262  LAST 1153   00,2276  0 0002 0           TC     Q          RETURN AND DO THE DAS, RESETTING L TO 0.
```

P1390 PROCESS SR AND SRR FOR SCALARS.

```
1391  REF  36  LAST 1159  00,2277  3 0135 0  GENSCR  CA    MPTEMP     SEE IF THE ORIGINAL SHIFT COUNT WAS LESS
1392  REF   2  LAST 1159  00,2300  6 3730 0   +1     AD    NEG12      THAN 14D.
1393                       00,2301  0 0006 1          EXTEND
1394  REF   1             00,2302  6 2322 0          BZMF  DOSSHFT    DO THE SHIFT IMMEDIATELY IF SO.

1395  REF  24  LAST 1159  00,2303  6 7716 0   +4     AD    NEGONE     IF NOT, DECREMENT SHIFT COUNT BY 14D AND
1396  REF  37  LAST 1160  00,2304  54 135 1          TS    MPTEMP     SHIFT MPAC RIGHT 14 PLACES.
1397  REF 233  LAST 1159  00,2305  3 5021 1          CAF   ZERO
1398  REF 473  LAST 1159  00,2306  56 154 1          XCH   MPAC
1399  REF 474  LAST 1160  00,2307  56 155 0          XCH   MPAC +1
1400  REF 475  LAST 1160  00,2310  54 156 1          TS    MPAC +2
1401  REF  38  LAST 1160  00,2311  10 135 1          CCS   MPTEMP     SEE IF FINISHED, DO FINAL DECREMENT.
1402  REF  39  LAST 1160  00,2312  54 135 1          TS    MPTEMP
1403  REF   3  LAST 1159  00,2313  0 2300 0          TC    GENSCR +1
1404                       00,2314   22650 1  SLOPEHI  DEC   .5884     SQRT CONSTANT.
1405  REF  34  LAST 1158  00,2315  3 5006 1          CAF   BIT10      FINISHED WITH SHIFT. SEE IF ROUND
1406  REF  74  LAST 1158  00,2316  7 0116 0          MASK  ADDRWD     WANTED.
1407  REF 298  LAST 1158  00,2317  10 000 0          CCS   A
1408  REF   4  LAST 1158  00,2320  0 7105 1          TC    ROUNDSUB
1409  REF  36  LAST 1159  00,2321  1 6030 0          TCF   DANZIG     DO SO AND/OR EXIT.

1410  REF  40  LAST 1160  00,2322  50 135 0  DOSSHFT  INDEX MPTEMP     PICK UP SHIFTING BIT.
1411  REF  63  LAST 1155  00,2323  3 5002 0          CAF   BIT14
1412  REF  41  LAST 1160  00,2324  54 135 1          TS    MPTEMP
1413  REF  35  LAST 1160  00,2325  3 5006 1          CAF   BIT10      SEE IF TERMINAL ROUND DESIRED.
1414  REF  75  LAST 1160  00,2326  7 0116 0          MASK  ADDRWD
1415  REF 299  LAST 1160  00,2327  10 000 0          CCS   A
1416  REF   1             00,2330  1 2031 0          TCF   RIGHTR     YES.
1417  REF   1             00,2331  1 2033 1          TCF   MPACSHR    JUST SHIFT RIGHT.
```

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P1418 PROCESS THE RIGHT- (SL(R) WITH A NEGATIVE COUNT), LEFT-, AND LEFT OPTIONS.

```
1420  REF  42  LAST 1160  00,2332  4 0135 1  RIGHT-  CS      MPTEMP   GET ABSOLUTE VALUE - 1 OF SHIFT COUNT
1421  REF   1              00,2333  6 2126 0           AD      OCT176   UNDERSTANDING THAT BIT8 (PSEUDO-SIGN)
1422  REF  43  LAST 1161  00,2334  54 135 1           TS      MPTEMP   WAS 1 INITIALLY.
1423  REF   1              00,2335  1 2236 0           TCF     RIGHT    DO NORMAL SHIFT RIGHT.

1424  REF   2  LAST 1161  00,2336  4 2126 1  LEFT-   CS      OCT176   SAME PROLOGUE TO LEFT FOR INDEXED RIGHT
1425  REF  44  LAST 1161  00,2337  6 0135 0           AD      MPTEMP   SHIFTS WHOSE NET SHIFT COUNT IS NEGATIVE
1426                      00,2340  4 0000 0           COM
1427  REF  45  LAST 1161  00,2341  54 135 1           TS      MPTEMP

1428  REF  21  LAST 1159  00,2342  10 163 1  LEFT    CCS     MODE     SINCE LEFT SHIFTING IS SONE ONE PLACE AT
1429  REF   1              00,2343  1 2346 0           TCF     GENSCL   A TIME, NO COMPARISON WITH 14 NEED BE
1430  REF   2  LAST 1161  00,2344  1 2346 0           TCF     GENSCL   DONE. FOR SCALARS, SEE IF TERMINAL ROUND
1431  REF   3  LAST 1156  00,2345  1 2145 1           TCF     VSSL     DESIRED. FOR VECTORS, SHIFT IMMEDIATELY.

1432  REF  76  LAST 1160  00,2346  4 0116 0  GENSCL  CS      ADDRWD   PUT ROUNDING BIT (BIT 10 OF ADDRWD)INTO
1433                      00,2347  0 0006 1           EXTEND           BIT 15 OF CYR WHERE THE ROUNDING BIT OF
1434  REF  41  LAST 1063  00,2350  7 5012 0           MP      BIT6     A SHORT SHIFT LEFT WOULD BE
1435  REF  35  LAST 1155  00,2351  54 020 1           TS      CYR
1436  REF   3  LAST 1154  00,2352  1 2103 0           TCF     TSSL +2  DO THE SHIFT.
```

P1437 SCALAR DIVISION INSTRUCTIONS, DDV AND BDDV, ARE EXECUTED HERE. AT THIS POINT, THE DIVIDEND IS IN MPAC
R1439 AND THE DIVISOR IN BUF.

1440	REF 138	LAST 1150	00,2353	4 5017 0	DDV/BDDV	CS	ONE		INITIALIZATION.
1441	REF 1		00,2354	54 136 1		TS	DVSIGN		+-1 FOR POSITIVE QUOTIENT - -0 FOR NEG.
1442	REF 1		00,2355	54 137 0		TS	DVNORMCT		DIVIDEND NORMALIZATION COUNT.
1443	REF 1		00,2356	54 140 0		TS	MAXDVSW		NEAR-ONE DIVIDE FLAG.
1444	REF 55	LAST 1150	00,2357	10 130 1		CCS	BUF		FORCE BUF POSITIVE WITH THE MAJOR PART
1445	REF 1		00,2360	1 2516 0		TCF	BUFPOS		NON-ZERO.
1446			00,2361	1 2363 1		TCF	+2		
1447	REF 1		00,2362	1 2531 0		TCF	BUFNEG		
1448	REF 476	LAST 1160	00,2363	54 156 1	BUFZERO	TS	MPAC +2		ZERO THIS.
1449	REF 9	LAST 1157	00,2364	0 7226 0		TC	TPAGREE		FORCE SIGN AGREEMENT BEFORE OVERFLOW
1450	REF 477	LAST 1162	00,2365	10 154 0		CCS	MPAC		TEST TO SEE IF MPAC NON-ZERO. (TOO BIG)
1451	REF 1		00,2366	1 2414 0		TCF	OVF+		MAJOR PART OF DIVIDEND IS POSITIVE NON-0
1452			00,2367	1 2371 1		TCF	+2		
1453	REF 2	LAST 1162	00,2370	1 2413 1		TCF	OVF+ -1		MAJOR PART OF DIVIDEND IS NEG. NON-ZERO
1454	REF 56	LAST 1162	00,2371	56 131 1		XCH	BUF +1		SHIFT DIVIDEND AND DIVISOR LEFT 14.
1455	REF 57	LAST 1162	00,2372	56 130 0		XCH	BUF		
1456	REF 478	LAST 1162	00,2373	56 155 0		XCH	MPAC +1		
1457	REF 479	LAST 1162	00,2374	56 154 1		XCH	MPAC		
1458	REF 58	LAST 1162	00,2375	10 130 1		CCS	BUF		TRY AGAIN ON FORMER MINOR PART.
1459	REF 1		00,2376	1 2422 0		TCF	BUF+		
1460			00,2377	1 2401 1		TCF	+2		OVERFLOW ON ZERO DIVISOR.
1461	REF 1		00,2400	1 2416 1		TCF	BUF-		
1462	REF 480	LAST 1162	00,2401	4 0154 0		CS	MPAC		SIGN OF MPAC DETERMINES SIGN OF RESULT.
1463			00,2402	0 0006 1	SGNDVOVF	EXTEND			
1464			00,2403	6 2405 1		BZMF	+2		
1465	REF 2	LAST 1162	00,2404	24 136 0		INCR	DVSIGN		NEGMAX IN MPAC PERHAPS.
1466	REF 30	LAST 1141	00,2405	3 4777 1	DVOVF	CAF	POSMAX		ON DIVISION OVERFLOW OF ANY SORT, SET
1467	REF 481	LAST 1162	00,2406	54 154 0		TS	MPAC		SET DP MPAC TO +-POSMAX.
1468	REF 1		00,2407	0 2630 0		TC	FINALDV +3		
1469	REF 139	LAST 1162	00,2410	3 5017 1		CAF	ONE		SET OVERFLOW INDICATOR AND EXIT.
1470	REF 5	LAST 1154	00,2411	54 121 1		TS	OVFIND		
1471	REF 37	LAST 1160	00,2412	0 6030 1		TC	DANZIG		
1472	REF 3	LAST 1162	00,2413	24 136 0	-1	INCR	DVSIGN		
1473	REF 59	LAST 1162	00,2414	4 0131 0	OVF+	CS	BUF +1		LOAD LOWER ORDER PART OF DIVISOR.
1474	REF 1		00,2415	1 2402 1		TCF	SGNDVOVF		GET SIGN OF RESULT.
1475			00,2416	0 0006 1	BUF-	EXTEND			IF BUF IS NEGATIVE, COMPLEMENT IT AND
1476	REF 60	LAST 1162	00,2417	4 0131 0		DCS	BUF		MAINTAIN DVSIGN FOR FINAL QUOTIENT SIGN.
1477	REF 61	LAST 1162	00,2420	52 131 0		DXCH	BUF		
1478	REF 4	LAST 1162	00,2421	24 136 0		INCR	DVSIGN		NOW -0.

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1479	REF 482	LAST 1162	00,2422	10 154 0	BUF+	CCS	MPAC	FORCE MPAC POSITIVE, CHECKING FOR ZERO
1480	REF 1		00,2423	1 2437 1		TCF	MPAC+	DIVIDEND IN THE PROCESS.
1481			00,2424	1 2426 1		TCF	+2	
1482	REF 1		00,2425	1 2433 0		TCF	MPAC-	
1483	REF 483	LAST 1163	00,2426	10 155 1		CCS	MPAC +1	
1484	REF 2	LAST 1163	00,2427	1 2437 1		TCF	MPAC+	
1485	REF 38	LAST 1162	00,2430	1 6030 0		TCF	DANZIG	EXIT IMMEDIATELY ON ZERO DIVIDEND.
1486	REF 2	LAST 1163	00,2431	1 2433 0		TCF	MPAC-	
1487	REF 39	LAST 1163	00,2432	1 6030 0		TCF	DANZIG	
1488			00,2433	0 0006 1	MPAC-	EXTEND		FORCE MPAC POSITIVE AS BUF IN BUF-.
1489	REF 484	LAST 1163	00,2434	4 0155 1		DCS	MPAC	
1490	REF 485	LAST 1163	00,2435	52 155 1		DXCH	MPAC	
1491	REF 5	LAST 1162	00,2436	24 136 0		INCR	DVSIGN	NOW +1 OR -0.

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1492	REF 486	LAST 1163	00,2437	4 0154 0	MPAC+	CS	MPAC	CHECK FOR DIVISION OVERFLOW. IF THE
1493	REF 25	LAST 1160	00,2440	6 7716 0		AD	NEGONE	MAJOR PART OF THE DIVIDEND IS LESS THAN
1494	REF 62	LAST 1162	00,2441	6 0130 0		AD	BUF	THE MAJOR PART OF THE DIVISOR BY AT
1495	REF 300	LAST 1160	00,2442	10 000 0		CCS	A	LEAST TWO, WE CAN PROCEED IMMEDIATELY
1496	REF 1		00,2443	1 2505 1		TCF	DVNORM	WITHOUT NORMALIZATION PRODUCING A DVMAX.
1497			00,2444	60001 0	-1/2+2	DCT	60001	USED IN SQRTSUB.
1498			00,2445	1 2446 1		TCF	+1	IF THE ABOVE DOES NOT HOLD, FORCE SIGN
1499	REF 11	LAST 1148	00,2446	3 5002 0		CAF	HALF	AGREEMENT IN NUMERATOR AND DENOMINATOR
1500			00,2447	6 0000 1		DOUBLE		TO FACILITATE OVERFLOW AND NEAR-ONE
1501	REF 487	LAST 1164	00,2450	6 0155 0		AD	MPAC +1	CHECKING.
1502	REF 488	LAST 1164	00,2451	54 155 1		TS	MPAC +1	
1503	REF 234	LAST 1160	00,2452	3 5021 1		CAF	ZERO	
1504	REF 31	LAST 1162	00,2453	6 4777 1		AD	POSMAX	
1505	REF 489	LAST 1164	00,2454	26 154 0		ADS	MPAC	
1506	REF 12	LAST 1164	00,2455	3 5002 0		CAF	HALF	SAME FOR BUF.
1507			00,2456	6 0000 1		DOUBLE		
1508	REF 63	LAST 1164	00,2457	6 0131 1		AD	BUF +1	
1509	REF 64	LAST 1164	00,2460	54 131 0		TS	BUF +1	
1510	REF 235	LAST 1164	00,2461	3 5021 1		CAF	ZERO	
1511	REF 32	LAST 1164	00,2462	6 4777 1		AD	POSMAX	
1512	REF 65	LAST 1164	00,2463	26 130 1		ADS	BUF	
1513	REF 490	LAST 1164	00,2464	4 0154 0		CS	MPAC	CHECK MAGNITUDE OF SIGN-CORRECTED
1514	REF 66	LAST 1164	00,2465	6 0130 0		AD	BUF	OPERANDS.
1515	REF 301	LAST 1164	00,2466	10 000 0		CCS	A	
1516	REF 2	LAST 1164	00,2467	1 2505 1		TCF	DVNORM	DIVIDE OK - WILL NOT BECOME MAXDV CASE.
1517	REF 13	LAST 1144	00,2470	00133 0	LBUF2	ADRES	BUF2	
1518	REF 1		00,2471	1 2405 0		TCF	DVOVF	DIVISOR NOT LESS THAN DIVIDEND - OVF.
1519	REF 2	LAST 1162	00,2472	54 140 0		TS	MAXDVSW	IF THE MAJOR PARTS OF THE DIVIDEND AND
1520	REF 491	LAST 1164	00,2473	4 0155 1		CS	MPAC +1	DIVISOR ARE EQUAL, A SPECIAL APPROXIMA-
1521	REF 67	LAST 1164	00,2474	6 0131 1		AD	BUF +1	TION IS USED (PROVIDED THE DIVISION IS
1522			00,2475	0 0006 1		EXTEND		POSSIBLE, OF COURSE).
1523	REF 2	LAST 1164	00,2476	6 2405 1		BZMF	DVOVF	
1524	REF 3	LAST 1164	00,2477	1 2505 1		TCF	DVNORM	IF NO OVERFLOW.

```
1525                          00,2500  0 0006 1  BUFNORM  EXTEND                ADD -1 TO AUGMENT SHIFT COUNT AND SHIFT
1526  REF   2  LAST 1162     00,2501  24 137 1           AUG     DVNORMCT       LEFT ONE PLACE.
1527                          00,2502  0 0006 1           EXTEND
1528  REF  68  LAST 1164     00,2503  3 0131 1           DCA     BUF
1529  REF  69  LAST 1165     00,2504  20 131 0           DAS     BUF

1530  REF  70  LAST 1165     00,2505  3 0130 0  DVNORM   CA      BUF            SEE IF DIVISOR NORMALIZED YET.
1531                          00,2506  6 0000 1           DOUBLE
1532                          00,2507  54 000 0           OVSK
1533  REF   1                 00,2510  1 2500 1           TCF     BUFNORM        NO - SHIFT LEFT ONE AND TRY AGAIN.

1534  REF 492  LAST 1164      00,2511  52 155 1           DXCH    MPAC           CALL DIVIDEND NORMALIZATION SEQUENCE
1535  REF   3  LAST 1165      00,2512  50 137 1           INDEX   DVNORMCT       PRIOR TO DOING THE DIVIDE.
1536  REF   1                 00,2513  0 2565 0           TC      MAXTEST

1537  REF 493  LAST 1165      00,2514  54 156 1           TS      MPAC +2        RETURNS WITH DIVISION DONE AND C(A) = 0.
1538  REF  40  LAST 1163      00,2515  1 6030 0           TCF     DANZIG

1539  REF 302  LAST 1164      00,2516  10 000 0  BUFPOS   CCS     A
1540  REF   2  LAST 1162      00,2517  1 2422 0           TCF     BUF+           TO BUF+ IF BUF IS GREATER THAN +1.

1541  REF  71  LAST 1165      00,2520  4 0131 0           CS      BUF +1         IF BUF IS +1, FORCING SIGN AGREEMENT
1542                          00,2521  0 0006 1           EXTEND                 MAY CAUSE BUF TO BECOME ZERO.
1543  REF   3  LAST 1165      00,2522  6 2422 1           BZMF    BUF+           BRANCH IF SIGNS AGREE.

1544  REF  13  LAST 1164      00,2523  3 5002 0           CA      HALF           SIGNS DISAGREE.  FORCE AGREEMENT.
1545                          00,2524  6 0000 1  +6       DOUBLE
1546  REF  72  LAST 1165      00,2525  26 131 0           ADS     BUF +1
1547  REF 236  LAST 1164      00,2526  3 5021 1           CA      ZERO
1548  REF  73  LAST 1165      00,2527  54 130 1           TS      BUF
1549  REF   1                 00,2530  1 2363 1           TCF     BUFZERO

1550  REF 303  LAST 1165      00,2531  10 000 0  BUFNEG   CCS     A
1551  REF   2  LAST 1162      00,2532  1 2416 1           TCF     BUF-           TO BUF- IF BUF IS LESS THAN -1.

1552  REF  74  LAST 1165      00,2533  3 0131 1           CA      BUF +1         IF BUF IS -1, FORCING SIGN AGREEMENT
1553                          00,2534  0 0006 1           EXTEND                 MAY CAUSE BUF TO BECOME ZERO.
1554  REF   3  LAST 1165      00,2535  6 2416 0           BZMF    BUF-           BRANCH IF SIGNS AGREE.

1555  REF  14  LAST 1165      00,2536  4 5002 1           CS      HALF           SIGNS DISAGREE.  FORCE AGREEMENT.
1556  REF   2  LAST 1162      00,2537  1 2524 1           TCF     BUFPOS +6
```

P1557 THE FOLLOWING ARE PROLOGUES TO SHIFT THE DIVIDEND ARRIVING IN A AND L BEFORE THE DIVIDE.

```
1559  REF  23  LAST 1154   00,2540  22 021 1  -21D  LXCH   SR          SPECIAL PROLOGUE FOR UNIT WHEN THE
1560                       00,2541  0 0006 1         EXTEND             LENGTH OF THE ARGUMENT WAS NOT LESS THAN
1561  REF  15  LAST 1165   00,2542  7 5002 1         MP     HALF        .5. IN THIS CASE, EACH COMPONENT MUST BE
1562  REF 149  LAST 1159   00,2543  56 001 0         XCH    L           SHIFTED RIGHT ONE TO PRODUCE A HALF-UNIT
1563  REF  24  LAST 1166   00,2544  6 0021 1         AD     SR          VECTOR.
1564  REF 150  LAST 1166   00,2545  56 001 0         XCH    L
1565  REF   1              00,2546  1 2571 1         TCF    GENDDV +1   WITH DP DIVIDEND IN A,L.

1566                       00,2547  20 001 1         DDOUBL             PROLOGUE WHICH NORMALIZES THE DIVIDEND
1567                       00,2550  20 001 1         DDOUBL             WHEN IT IS KNOWN THAT NO DIVISION
1568                       00,2551  20 001 1         DDOUBL             OVERFLOW WILL OCCUR.
1569                       00,2552  20 001 1         DDOUBL
1570                       00,2553  20 001 1         DDOUBL
1571                       00,2554  20 001 1         DDOUBL
1572                       00,2555  20 001 1         DDOUBL
1573                       00,2556  20 001 1         DDOUBL
1574                       00,2557  20 001 1         DDOUBL
1575                       00,2560  20 001 1         DDOUBL
1576                       00,2561  20 001 1         DDOUBL
1577                       00,2562  20 001 1         DDOUBL
1578                       00,2563  20 001 1         DDOUBL
1579  REF 494  LAST 1165   00,2564  52 155 1         DXCH   MPAC

1580  REF   3  LAST 1164   00,2565  10 140 0  MAXTEST CCS    MAXDVSW     0 IF MAJORS MIGHT BE =, -1 OTHERWISE.
1581                       00,2566   06552 0  BIASHI  DEC    .4192 B-1   SQRT CONSTANTS

1582  REF   1              00,2567  1 2642 1         TCF    MAXDV       CHECK TO SEE IF THEY ARE NOW EQUAL.
```

P1583 THE FOLLOWING IS A GENERAL PURPOSE DOUBLE PRECISION DIVISION ROUTINE. IT DIVIDES MPAC BY BUF AND LEAVES
R1585 THE RESULT IN MPAC. THE FOLLOWING CONDITIONS MUST BE SATISFIED:

R1586 1. THE DIVISOR (BUF) MUST BE POSITIVE AND NOT LESS THAN .5.

R1587 2. THE DIVIDEND (MPAC) MUST BE POSITIVE WITH THE MAJOR PART OF MPAC STRICTLY LESS THAN THAT OF BUF
R1589 (A SPECIAL APPROXIMATION, MAXDV, IS USED WHEN THE MAJOR PARTS ARE EQUAL).

R1591 UNDERSTANDING THAT A/B = Q + S(R/B) WHERE S = 2(-14) AND Q AND R ARE QUOTIENT AND REMAINDER, RESPEC-
R1593 TIVELY, THE FOLLOWING APPROXIMATION IS OBTAINED BY MULTIPLYING ABOVE AND BELOW BY C - SD AND NEGLECTING TERMS OF
R1595 ORDER S-SQUARED (POSSIBLY INTRODUCING ERROR INTO THE LOW TWO BITS OF THE RESULT). SIGN AGREEMENT IS UNNECESSARY.

R1597 A + SB . (R - QD) A + SB
R1599 ------ = Q + S(------) WHERE Q AND R ARE QUOTIENT AND REMAINDER OF ------ RESPECTIVELY.
R1601 C + SD (C) C

```
 1603  REF 495  LAST 1166   00,2570  52 155 1  GENDDV  DXCH   MPAC        WE NEED A AND B ONLY FOR FIRST DV.
 1604                       00,2571  0 0006 1    +1     EXTEND            (SPECIAL UNIT PROLOGUE ENTERS HERE).
 1605  REF  75  LAST 1165   00,2572  10 130 1           DV     BUF         A NOW CONTAINS Q AND L, R.
 1606  REF 496  LAST 1167   00,2573  52 155 1           DXCH   MPAC

 1607  REF 497  LAST 1167   00,2574  4 0154 0           CS     MPAC        FORM DIVIDEND FOR MINOR PART OF RESULT.
 1608                       00,2575  0 0006 1           EXTEND
 1609  REF  76  LAST 1167   00,2576  7 0131 0           MP     BUF +1
 1610  REF 498  LAST 1167   00,2577  6 0155 0           AD     MPAC +1     OVERFLOW AT THIS POINT IS POSITIVE SINCE
 1611                       00,2600  54 000 0           OVSK               R IS POSITIVE IN EVERY CASE.
 1612                       00,2601  1 2606 1           TCF    +5

 1613                       00,2602  0 0006 1           EXTEND            OVERFLOW CAN BE REMOVED BY SUBTRACTING C
 1614  REF  77  LAST 1167   00,2603  60 130 0           SU     BUF         (BUF) ONCE SINCE R IS ALWAYS LESS THAN C
 1615  REF 499  LAST 1167   00,2604  24 154 1           INCR   MPAC        IN THIS CASE. INCR COMPENSATES SUBTRACT.
 1616  REF   1              00,2605  1 2610 0           TCF    +DOWN       (SINCE C(A) IS STILL POSITIVE).

 1617                       00,2606  0 0006 1    +5     EXTEND            C(A) CAN BE MADE LESS THAN C IN MAGNI-
 1618  REF   1              00,2607  6 2620 1           BZMF   -UP         TUDE BY DIMINISHING IT BY C (SINCE C IS
A1619                                                                     NOT LESS THAN .5) UNLESS C(A) = 0.
```

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```
1620                              00,2610  0 0006 1  +DOWN     EXTEND
1621  REF  78  LAST 1167         00,2611  60 130 0             SU       BUF          IF POSITIVE, REDUCE ONLY IF NECESSARY
1622                              00,2612  0 0006 1             EXTEND                SINCE THE COMPENSATING INCR MIGHT CAUSE
1623                              00,2613  1 2616 0             BZF      +3           OVERFLOW.
1624                              00,2614  0 0006 1             EXTEND                DONT SUBTRACT UNLESS RESULT IS POSITIVE
1625  REF   1                     00,2615  6 2624 0             BZMF     ENDMAXDV     OR ZERO.

1626  REF 500  LAST 1167          00,2616  24 154 1   +3        INCR     MPAC         KEEP SUBTRACT HERE AND COMPENSATE.
1627  REF   2  LAST 1162          00,2617  1 2625 0             TCF      FINALDV

1628                              00,2620  0 0006 1   -UP       EXTEND                IF ZERO, SET MINOR PART OF RESULT TO
1629  REF   3  LAST 1168          00,2621  1 2630 1             BZF      FINALDV +3   ZERO.

1630                              00,2622  0 0006 1             EXTEND                IF NEGATIVE, ADD C TO A, SUBTRACTING ONE
1631  REF 501  LAST 1168          00,2623  26 154 0             DIM      MPAC         TO COMPENSATE. DIM IS OK HERE SINCE THE
1632  REF  79  LAST 1168          00,2624  6 0130 0  ENDMAXDV   AD       BUF          MAJOR PART NEVER GOES NEGATIVE.
```

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```
1633                          00,2625  22 007 0  FINALDV  ZL                DO DV TO OBTAIN MINOR PART OF RESULT.
1634                          00,2626  0 0006 1            EXTEND
1635  REF  80  LAST 1168     00,2627  10 130 1            DV      BUF
1636  REF 502  LAST 1168     00,2630  54 155 1  +3        TS      MPAC +1

1637  REF   6  LAST 1163     00,2631  10 136 1            CCS     DVSIGN    LEAVE RESULT POSITIVE UNLESS C(DVSIGN)=
1638  REF 263  LAST 1159     00,2632  0 0002 0            TC      Q         -0.
1639  REF 264  LAST 1169     00,2633  0 0002 0            TC      Q
1640  REF 265  LAST 1169     00,2634  0 0002 0            TC      Q

1641                          00,2635  0 0006 1            EXTEND
1642  REF 503  LAST 1169     00,2636  4 0155 1            DCS     MPAC
1643  REF 504  LAST 1169     00,2637  52 155 1            DXCH    MPAC
1644  REF 237  LAST 1165     00,2640  3 5021 1            CAF     ZERO      SO WE ALWAYS RETURN WITH C(A) = 0.
1645  REF 266  LAST 1169     00,2641  0 0002 0            TC      Q
```

P1646 IF THE MAJOR PARTS OF THE DIVISOR AND DIVIDEND ARE EQUAL, BUT THE MINOR PARTS ARE SUCH THAT THE
R1648 DIVIDEND IS STRICTLY LESS THAN THE DIVISOR IN MAGNITUDE, THE FOLLOWING APPROXIMATION IS USED. THE ASSUMPTIONS
R1650 ARE THE SAME AS THE GENERAL ROUTINE WITH THE ADDITION THAT SIGN AGREEMENT IS NECESSARY (B, C, & D POSITIVE).

$$\frac{C + SB}{C + SD} = 37777 + S\left(\frac{C + B - D}{C}\right)$$

R1655 THE DIVISION MAY BE PERFORMED IMMEDIATELY SINCE B IS STRICTLY LESS THAN D AND C IS NOT LESS THAN .5.

```
 1657  REF 505  LAST 1169   00,2642  4 0154 0  MAXDV   CS      MPAC       SEE IF MAXDV CASE STILL HOLDS AFTER
 1658  REF  81  LAST 1169   00,2643  6 0130 0          AD      BUF        NORMALIZATION.
 1659                       00,2644  0 0006 1          EXTEND
 1660                       00,2645  1 2647 1          BZF     +2
 1661  REF   2  LAST 1166   00,2646  1 2570 0          TCF     GENDDV     MPAC NOW LESS THAN BUF - DIVIDE AS USUAL

 1662  REF  33  LAST 1164   00,2647  3 4777 1  +2      CAF     POSMAX     SET MAJOR PART OF RESULT.
 1663  REF 506  LAST 1170   00,2650  54 154 0          TS      MPAC

 1664  REF  82  LAST 1170   00,2651  4 0131 0          CS      BUF +1     FORM DIVIDEND OF MINOR PART OF RESULT.
 1665  REF 507  LAST 1170   00,2652  6 0155 0          AD      MPAC +1
 1666  REF   2  LAST 1168   00,2653  1 2624 1          TCF     ENDMAXDV   GO ADD C AND DO DIVIDE. ATTACHING SIGN
A1667                                                                    BEFORE EXITING.
```

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P1668 VECTOR DIVIDED BY SCALAR. V/SC. IS EXECUTED HERE. THE VECTOR IS NOW IN MPAC WITH SCALAR IN BUF.

```
1670   REF 140  LAST 1162   00,2654  4 5017 0  V/SC2   CS     ONE          INITIALIZE DIVIDEND NORMALIZATION COUNT
1671   REF   4  LAST 1165   00,2655  54 137 0          TS     OVNORMCT     AND DIVISION SIGN REGISTER.
1672   REF  41  LAST 1148   00,2656  54 127 1          TS     VBUF +5

1673   REF   1              00,2657  0 3010 0          TC     VECAGREE     FORCE SIGN AGREEMENT IN VECTOR

1674   REF  83  LAST 1170   00,2660  52 131 0          DXCH   BUF
1675   REF   1              00,2661  0 7513 1          TC     ALSIGNAG     SIGN AGREE BUF
1676   REF  84  LAST 1171   00,2662  52 131 0          DXCH   BUF
1677   REF  85  LAST 1171   00,2663  10 130 1          CCS    BUF          FORCE DIVISOR POSITIVE WITH MAJOR PART
1678   REF   1              00,2664  1 2721 0          TCF    /BUF+        NON-ZERO (IF POSSIBLE).
1679                        00,2665  1 2667 0          TCF    +2
1680   REF   1              00,2666  1 2715 1          TCF    /BUF-

1681   REF  86  LAST 1171   00,2667  56 131 1          XCH    BUF +1       SHIFT VECTOR AND SCALAR LEFT 14.
1682   REF  87  LAST 1171   00,2670  56 130 0          XCH    BUF
1683   REF 508  LAST 1170   00,2671  56 155 0          XCH    MPAC +1
1684   REF 509  LAST 1171   00,2672  56 154 1          XCH    MPAC
1685                        00,2673  0 0006 1          EXTEND                  CHECK FOR OVERFLOW IN EACH CASE.
1686                        00,2674  1 2676 0          BZF    +2
1687   REF   3  LAST 1164   00,2675  1 2405 0          TCF    DVOVF

1688   REF 510  LAST 1171   00,2676  56 160 0          XCH    MPAC +4
1689   REF 511  LAST 1171   00,2677  56 157 1          XCH    MPAC +3
1690                        00,2700  0 0006 1          EXTEND
1691                        00,2701  1 2703 0          BZF    +2
1692   REF   4  LAST 1171   00,2702  1 2405 0          TCF    DVOVF

1693   REF 512  LAST 1171   00,2703  56 162 1          XCH    MPAC +6
1694   REF 513  LAST 1171   00,2704  56 161 1          XCH    MPAC +5
1695                        00,2705  0 0006 1          EXTEND
1696                        00,2706  1 2710 1          BZF    +2
1697   REF   5  LAST 1171   00,2707  1 2405 0          TCF    DVOVF

1698   REF  88  LAST 1171   00,2710  10 130 1          CCS    BUF
1699   REF   2  LAST 1171   00,2711  1 2721 0          TCF    /BUF+
1700   REF   6  LAST 1171   00,2712  1 2405 0          TCF    DVOVF        ZERO DIVISOR - OVERFLOW.
1701   REF   2  LAST 1171   00,2713  1 2715 1          TCF    /BUF-
1702   REF   7  LAST 1171   00,2714  1 2405 0          TCF    DVOVF

1703                        00,2715  0 0006 1  /BUF-    EXTEND                  ON NEGATIVE, COMPLEMENT BUF AND MAINTAIN
1704   REF  89  LAST 1171   00,2716  4 0131 0          DCS    BUF          DVSIGN IN VBUF +5.
1705   REF  90  LAST 1171   00,2717  52 131 0          DXCH   BUF
1706   REF  42  LAST 1171   00,2720  24 127 0          INCR   VBUF +5
```

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```
1707                                00,2721  0 0006 1  /BUF+    EXTEND
1708  REF  91  LAST 1171           00,2722  3 0131 1            DCA     BUF        LEAVE ABS(ORIG DIVISOR) IN BUF2
1709  REF  14  LAST 1164           00,2723  52 134 0            DXCH    BUF2       FOR OVERFLOW TESTING
1710  REF   1                      00,2724  1 2732 1            TCF     /NORM      NORMALIZE DIVISOR IN BUF.

1711                                00,2725  0 0006 1  /NORM2   EXTEND             IF LESS THAN .5, AUGMENT DVNORMCT AND
1712  REF   5  LAST 1171           00,2726  24 137 1            AUG     DVNORMCT   DOUBLE DIVISOR.
1713                                00,2727  0 0006 1            EXTEND
1714  REF  92  LAST 1172           00,2730  3 0131 1            DCA     BUF
1715  REF  93  LAST 1172           00,2731  20 131 0            DAS     BUF

1716  REF  94  LAST 1172           00,2732  3 0130 0  /NORM     CA      BUF        SEE IF DIVISOR NORMALIZED.
1717                                00,2733  6 0000 1            DOUBLE
1718                                00,2734  54 000 0            OVSK
1719  REF   1                      00,2735  1 2725 1            TCF     /NORM2     DOUBLE AND TRY AGAIN IF NOT.

1720  REF   1                      00,2736  0 2750 1            TC      V/SCDV     DO X COMPONENT DIVIDE.
1721  REF 514  LAST 1171           00,2737  52 160 1            DXCH    MPAC +3    SUPPLY ARGUMENTS IN USUAL SEQUENCE.
1722  REF 515  LAST 1172           00,2740  52 155 1            DXCH    MPAC
1723  REF 516  LAST 1172           00,2741  52 160 1            DXCH    MPAC +3

1724  REF   2  LAST 1172           00,2742  0 2750 1            TC      V/SCDV     Y COMPONENT.
1725  REF 517  LAST 1172           00,2743  52 162 0            DXCH    MPAC +5
1726  REF 518  LAST 1172           00,2744  52 155 1            DXCH    MPAC
1727  REF 519  LAST 1172           00,2745  52 162 0            DXCH    MPAC +5

1728  REF   3  LAST 1172           00,2746  0 2750 1            TC      V/SCDV     Z COMPONENT.
1729  REF   2  LAST 1155           00,2747  1 7367 0            TCF     VROTATEX   GO RE-ARRANGE COMPONENTS BEFORE EXIT.
```

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P1730 SUBROUTINE USED BY V/SC TO DIVIDE VECTOR COMPONENT IN MPAC.+1 BY THE SCALAR GIVEN IN BUF.

```
1732   REF  43  LAST 1171   00,2750  3 0127 0  V/SCDV   CA     VBUF +5      REFLECTS SIGN OF SCALAR.
1733   REF   7  LAST 1169   00,2751  54 136 1           TS     DVSIGN

1734   REF 520  LAST 1172   00,2752  10 154 0           CCS    MPAC         FORCE MPAC POSITIVE, EXITING ON ZERO.
1735   REF   1              00,2753  1 2767 1           TCF    /MPAC+
1736                        00,2754  1 2756 0           TCF    +2
1737   REF   1              00,2755  1 2763 0           TCF    /MPAC-

1738   REF 521  LAST 1173   00,2756  10 155 1           CCS    MPAC +1
1739   REF   2  LAST 1173   00,2757  1 2767 1           TCF    /MPAC+
1740   REF 267  LAST 1169   00,2760  0 0002 0           TC     Q
1741   REF   2  LAST 1173   00,2761  1 2763 0           TCF    /MPAC-
1742   REF 268  LAST 1173   00,2762  0 0002 0           TC     Q

1743                        00,2763  0 0006 1  /MPAC-    EXTEND               USUAL COMPLEMENTING AND SETTING OF SIGN.
1744   REF 522  LAST 1173   00,2764  4 0155 1           DCS    MPAC
1745   REF 523  LAST 1173   00,2765  52 155 1           DXCH   MPAC
1746   REF   8  LAST 1173   00,2766  24 136 0           INCR   DVSIGN

1747   REF 141  LAST 1171   00,2767  4 5017 0  /MPAC+    CS     ONE          INITIALIZE NEAR-ONE SWITCH.
1748   REF   4  LAST 1166   00,2770  54 140 0           TS     MAXDVSW

1749   REF 524  LAST 1173   00,2771  4 0154 0           CS     MPAC         CHECK POSSIBLE OVERFLOW.
1750   REF  15  LAST 1172   00,2772  6 0133 0           AD     BUF2         UNNORMALIZED INPUT DIVISOR.
1751   REF 304  LAST 1165   00,2773  10 000 0           CCS    A
1752   REF   1              00,2774  1 3004 1           TCF    DDVCALL      NOT NEAR-ONE
1753                        00,2775  1 2777 0           TCF    +2           +0 IS JUST POSSIBLE
1754   REF   8  LAST 1171   00,2776  1 2405 0           TCF    DVOVF        NO HOPE
1755   REF   5  LAST 1173   00,2777  54 140 0           TS     MAXDVSW      SIGNAL POSSIBLE NEAR-ONE CASE
1756   REF 525  LAST 1173   00,3000  4 0155 1           CS     MPAC +1      SEE IF DIVISION CAN BE DONE
1757   REF  16  LAST 1173   00,3001  6 0134 1           AD     BUF2 +1
1758                        00,3002  0 0006 1           EXTEND
1759   REF   9  LAST 1173   00,3003  6 2405 1           BZMF   DVOVF

1760   REF 526  LAST 1173   00,3004  52 155 1  DDVCALL   DXCH   MPAC         CALL PRE-DIVIDE NORMALIZATION.
1761   REF   6  LAST 1172   00,3005  50 137 1           INDEX  DVNORMCT
1762   REF   2  LAST 1165   00,3006  1 2565 1           TCF    MAXTEST
```

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```
1763                          00,3007   32506 0  SLOPELO  DEC     .8324

1764   REF 269  LAST 1173     00,3010   56 002 0 VECAGREE XCH     Q          SAVE Q IN A
1765   REF 527  LAST 1173     00,3011   52 155 1          DXCH    MPAC
1766   REF   2  LAST 1171     00,3012   0 7513 1          TC      ALSIGNAG   SIGNAGREE MPAC
1767   REF 528  LAST 1174     00,3013   52 155 1          DXCH    MPAC
1768   REF 529  LAST 1174     00,3014   52 160 1          DXCH    MPAC +3
1769   REF   3  LAST 1174     00,3015   0 7513 1          TC      ALSIGNAG   SIGN AGREE MPAC +3
1770   REF 530  LAST 1174     00,3016   52 160 1          DXCH    MPAC +3
1771   REF 531  LAST 1174     00,3017   52 162 0          DXCH    MPAC +5
1772   REF   4  LAST 1174     00,3020   0 7513 1          TC      ALSIGNAG   SIGNAGREE MPAC +5
1773   REF 532  LAST 1174     00,3021   52 162 0          DXCH    MPAC +5
1774   REF 305  LAST 1173     00,3022   0 0000 1          TC      A
```

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P1775 THE FOLLOWING ROUTINE EXECUTES THE UNIT INSTRUCTION, WHICH TAKES THE UNIT OF THE VECTOR IN MPAC.

```
1777  REF   2  LAST 1171  00,3023  0 3010 0  UNIT   TC     VECAGREE   FORCE SIGN AGREEMENT IN VECTOR
1778  REF   2  LAST 1144  00,3024  0 7501 1         TC     MPACVBUF   SAVE ARGUMENT IN VBUF
1779  REF 238  LAST 1169  00,3025  3 5021 1         CAF    ZERO       MUST SENSE OVERFLOW IN FOLLOWING DOT.
1780  REF   6  LAST 1162  00,3026  56 121 0         XCH    OVFIND
1781  REF   3  LAST   70  00,3027  54 141 1         TS     TEM1
1782  REF   1             00,3030  0 3317 1         TC     VSQSUB     DOT MPAC WITH ITSELF.
1783  REF   4  LAST 1175  00,3031  3 0141 0         CA     TEM1
1784  REF   7  LAST 1175  00,3032  56 121 0         XCH    OVFIND
1785                      00,3033  0 0006 1         EXTEND
1786                      00,3034  1 3036 0         BZF    +2
1787  REF  10  LAST 1173  00,3035  1 2405 0         TCF    DVOVF
1788                      00,3036  0 0006 1         EXTEND
1789  REF 533  LAST 1174  00,3037  3 0155 0         DCA    MPAC       LEAVE THE SQUARE OF THE LENGTH OF THE
1790  REF  26  LAST 1129  00,3040  50 120 1         INDEX  FIXLOC     ARGUMENT IN LVSQUARE.
1791  REF   1             00,3041  52 043 1         DXCH   LVSQUARE

1792  REF   1             00,3042  0 3343 0         TC     SQRTSUB    GO TAKE THE NORMALIZED SQUARE ROOT.

1793  REF 534  LAST 1175  00,3043  10 154 0         CCS    MPAC       CHECK FOR UNIT OVERFLOW.
1794                      00,3044  1 3051 1         TCF    +5         MPAC IS NOT LESS THAN .5 UNLESS
1795  REF 151  LAST 1166  00,3045  54 001 1         TS     L
1796  REF  27  LAST 1175  00,3046  50 120 1         INDEX  FIXLOC
1797  REF   1             00,3047  52 045 1         DXCH   LV
1798  REF  11  LAST 1175  00,3050  1 2405 0         TCF    DVOVF      INPUT TO SQRTSUB WAS 0.

1799  REF   1             00,3051  4 4333 1         CS     FOURTEEN   SEE IF THE INPUT WAS SO SMALL THE THE
1800  REF  46  LAST 1161  00,3052  6 0135 0         AD     MPTEMP     FIRST TWO REGISTERS OF THE SQUARE WERE 0
1801  REF 306  LAST 1174  00,3053  10 000 0         CCS    A
1802                      00,3054  4 0000 0         COM                IF SO, SAVE THE NEGATIVE OF THE SHIFT
1803  REF   1             00,3055  1 3133 1         TCF    SMALL      COUNT -15D.

1804  REF   1             00,3056  1 3065 0         TCF    LARGE      (THIS IS USUALLY THE CASE.)

1805  REF   4  LAST 1091  00,3057  4 5025 1         CS     THIRTEEN   IF THE SHIFT COUNT WAS EXACTLY 14, SET
1806  REF  47  LAST 1175  00,3060  54 135 1         TS     MPTEMP     THE PRE-DIVIDE NORM COUNT TO -13D.

1807  REF 535  LAST 1175  00,3061  3 0154 1         CA     MPAC       SHIFT THE LENGTH RIGHT 14 BEFORE STORING
1808  REF 152  LAST 1175  00,3062  54 001 1  SMALL2 TS     L          (SMALL EXITS TO THIS POINT).
1809  REF 239  LAST 1175  00,3063  3 5021 1         CAF    ZERO
1810  REF   1             00,3064  1 3112 1         TCF    LARGE2     GO TO STORE LENGTH AND PROCEED.

1811  REF  48  LAST 1175  00,3065  10 135 1  LARGE  CCS    MPTEMP     MOST ALL CASES COME HERE.
1812  REF   1             00,3066  1 3074 0         TCF    LARGE3     SEE IF NO NORMALIZATION WAS REQUIRED BY

1813  REF   1             00,3067  4 2024 1         CS     SRDDV      SQRT, AND IF SO, SET UP FOR A SHIFT
1814  REF  49  LAST 1175  00,3070  54 135 1         TS     MPTEMP     RIGHT 1 BEFORE DIVIDING TO PRODUCE
1815                      00,3071  0 0006 1         EXTEND             THE DESIRED HALF UNIT VECTOR.
1816  REF 536  LAST 1175  00,3072  3 0155 0         DCA    MPAC
```

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1817 REF 2 LAST 1175 00,3073 1 3112 1 TCF LARGE2

```
1818                          00,3074  4 0000 0  LARGE3   COM                LEAVE NEGATIVE OF SHIFT COUNT-1 FOR
1819  REF  50  LAST 1175     00,3075  54 135 1            TS      MPTEMP     PREDIVIDE LEFT SHIFT.

1820                          00,3076  4 0000 0           COM                PICK UP REQUIRED SHIFTING BIT TO UNNORM-
1821  REF 307  LAST 1175     00,3077  50 000 1           INDEX   A          ALIZE THE SQRT RESULT.
1822  REF  64  LAST 1160     00,3100  3 5002 0           CAF     BIT14
1823  REF  95  LAST 1172     00,3101  54 130 1           TS      BUF
1824                          00,3102  0 0006 1           EXTEND
1825  REF 537  LAST 1175     00,3103  7 0155 1           MP      MPAC +1
1826  REF  96  LAST 1177     00,3104  56 130 0           XCH     BUF
1827                          00,3105  0 0006 1           EXTEND             (UNNORMALIZE THE SQRT FOR LV).
1828  REF 538  LAST 1177     00,3106  7 0154 0           MP      MPAC
1829  REF 153  LAST 1175     00,3107  56 001 0           XCH     L
1830  REF  97  LAST 1177     00,3110  6 0130 0           AD      BUF
1831  REF 154  LAST 1177     00,3111  56 001 0           XCH     L

1832  REF  28  LAST 1175     00,3112  50 120 1  LARGE2   INDEX   FIXLOC
1833  REF   2  LAST 1175     00,3113  52 045 1           DXCH    LV         LENGTH NOW STORED IN WORK AREA.

1834  REF 142  LAST 1173     00,3114  4 5017 0           CS      ONE
1835  REF   6  LAST 1173     00,3115  54 140 0           TS      MAXDVSW    NO MAXDV CASES IN UNIT.

1836  REF  44  LAST 1173     00,3116  52 123 0           DXCH    VBUF       PREPARE X COMPONENT FOR DIVIDE, SETTING
1837  REF 539  LAST 1177     00,3117  52 155 1           DXCH    MPAC       LENGTH OF VECTOR AS DIVISOR IN BUF.
1838  REF  98  LAST 1177     00,3120  52 131 0           DXCH    BUF
1839  REF   1                00,3121  0 3151 1           TC      UNITDV

1840  REF  45  LAST 1177     00,3122  52 125 0           DXCH    VBUF +2    DO Y AND Z IN USUAL FASHION SO WE CAN
1841  REF 540  LAST 1177     00,3123  52 155 1           DXCH    MPAC       EXIT THROUGH VROTATEX.
1842  REF 541  LAST 1177     00,3124  52 160 1           DXCH    MPAC +3
1843  REF   2  LAST 1177     00,3125  0 3151 1           TC      UNITDV

1844  REF  46  LAST 1177     00,3126  52 127 1           DXCH    VBUF +4
1845  REF 542  LAST 1177     00,3127  52 155 1           DXCH    MPAC
1846  REF 543  LAST 1177     00,3130  52 162 0           DXCH    MPAC +5
1847  REF   3  LAST 1177     00,3131  0 3151 1           TC      UNITDV
1848  REF   3  LAST 1172     00,3132  1 7367 0           TCF     VROTATEX   AND EXIT.
```

P1849 IF THE LENGTH OF THE ARGUMENT VECTOR WAS LESS THAN 2(-28), EACH COMPONENT MUST BE SHIFTED LEFT AT LEAST
R1851 14 PLACES BEFORE THE DIVIDE. NOTE THAT IN THIS CASE, THE MAJOR PART OF EACH COMPONENT IS ZERO.

1853	REF 51	LAST 1177	00,3133	54 135 1	SMALL	TS	MPTEMP		NEGATIVE OF PRE-DIVIDE SHIFT COUNT.
1854	REF 240	LAST 1175	00,3134	3 5021 1		CAF	ZERO		SHIFT EACH COMPONENT LEFT 14.
1855	REF 47	LAST 1177	00,3135	56 123 1		XCH	VBUF +1		
1856	REF 48	LAST 1178	00,3136	56 122 0		XCH	VBUF		
1857	REF 49	LAST 1178	00,3137	56 125 1		XCH	VBUF +3		
1858	REF 50	LAST 1178	00,3140	56 124 0		XCH	VBUF +2		
1859	REF 51	LAST 1178	00,3141	56 127 0		XCH	VBUF +5		
1860	REF 52	LAST 1178	00,3142	56 126 1		XCH	VBUF +4		
1861	REF 52	LAST 1178	00,3143	4 0135 1		CS	MPTEMP		
1862	REF 308	LAST 1177	00,3144	50 000 1		INDEX	A		
1863	REF 65	LAST 1177	00,3145	3 5002 0		CAF	BIT14		
1864			00,3146	0 0006 1		EXTEND			
1865	REF 544	LAST 1177	00,3147	7 0154 0		MP	MPAC		
1866	REF 1		00,3150	1 3062 1		TCF	SMALL2		
1867	REF 4	LAST 769	5025		THIRTEEN	=	OCT15		
1868	REF 2	LAST 782	4333		FOURTEEN	=	OCT16		
1869	REF 14	LAST 375	4333		OCT16	=	R1D1		

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P1870 THE FOLLOWING ROUTINE SETS UP THE CALL TO THE DIVIDE ROUTINES.

```
1871  REF 545  LAST 1178  00,3151  10 154 0  UNITDV  CCS    MPAC      FORCE MPAC POSITIVE IF POSSIBLE. SETTING
1872  REF   1             00,3152  1 3170 0          TCF    UMPAC+    DVSIGN ACCORDING TO THE SIGN OF MPAC
1873                      00,3153  1 3155 1          TCF    +2        SINCE THE DIVISOR IS ALWAYS POSITIVE
1874  REF   1             00,3154  1 3162 0          TCF    UMPAC-    HERE.

1875  REF 546  LAST 1179  00,3155  10 155 1          CCS    MPAC +1
1876  REF   2  LAST 1179  00,3156  1 3170 0          TCF    UMPAC+
1877  REF 270  LAST 1174  00,3157  0 0002 0          TC     Q         EXIT IMMEDIATELY ON ZERO.
1878  REF   2  LAST 1179  00,3160  1 3162 0          TCF    UMPAC-
1879  REF 271  LAST 1179  00,3161  0 0002 0          TC     Q

1880  REF 241  LAST 1178  00,3162  4 5021 0  UMPAC-  CS     ZERO      IF NEGATIVE, SET -0 IN DVSIGN FOR FINAL
1881  REF   9  LAST 1173  00,3163  54 136 1          TS     DVSIGN    COMPLEMENT.
1882                      00,3164  0 0006 1          EXTEND
1883  REF 547  LAST 1179  00,3165  4 0155 1          DCS    MPAC      PICK UP ABSOLUTE VALUE OF ARG AND JUMP.
1884  REF  53  LAST 1178  00,3166  50 135 0          INDEX  MPTEMP
1885  REF   3  LAST 1173  00,3167  1 2564 0          TCF    MAXTEST -1

1886  REF  10  LAST 1179  00,3170  54 136 1  UMPAC+  TS     DVSIGN    SET DVSIGN FOR POSITIVE QUOTIENT.
1887  REF 548  LAST 1179  00,3171  52 155 1          DXCH   MPAC
1888  REF  54  LAST 1179  00,3172  50 135 0          INDEX  MPTEMP
1889  REF   4  LAST 1179  00,3173  1 2564 0          TCF    MAXTEST -1
```

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P1890 MISCELLANEOUS UNARY OPERATIONS.

```
1891  REF   1              00,3174  0 3300 1  DSQ       TC      DSQSUB      SQUARE THE DP CONTENTS OF MPAC.
1892  REF  41  LAST 1165   00,3175  1 6030 0            TCF     DANZIG

1893  REF  22  LAST 1161   00,3176  10 163 1  ABVALABS  CCS     MODE        ABVAL OR ABS INSTRUCTION.
1894  REF   1              00,3177  1 3226 0            TCF     ABS         DO ABS ON SCALAR.
1895  REF   2  LAST 1180   00,3200  1 3226 0            TCF     ABS

1896  REF   2  LAST 1175   00,3201  0 3317 1  ABVAL     TC      VSQSUB      DOT MPAC WITH ITSELF.
1897  REF  23  LAST 1180   00,3202  22 163 0            LXCH    MODE        MODE IS NOW DP (L ZERO AFTER DAS).

1898                       00,3203  0 0006 1            EXTEND              STORE SQUARE OF LENGTH IN WORK AREA.
1899  REF 549  LAST 1179   00,3204  3 0155 0            DCA     MPAC
1900  REF  29  LAST 1177   00,3205  50 120 1            INDEX   FIXLOC
1901  REF   2  LAST 1175   00,3206  52 043 1            DXCH    LVSQUARE
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P1902   PROGRAM DESCRIPTION- SUBROUTINE SQRT
R1903   FUNCTIONAL DESCRIPTION-DOUBLE PRECISION SQUARE ROOT ROUTINE
R1904       THIS PROGRAM TAKES THE SQUARE ROOT OF THE 27 OR 28 MOST SIGNIFICANT BITS IN THE TRIPLE PRECISION SET OF
R1906       NUMBERS-MPAC,MPAC+1,AND MPAC+2.  THE ROOT IS RETURNED DOUBLE          PRECISION IN MPAC AND MPAC+1.
R1908   WARNING- THIS SUBROUTINE USES A TRIPLE PRECISION INPUT. THE PROGRAMMER  MUST ASSURE THE CONTENTS OF MPAC+2
R1910       ESPECIALLY IF THE CONTENTS OF MPAC IS SMALL OR ZERO.  FOR DETAILS SEE STG MEMO NO.949.
R1912   CALLING SEQUENCE- IN INTERPRETIVE MODE I.E., FOLLOWING TC  INTPRET,SQRT   NO ADDRESS IS ALLOWED
R1914   INPUT SCALING  THE BINARY POINT IS ASSUMED TO THE RIGHT OF BIT 15. THE  ANSWER IS RETURNED WITH THE SAME SCALING
R1916   SUBROUTINES- GENSCR,MPACSHR, SQRTSUB,ABORT
R1917   ABORT EXIT MODE- ABORTS ON NEGATIVE INPUT -1.2X10E-4 (77775  OCTAL)     OR LESS.
R1919       DISPLAYS ERROR CODE 1302
R1920                   TC   ABORT
R1921                   OCT  1302
R1922   DEBRIS -  LOCATIONS BUF,MPTEMP,ADDRWD ARE USED
 1923   REF   2  LAST 1175   00,3207  0 3343 0  SQRT     TC     SQRTSUB        TAKE THE SQUARE ROOT OF MPAC.
 1924   REF  55  LAST 1179   00,3210  10 135 1           CCS    MPTEMP         RETURNED NORMALIZED SQUARE ROOT. SEE IF
 1925                        00,3211  1 3213 0           TCF    +2             ANY UN-NORMALIZATION REQUIRED AND EXIT
 1926   REF  42  LAST 1180   00,3212  1 6030 0           TCF    DANZIG         IF NOT.

 1927   REF   3  LAST 1160   00,3213  6 3730 0           AD     NEG12          A RIGHT SHIFT OF MORE THAN 13 COULD BE
 1928                        00,3214  0 0006 1           EXTEND                REQUIRED IF INPUT WAS ZERO IN MPAC,+1.
 1929   REF   1              00,3215  6 3221 0           BZMF   SQRTSHFT       GOES HERE IN MOST CASES.
 1930                        00,3216  22 007 0           ZL                    IF A LONG SHIFT IS REQUIRED, GO TO
 1931   REF  77  LAST 1161   00,3217  22 116 1           LXCH   ADDRWD         GENERAL RIGHT SHIFT ROUTINES.
 1932   REF   4  LAST 1160   00,3220  1 2303 1           TCF    GENSCR +4      ADDRWD WAS ZERO TO PREVENT ROUND.

 1933   REF  56  LAST 1181   00,3221  50 135 0  SQRTSHFT INDEX  MPTEMP         SELECT SHIFTING BIT AND EXIT THROUGH
 1934   REF  45  LAST 1131   00,3222  3 5001 0           CAF    BIT15          SHIFT ROUTINES.
 1935   REF  57  LAST 1181   00,3223  54 135 1           TS     MPTEMP
 1936   REF 242  LAST 1179   00,3224  3 5021 1           CAF    ZERO           TO ZERO MPAC +2 IN THE PROCESS.
 1937   REF   2  LAST 1160   00,3225  1 2036 1           TCF    MPACSHR +3

 1938   REF   3  LAST 1157   00,3226  0 5672 1  ABS      TC     BRANCH         TEST SIGN OF MPAC AND COMPLEMENT IF
 1939   REF  43  LAST 1181   00,3227  1 6030 0           TCF    DANZIG
 1940   REF  44  LAST 1181   00,3230  1 6030 0           TCF    DANZIG
 1941   REF   4  LAST 1151   00,3231  1 7637 0           TCF    COMP
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1942   REF  16  LAST 1146   00,3232  4 5015 1  VDEF    CS      FOUR          VECTOR DEFINE - ESSENTIALLY TREATS
1943   REF  13  LAST 1149   00,3233  26 166 1          ADS     PUSHLOC       SCALAR IN MPAC AS X COMPONENT. PUSHES UP
1944                        00,3234  0 0006 1          EXTEND                FOR Y AND THEN AGAIN FOR Z.
1945   REF 309  LAST 1178   00,3235  5 0000 1          INDEX   A
1946                        00,3236  3 0003 1          DCA     2
1947   REF 550  LAST 1180   00,3237  52 160 1          DXCH    MPAC +3
1948                        00,3240  0 0006 1          EXTEND
1949   REF  14  LAST 1182   00,3241  5 0166 0          INDEX   PUSHLOC
1950                        00,3242  3 0001 0          DCA     0
1951   REF 551  LAST 1182   00,3243  52 162 0          DXCH    MPAC +5
1952   REF   2  LAST 1146   00,3244  1 6470 0          TCF     VMODE         MODE IS NON VECTOR.

1953   REF   3  LAST 1180   00,3245  0 3317 1  VSQ     TC      VSOSUB        DOT MPAC WITH ITSELF.
1954   REF   1              00,3246  1 7301 0          TCF     DMODE         MODE IS NOW DP.

1955                        00,3247  0 0006 1  PUSH    EXTEND                PUSH DOWN MPAC LEAVING IT LOADED.
1956   REF 552  LAST 1182   00,3250  3 0155 0          DCA     MPAC
1957   REF  15  LAST 1182   00,3251  50 166 0          INDEX   PUSHLOC       PUSH DOWN FIRST TWO REGISTERS IN EACH
1958                        00,3252  52 001 1          DXCH    0

1959   REF  24  LAST 1180   00,3253  50 163 0          INDEX   MODE          INCREMENT PUSHDOWN POINTER.
1960   REF   5  LAST 1126   00,3254  3 6213 1          CAF     NO.WDS
1961   REF  16  LAST 1182   00,3255  26 166 1          ADS     PUSHLOC

1962   REF  25  LAST 1182   00,3256  10 163 1          CCS     MODE
1963   REF   1              00,3257  1 3272 1          TCF     TPUSH         PUSH DOWN MPAC +2.
1964   REF  45  LAST 1181   00,3260  1 6030 0          TCF     DANZIG        DONE FOR DP.

1965                        00,3261  0 0006 1          EXTEND                ON VECTOR, PUSH DOWN Y AND Z COMPONENTS.
1966   REF 553  LAST 1182   00,3262  3 0160 0          DCA     MPAC +3
1967   REF  17  LAST 1182   00,3263  50 166 0          INDEX   PUSHLOC
1968                        00,3264  51'775 0          DXCH    0 -4
1969                        00,3265  0 0006 1          EXTEND
1970   REF 554  LAST 1182   00,3266  3 0162 1          DCA     MPAC +5
1971   REF  18  LAST 1182   00,3267  50 166 0          INDEX   PUSHLOC
1972                        00,3270  51'777 1          DXCH    0 -2
1973   REF  46  LAST 1182   00,3271  1 6030 0          TCF     DANZIG

1974   REF 555  LAST 1182   00,3272  3 0156 0  TPUSH   CA      MPAC +2
1975   REF   2  LAST 1125   00,3273  1 6523 1          TCF     ENDTPUSH +2

1976   REF  30  LAST 1180   00,3274  50 120 1  RVQ     INDEX   FIXLOC        RVQ - RETURN IVA QPRET.
1977   REF  17  LAST 1128   00,3275  3 0052 0          CA      QPRET
1978   REF  21  LAST 1140   00,3276  54 117 1          TS      POLISH
1979   REF   5  LAST 1129   00,3277  1 6621 0          TCF     GOTO +4       (ASSUME QPRET POINTS TO FIXED ONLY.)
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P1980                THE FOLLOWING SUBROUTINES ARE USED IN SQUARING MPAC, IN BOTH THE SCALAR AND VECTOR SENSE. THEY ARE
R1982   SPECIAL CASES OF DMPSUB AND DOTSUB, PUT IN TO SAVE SOME TIME.

 1983   REF 556  LAST 1182   00,3300  3 0155 0  DSQSUB   CA      MPAC +1          SQUARES THE SCALAR CONTENTS OF MPAC.
 1984                        00,3301  0 0006 1            EXTEND
 1985                        00,3302  7 0000 0            SQUARE
 1986   REF 557  LAST 1183   00,3303  54 156 1            TS      MPAC +2
 1987   REF 243  LAST 1181   00,3304  3 5021 1            CAF     ZERO             FORM 2(CROSS TERM).
 1988   REF 558  LAST 1183   00,3305  56 155 0            XCH     MPAC +1
 1989                        00,3306  0 0006 1            EXTEND
 1990   REF 559  LAST 1183   00,3307  7 0154 0            MP      MPAC
 1991                        00,3310  20 001 1            DDOUBL           AND MAYBE OVERFLOW.
 1992   REF 560  LAST 1183   00,3311  20 156 1            DAS     MPAC +1  AND SET A TO NET OVERFLOW.
 1993   REF 561  LAST 1183   00,3312  56 154 1            XCH     MPAC
 1994                        00,3313  0 0006 1            EXTEND
 1995                        00,3314  7 0000 0            SQUARE
 1996   REF 562  LAST 1183   00,3315  20 155 1            DAS     MPAC
 1997   REF 272  LAST 1179   00,3316  0 0002 0            TC      Q

 1998                        00,3317  0 0006 1  VSQSUB    EXTEND           DOTS THE VECTOR IN MPAC WITH ITSELF.
 1999   REF   8  LAST 1138   00,3320  22 137 1            QXCH    DOTRET
 2000   REF   2  LAST 1180   00,3321  0 3300 1            TC      DSQSUB   SQUARE THE X COMPONENT.
 2001   REF 563  LAST 1183   00,3322  52 160 1            DXCH    MPAC +3
 2002   REF 564  LAST 1183   00,3323  52 155 1            DXCH    MPAC
 2003   REF  99  LAST 1177   00,3324  52 131 0            DXCH    BUF              SO WE CAN END IN DOTSUB.
 2004   REF 565  LAST 1183   00,3325  3 0156 0            CA      MPAC +2
 2005   REF 100  LAST 1183   00,3326  54 132 0            TS      BUF +2

 2006   REF   3  LAST 1183   00,3327  0 3300 1            TC      DSQSUB   SQUARE Y COMPONENT.
 2007   REF 566  LAST 1183   00,3330  52 156 1            DXCH    MPAC +1
 2008   REF 101  LAST 1183   00,3331  20 132 0            DAS     BUF +1
 2009   REF 567  LAST 1183   00,3332  6 0154 1            AD      MPAC
 2010   REF 102  LAST 1183   00,3333  6 0130 0            AD      BUF
 2011   REF 103  LAST 1183   00,3334  54 130 1            TS      BUF
 2012                        00,3335  1 3337 1            TCF     +2
 2013   REF   8  LAST 1175   00,3336  54 121 1            TS      OVFIND           IF OVERFLOW.

 2014   REF 568  LAST 1183   00,3337  52 162 0            DXCH    MPAC +5
 2015   REF 569  LAST 1183   00,3340  52 155 1            DXCH    MPAC
 2016   REF   4  LAST 1183   00,3341  0 3300 1            TC      DSQSUB   SQUARE Z COMPONENT.
 2017   REF   1              00,3342  1 7154 1            TCF     ENDDOT           END AS IN DOTSUB.
```

P2018 DOUBLE PRECISION SQUARE ROOT ROUTINE. TAKE THE SQUARE ROOT OF THE TRIPLE PRECISION (MPAC +2 USED ONLY
R2020 IN NORMALIZATION) CONTENTS OF MPAC AND LEAVE THE NORMALIZED RESULT IN MPAC (C(MPAC) GREATER THAN OR EQUAL TO
R2022 .5). THE RIGHT SHIFT COUNT (TO UNNORMALIZE) IS LEFT IN MPTEMP.

```
2023  REF 244  LAST 1183  00,3343  3 5021 1  SQRTSUB  CAF   ZERO      START BY ZEROING RIGHT SHIFT COUNT.
2024  REF  58  LAST 1181  00,3344  54 135 1            TS    MPTEMP

2025  REF 570  LAST 1183  00,3345  10 154 0            CCS   MPAC      CHECK FOR POSITIVE ARGUMENT, SHIFTING
2026  REF   1             00,3346  1 3404 0            TCF   SMPAC+    FIRST SIGNIFICANT MPAC REGISTER INTO
2027                      00,3347  1 3351 1            TCF   +2        MPAC ITSELF.
2028  REF   1             00,3350  1 3373 1            TCF   SQRTNEG   SEE IF MAG OF ARGUMENT LESS THAN 10(-4).

2029  REF 571  LAST 1184  00,3351  56 156 0            XCH   MPAC +2   MPAC IS ZERO - SHIFT LEFT 14.
2030  REF 572  LAST 1184  00,3352  56 155 0            XCH   MPAC +1
2031  REF 573  LAST 1184  00,3353  54 154 0            TS    MPAC
2032  REF  15  LAST  896  00,3354  3 5023 0            CAF   SEVEN     AUGMENT RIGHT SHIFT COUNTER.
2033  REF  59  LAST 1184  00,3355  54 135 1            TS    MPTEMP

2034  REF 574  LAST 1184  00,3356  10 154 0            CCS   MPAC      SEE IF MPAC NOW PNZ.
2035  REF   2  LAST 1184  00,3357  1 3404 0            TCF   SMPAC+
2036                      00,3360  1 3362 1            TCF   +2
2037  REF   1             00,3361  1 3376 1            TCF   ZEROANS   NEGATIVE BUT LESS THAN 10(-4) IN MAG.

2038  REF 575  LAST 1184  00,3362  56 155 0            XCH   MPAC +1   ZERO - SHIFT LEFT 14 AGAIN.
2039  REF 576  LAST 1184  00,3363  54 154 0            TS    MPAC
2040  REF  16  LAST 1184  00,3364  3 5023 0            CAF   SEVEN     AUGMENT RIGHT SHIFT COUNTER.
2041  REF  60  LAST 1184  00,3365  26 135 1            ADS   MPTEMP

2042  REF 577  LAST 1184  00,3366  10 154 0            CCS   MPAC
2043  REF   3  LAST 1184  00,3367  1 3404 0            TCF   SMPAC+
2044  REF 273  LAST 1183  00,3370  0 0002 0            TC    Q         SQRT(0) = 0.
2045  REF   2  LAST 1184  00,3371  1 3376 1            TCF   ZEROANS
2046  REF   1             00,3372  1 3452 0            TCF   FIXROOT   DO NOT LEAVE SQRTSUB WITH -0 IN MPAC.

2047  REF 310  LAST 1182  00,3373  10 000 0  SQRTNEG   CCS   A         ARGUMENT IS NEGATIVE, BUT SEE IF SIGN-
2048  REF   1             00,3374  1 3402 0            TCF   SQRTABRT  CORRECTED ARGUMENT IS LESS THAN 10(-4)

2049  REF 578  LAST 1184  00,3375  10 155 1            CCS   MPAC +1   IN MAGNITUDE. IF SO, CALL ANSWER ZERO.
2050  REF 245  LAST 1184  00,3376  3 5021 1  ZEROANS   CAF   ZERO      FORCE ANSWER TO ZERO HERE.
2051  REF   2  LAST 1184  00,3377  1 3452 0            TCF   FIXROOT
2052  REF   2  LAST 1184  00,3400  1 3402 0            TCF   SQRTABRT
2053  REF   3  LAST 1184  00,3401  1 3452 0            TCF   FIXROOT

2054  REF   6  LAST  918  00,3402  0 5721 0  SQRTABRT  TC    PODOOO
2055                      00,3403   01302 1            OCT   1302
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2056  REF   1             00,3404  6 2444 1  SMPAC+  AD      -1/2+2      SEE IF ARGUMENT GREATER THAN OR EQUAL TO
2057                      00,3405  0 0006 1          EXTEND                .5.
2058  REF   1             00,3406  6 3455 0          BZMF    SRTEST      IF SO, SEE IF LESS THAN .25.

2059  REF 579 LAST 1184   00,3407  52 155 1          DXCH    MPAC        WE WILL TAKE THE SQUARE ROOT OF MPAC/2.
2060  REF  25 LAST 1166   00,3410  22 021 1          LXCH    SR          SHIFT RIGHT 1 AND GO TO THE SQRT ROUTINE
2061                      00,3411  0 0006 1          EXTEND
2062  REF  16 LAST 1166   00,3412  7 5002 1          MP      HALF
2063  REF 580 LAST 1185   00,3413  52 155 1          DXCH    MPAC
2064  REF  26 LAST 1185   00,3414  56 021 1          XCH     SR
2065  REF 581 LAST 1185   00,3415  26 155 1          ADS     MPAC +1     GUARANTEED NO OVERFLOW.

2066  REF   1             00,3416  3 2314 0  ARGHI   CAF     SLOPEHI     ARGUMENT BETWEEN .25 AND .5. GET A
2067                      00,3417  0 0006 1          EXTEND                LINEAR APPROXIMATION FOR THIS RANGE.
2068  REF 582 LAST 1185   00,3420  7 0154 0          MP      MPAC
2069  REF   1             00,3421  6 2566 0          AD      BIASHI      X0/2 = (MPAC/2)(SLOPEHI) + BIASHI/2.

2070  REF 104 LAST 1183   00,3422  54 130 1  +4      TS      BUF         X0/2 (ARGLO ENTERS HERE).
2071  REF 583 LAST 1185   00,3423  3 0154 1          CA      MPAC        SINGLE-PRECISION THROUGHOUT.
2072                      00,3424  22 007 0          ZL
2073                      00,3425  0 0006 1          EXTEND
2074  REF 105 LAST 1185   00,3426  10 130 1          DV      BUF         (MPAC/2)/(X0/2)
2075                      00,3427  0 0006 1          EXTEND
2076  REF  17 LAST 1185   00,3430  7 5002 1          MP      HALF
2077  REF 106 LAST 1185   00,3431  26 130 1          ADS     BUF         X1 = X0/2 + .5(MPAC/2)/(X0/2).

2078                      00,3432  0 0006 1          EXTEND
2079  REF  18 LAST 1185   00,3433  7 5002 1          MP      HALF        FORM UP X1/2.
2080  REF 584 LAST 1185   00,3434  52 155 1          DXCH    MPAC        SAVE AND BRING OUT ARGUMENT.
2081                      00,3435  0 0006 1          EXTEND              TAKE DP QUOTIENT WITH X1.
2082  REF 107 LAST 1185   00,3436  10 130 1          DV      BUF
2083  REF 108 LAST 1185   00,3437  54 131 0          TS      BUF +1      SAVE MAJOR PART OF QUOTIENT.
2084  REF 246 LAST 1184   00,3440  3 5021 1          CAF     ZERO        FORM MINOR PART OF QUOTIENT USING
2085  REF 155 LAST 1177   00,3441  56 001 0          XCH     L           (REMAINDER,0).
2086                      00,3442  0 0006 1          EXTEND
2087  REF 109 LAST 1185   00,3443  10 130 1          DV      BUF
2088  REF 156 LAST 1185   00,3444  54 001 1          TS      L           IN PREPARATION FOR DAS.
2089  REF 110 LAST 1185   00,3445  3 0131 1          CA      BUF +1
2090  REF 585 LAST 1185   00,3446  20 155 1          DAS     MPAC        X2 = X1/2 + (MPAC/2)X1

2091                      00,3447  0 0006 1          EXTEND              OVERFLOWS IF ARG. NEAR POSMAX.
2092  REF   1             00,3450  1 3454 0          BZF     TCQBNK00
2093  REF  34 LAST 1170   00,3451  3 4777 1          CAF     POSMAX
2094  REF 586 LAST 1185   00,3452  54 154 0  FIXROOT  TS      MPAC
2095  REF 587 LAST 1185   00,3453  54 155 1          TS      MPAC +1
2096  REF 274 LAST 1184   00,3454  0 0002 0  TCQBNK00 TC      Q           RETURN TO CALLER TO UNNORMALIZE, ETC.
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2097  REF   6  LAST 1021   00,3455  6 5003 1  SRTEST   AD      QUARTER     ARGUMENT WAS LESS THAN .5, SEE IF LESS
2098                       00,3456  0 0006 1           EXTEND              THAN .25.
2099  REF   1              00,3457  6 3501 0           BZMF    SQRTNORM    IF SO, BEGIN NORMALIZATION.

2100  REF 588  LAST 1185   00,3460  52 155 1           DXCH    MPAC        IF BETWEEN .5 AND .25, SHIFT RIGHT 1 AND
2101  REF  27  LAST 1185   00,3461  22 021 1           LXCH    SR          START AT ARGLO.
2102                       00,3462  0 0006 1           EXTEND
2103  REF  19  LAST 1185   00,3463  7 5002 1           MP      HALF
2104  REF 589  LAST 1186   00,3464  52 155 1           DXCH    MPAC
2105  REF  28  LAST 1186   00,3465  56 021 1           XCH     SR
2106  REF 590  LAST 1186   00,3466  26 155 1           ADS     MPAC +1     NO OVERFLOW.

2107  REF   1              00,3467  3 3007 0  ARGLO    CAF     SLOPELO     (NORMALIZED) ARGUMENT BETWEEN .125 AND
2108                       00,3470  0 0006 1           EXTEND              .25
2109  REF 591  LAST 1186   00,3471  7 0154 0           MP      MPAC
2110  REF   1              00,3472  6 2270 0           AD      BIASLO
2111  REF   1              00,3473  1 3422 1           TCF     ARGHI +4    BEGIN SQUARE ROOT.

2112                       00,3474  0 0006 1  SQRTNM2  EXTEND              SHIFT LEFT 2 AND INCREMENT RIGHT SHIFT
2113  REF 592  LAST 1186   00,3475  3 0156 0           DCA     MPAC +1     COUNT (FOR TERMINAL UNNORMALIZATION).
2114  REF 593  LAST 1186   00,3476  20 156 1           DAS     MPAC +1
2115  REF 594  LAST 1186   00,3477  6 0154 1           AD      MPAC
2116  REF 595  LAST 1186   00,3500  26 154 0           ADS     MPAC        (NO OVERFLOW).

2117  REF  61  LAST 1184   00,3501  24 135 0  SQRTNORM INCR    MPTEMP      FIRST TIME THROUGH. JUST SHIFT LEFT 1
2118                       00,3502  0 0006 1           EXTEND              (PUTS IN EFFECTIVE RIGHT SHIFT SINCE
2119  REF 596  LAST 1186   00,3503  3 0156 0           DCA     MPAC +1     WE WANT MPAC/2).
2120  REF 597  LAST 1186   00,3504  20 156 1           DAS     MPAC +1
2121  REF 598  LAST 1186   00,3505  6 0154 1           AD      MPAC
2122  REF 599  LAST 1186   00,3506  26 154 0           ADS     MPAC        (AGAIN NO OVERFLOW).
2123                       00,3507  6 0000 1           DOUBLE
2124  REF  19  LAST  379   00,3510  54 022 0           TS      CYL

2125  REF  20  LAST 1186   00,3511  10 022 0  NORMTEST CCS     CYL         SEE IF ARGUMENT NOW NORMALIZED AT
2126  REF  21  LAST 1186   00,3512  10 022 0           CCS     CYL         GREATER THAN .125.
2127  REF   1              00,3513  1 3474 1           TCF     SQRTNM2     NO - SHIFT LEFT 2 MORE AND TRY AGAIN.
2128  REF   2  LAST 1186   00,3514  1 3416 0           TCF     ARGHI       YES - NOW BETWEEN .5 AND .25.
2129  REF   1              00,3515  1 3467 0           TCF     ARGLO       ARGUMENT NOW BETWEEN .25 AND .125.
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P2130 TRIGONOMETRIC FUNCTION PACKAGE.

R2131 THE FOLLOWING TRIGONOMETRIC FUNCTIONS ARE AVAILABLE AS INTERPRETIVE OPERATIONS:

R2133 1. SIN COMPUTES (1/2)SINE(2 PI MPAC).
R2134 2. COS COMPUTES (1/2)COSINE(2 PI MPAC).

R2135 3. ASIN COMPUTES (1/2PI)ARCSINE(2 MPAC).
R2136 4. ACOS COMPUTES (1/2PI)ARCCOSINE(2 MPAC).

R2137 SIN-ASIN AND COS-ACOS ARE MUTUALLY INVERSE, IE SIN(ASIN(X)) = X.

```
2138  REF   4  LAST 1181   00,3516  0 6672 1  COSINE   TC      BRANCH      FINDS COSINE USING THE IDENTITY
2139                       00,3517  1 3522 0            TCF     +3          COS(X) = SIN(PI/2 - ABS(X)).
2140  REF   1              00,3520  1 3525 1            TCF     PRESINE
2141  REF   2  LAST 1187   00,3521  1 3525 1            TCF     PRESINE

2142                       00,3522  0 0006 1  +3       EXTEND
2143  REF 600  LAST 1186   00,3523  4 0155 1            DCS     MPAC
2144  REF 601  LAST 1187   00,3524  52 155 1            DXCH    MPAC

2145  REF   7  LAST 1186   00,3525  3 5003 1  PRESINE   CAF     QUARTER     PI/2 SCALED.
2146  REF 602  LAST 1187   00,3526  26 154 0            ADS     MPAC

2147  REF 603  LAST 1187   00,3527  52 155 1  SINE     DXCH    MPAC        DOUBLE ARGUMENT.
2148                       00,3530  20 001 1            DDOUBL
2149                       00,3531  54 000 0            OVSK                SEE IF OVERFLOW PRESENT.
2150                       00,3532  1 3535 0            TCF     +3          IF NOT, ARGUMENT OK AS IS.

2151                       00,3533  0 0006 1            EXTEND              IF SO, WE LOST (OR GAINED) PI. SO
2152                       00,3534  4 0001 1            DCOM                COMPLEMENT MPAC USING THE IDENTITY
A2153                                                                       SIN(X-(+)PI) = SIN(-X).
2154  REF 604  LAST 1187   00,3535  52 155 1  +3       DXCH    MPAC
2155  REF 605  LAST 1187   00,3536  3 0154 1            CA      MPAC        SEE IF ARGUMENT GREATER THAN .5 IN
2156                       00,3537  6 0000 1            DOUBLE              MAGNITUDE. IF SO, REDUCE IT TO LESS THAN
2157  REF 157  LAST 1185   00,3540  54 001 1            TS      L           .5 (+-PI/2 SCALED) AS FOLLOWS:
2158  REF   1              00,3541  1 3552 1            TCF     SN1

2159  REF 311  LAST 1184   00,3542  50 000 1            INDEX   A           IF POSITIVE, FORM PI - X. IF NEGATIVE
2160  REF   7  LAST 1082   00,3543  3 5001 0            CAF     NEGI/2 +1   USE -PI - X.
2161                       00,3544  6 0000 1            DOUBLE
2162                       00,3545  0 0006 1            EXTEND
2163  REF 606  LAST 1187   00,3546  60 154 1            SU      MPAC        GUARANTEED NO OVERFLOW.
2164  REF 607  LAST 1187   00,3547  54 154 0            TS      MPAC
2165  REF 608  LAST 1187   00,3550  4 0155 1            CS      MPAC +1
2166  REF 609  LAST 1187   00,3551  54 155 1            TS      MPAC +1
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2167                          00,3552  0 0006 1  SN1     EXTEND                SET UP TO EVALUATE HASTINGS POLYNOMIAL
2168  REF 610  LAST 1187     00,3553  3 0155 0          DCA     MPAC
2169  REF  17  LAST 1173     00,3554  52 134 0          DXCH    BUF2
2170  REF   5  LAST 1183     00,3555  0 3300 1          TC      DSQSUB               SQUARE MPAC.

2171  REF   5  LAST  896     00,3556  0 7171 1          TC      POLY                 EVALUATE FOURTH ORDER POLYNOMIAL.
2172                          00,3557   00003 1         DEC     3
2173                          00,3560   14441 0         2DEC    +.3926990796
2173                          00,3561   37325 1
2174                          00,3562   53250 0         2DEC    -.6459637111
2174                          00,3563   60764 1
2175                          00,3564   12146 1         2DEC    +.318758717
2175                          00,3565   21276 1
2176                          00,3566   75466 1         2DEC    -.074780249
2176                          00,3567   71471 0
2177                          00,3570   00236 0         2DEC    +.009694988
2177                          00,3571   32757 0

2178  REF   1                 00,3572  3 2470 0          CAF     LBUF2                MULTIPLY BY ARGUMENT AND SHIFT LEFT 2.
2179  REF  19  LAST 1149     00,3573  0 7055 0          TC      DMPSUB -1

2180                          00,3574  0 0006 1          EXTEND
2181  REF 611  LAST 1188     00,3575  3 0156 0          DCA     MPAC +1
2182  REF 612  LAST 1188     00,3576  20 156 1          DAS     MPAC +1
2183  REF 613  LAST 1188     00,3577  6 0154 1          AD      MPAC
2184  REF 614  LAST 1188     00,3600  26 154 0          ADS     MPAC                 NEITHER SHIFT OVERFLOWS.
2185                          00,3601  0 0006 1          EXTEND
2186  REF 615  LAST 1188     00,3602  3 0156 0          DCA     MPAC +1
2187  REF 616  LAST 1188     00,3603  20 156 1          DAS     MPAC +1
2188  REF 617  LAST 1188     00,3604  6 0154 1          AD      MPAC
2189  REF 618  LAST 1188     00,3605  26 154 0          ADS     MPAC
2190  REF  47  LAST 1182     00,3606  1 6030 0          TCF     DANZIG
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P2191 ARCSIN/ARCCOS ROUTINE.

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2192  REF   1              00,3607  3 3630 1  ARCSIN   CAF    LASINEX    COMPUTE ARCSIN BY USING THE IDENTITY
2193                       00,3610  1 3612 0            TCF    +2         ARCSIN(X) = PI/2 - ARCCOS(X).

2194  REF   1              00,3611  3 3712 0  ARCCOS   CAF    LDANZIG    (EXITS IMMEDIATELY).
2195  REF   1              00,3612  54 136 1            TS     ESCAPE
2196  REF   5  LAST 1187  00,3613  0 6672 1            TC     BRANCH     TEST SIGN OF INPUT.
2197  REF   1              00,3614  1 3624 0            TCF    ACOSST     START IMMEDIATELY IF POSITIVE.
2198  REF   1              00,3615  1 3726 0            TCF    ACOSZERO   ARCCOS(0) = PI/2 = .25.
2199                       00,3616  0 0006 1            EXTEND            IF NEGATIVE, USE THE IDENTITY
2200  REF 619  LAST 1188   00,3617  4 0155 1            DCS    MPAC       ARCCOS(X) = PI - ARCCOS(-X), FORCING
2201  REF 620  LAST 1189   00,3620  52 155 1            DXCH   MPAC       ARGUMENT POSITIVE.
2202  REF   1              00,3621  3 3731 1            CAF    TCSUBTR    SET EXIT  TO DO ABOVE BEFORE
2203  REF   2  LAST 1189   00,3622  56 136 0            XCH    ESCAPE     ARCSIN/ARCCOS CONSIDERATIONS.
2204  REF   1              00,3623  54 137 0            TS     ESCAPE2

2205  REF  20  LAST 1186   00,3624  4 5002 1  ACOSST   CS     HALF       TEST MAGNITUDE OF INPUT.
2206  REF 621  LAST 1189   00,3625  6 0154 1            AD     MPAC
2207  REF 312  LAST 1187   00,3626  10 000 0            CCS    A
2208  REF   1              00,3627  1 3720 0            TCF    ACOSOVF    THIS IS PROBABLY AN OVERFLOW CASE.

2209  REF   1              00,3630  1 3706 1  LASINEX  TCF    ASINEX

2210  REF   1              00,3631  1 3641 0            TCF    ACOSST2    NO OVERFLOW - PROCEED.

2211  REF 622  LAST 1189   00,3632  10 155 1            CCS    MPAC +1    IF MAJOR PART IS .5, CALL ANSWER 0
2212  REF 247  LAST 1185   00,3633  3 5021 1            CAF    ZERO       UNLESS MINOR PART NEGATIVE.
2213  REF   1              00,3634  1 3636 0            TCF    ACOS=0

2214  REF   2  LAST 1189   00,3635  1 3641 0            TCF    ACOSST2

2215  REF 623  LAST 1189   00,3636  54 155 1  ACOS=0   TS     MPAC +1
2216  REF 624  LAST 1189   00,3637  54 154 0            TS     MPAC
2217  REF   3  LAST 1189   00,3640  0 0136 0            TC     ESCAPE

2218                       00,3641  0 0006 1  ACOSST2  EXTEND            NOW THAT ARGUMENT IS IN PROPER RANGE.
2219  REF 625  LAST 1189   00,3642  4 0155 1            DCS    MPAC       BEGIN COMPUTATION. USE HASTINGS
2220  REF  21  LAST 1189   00,3643  6 5002 0            AD     HALF       APPROXIMATION ARCCOS(X) = SQRT(1-X)P(X)
2221  REF 626  LAST 1189   00,3644  52 155 1            DXCH   MPAC       IN A SCALED VERSION WHERE P(X) IS A
2222  REF  18  LAST 1188   00,3645  52 134 0            DXCH   BUF2       SEVENTH ORDER POLYNOMIAL.

2223  REF   3  LAST 1181   00,3646  0 3343 0            TC     SQRTSUB    RETURNS WITH NORMALIZED SQUARE ROOT.

2224  REF  62  LAST 1186   00,3647  10 135 1            CCS    MPTEMP     SEE IF UN-NORMALIZATION REQUIRED.
2225  REF   1              00,3650  1 3713 0            TCF    ACOSSHR    IF SO.
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2226   REF 627  LAST 1189   00,3651  52 155 1  ACOS3   DXCH   MPAC          SET UP FOR POLYNOMIAL EVALUATION.
2227   REF  19  LAST 1189   00,3652  52 134 0          DXCH   BUF2
2228   REF 628  LAST 1190   00,3653  52 155 1          DXCH   MPAC

2229   REF   6  LAST 1188   00,3654  0 7171 1          TC     POLY
2230                        00,3655   00006 1          DEC    6
2231                        00,3656   13240 0          2DEC   +.353553385     COEFFICIENTS ARE C 2(+I)/PISQRT(2) WHERE
2231                        00,3657   23630 0
2232                        00,3660   74721 0          2DEC*  -.0483017006 B+1*                 I
2232                        00,3661   47775 1
2233                        00,3662   02440 0          2DEC*  +.0200273085 B+2*    WHERE C STANDS FOR ORIGINAL COEFFS.
2233                        00,3663   20237 0
2234                        00,3664   75067 1          2DEC*  -.0112931863 B+3*
2234                        00,3665   70742 1
2235                        00,3666   03436 0          2DEC*  +.00695311612 B+4*
2235                        00,3667   26756 1
2236                        00,3670   74037 0          2DEC*  -.00384617957 B+5*
2236                        00,3671   57640 1
2237                        00,3672   03046 0          2DEC*  +.001501297736 B+6*
2237                        00,3673   07143 0
2238                        00,3674   76654 1          2DEC*  -.000284160334 B+7*
2238                        00,3675   42244 0

2239   REF   2  LAST 1188   00,3676  3 2470 0          CAF    LBUF2          DO FINAL MULTIPLY AND GO TO ANY
2240   REF  20  LAST 1188   00,3677  0 7055 0          TC     DMPSUB -1      EPILOGUE SEQUENCES.
2241   REF   4  LAST 1189   00,3700  0 0136 0          TC     ESCAPE

2242                        00,3701  0 0006 1  SUBTR    EXTEND                EPILOGUE FOR NEGATIVE INPUTS TO ARCCOS.
2243   REF 629  LAST 1190   00,3702  4 0155 1          DCS    MPAC
2244   REF  22  LAST 1189   00,3703  6 5002 0          AD     HALF           FORMS PI - ARCCOS(-X) = ARCCOS(X).
2245   REF 630  LAST 1190   00,3704  52 155 1          DXCH   MPAC
2246   REF   2  LAST 1189   00,3705  0 0137 1          TC     ESCAPE2        GO TO POSSIBLE ARCSIN EPILOGUE.

2247                        00,3706  0 0006 1  ASINEX   EXTEND
2248   REF 631  LAST 1190   00,3707  4 0155 1          DCS    MPAC           ARCSIN EPILOGUE - GET ARCSIN(X)
2249   REF   8  LAST 1187   00,3710  6 5003 1          AD     QUARTER        = PI/2 - ARCCOS(X).
2250   REF 632  LAST 1190   00,3711  52 155 1          DXCH   MPAC
2251   REF  48  LAST 1188   00,3712  1 6030 0  LDANZIG  TCF    DANZIG
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2252   REF 313  LAST 1189   00,3713  50 000 1  ACOSSHR  INDEX  A          THE SHIFT RIGHT IS LESS THAN 14 SINCE
2253   REF  66  LAST 1178   00,3714  3 5002 0            CAF    BIT14      THE INPUT WAS NON-ZERO DP.
2254   REF  63  LAST 1189   00,3715  54 135 1            TS     MPTEMP
2255   REF   4  LAST 1155   00.3716  0 2073 1            TC     VSHRRND    DP SHIFT RIGHT AND ROUND.
2256   REF   1              00,3717  1 3651 1            TCF    ACOS3      PROCEED.

2257                        00,3720  0 0006 1  ACOSOVF  EXTEND             IF MAJOR PART WAS ONLY 1 MORE THAN .5.
2258   REF   2  LAST 1189   00,3721  1 3636 0            BZF    ACOS=0     CALL ANSWER ZERO.

2259   REF  34  LAST  828   00,3722  0 5650 1  ACOSABRT TC     ALARM      IF OVERFLOW, CALL ANSWER ZERO BUT
22591                       00.3723   01301 1            OCT    1301       SOUND AN ALARM.

2260   REF 248  LAST 1189   00,3724  3 5021 1            CAF    ZERO
22601  REF   3  LAST 1191   00,3725  1 3636 0            TCF    ACOS=0

2261   REF   9  LAST 1190   00,3726  3 5003 1  ACOSZERO CAF    QUARTER    ACOS(0) = PI/2.
2262   REF   4  LAST 1191   00,3727  1 3637 1            TCF    ACOS=0 +1  SET MPAC AND EXIT VIA ESCAPE.

2263                        00,3730   77763 0  NEG12    DEC    -12
2264   REF   1              00,3731  1 3701 0  TCSUBTR  TCF    SUBTR
```

P2265 THE FOLLOWING INSTRUCTIONS ARE AVAILABLE FOR SETTING, MODIFYING, AND BRANCHING ON INDEX REGISTERS:

R2267 1. AXT ADDRESS TO INDEX TRUE.
R2268 1. AXC ADDRESS TO INDEX COMPLEMENTED.
R2269 3. LXA LOAD INDEX FROM ERASABLE.
R2270 4. LXC LOAD INDEX COMPLEMENTED FROM ERASABLE.
R2271 5. SXA STORE INDEX IN ERASABLE.
R2272 6. XCHX EXCHANGE INDEX REIGSTER WITH ERASABLE.

R2273 7. INCR INCREMENT INDEX REGISTER.
R2274 8. XAD ERASABLE ADD TO INDEX REGISTER.
R2275 9. XSU ERASABLE SUBTRACT FROM INDEX REGISTER.

R2276 10. TIX BRANCH ON INDEX REGISTER AND DECREMENT.

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2277                        01,2371                     BANK    01

2278  REF   1                                           COUNT   01/INTER

2279  REF   1               01,2371  0 2466 1  AXT      TC      TAGSUB          SELECT APPROPRIATE INDEX REGISTER.
2280  REF  22  LAST 1182    01,2372  3 0117 0           CA      POLISH
2281  REF   4  LAST 1111    01,2373  50 130 0  XSTORE   INDEX   INDEXLOC        CONTAINS C(FIXLOC) OR C(FIXLOC)+1.
2282  REF  58  LAST 1121    01,2374  54 046 1           TS      X1
2283  REF  49  LAST 1190    01,2375  1 6030 0           TCF     DANZIG

2284  REF   2  LAST 1192    01,2376  0 2466 1  AXC      TC      TAGSUB
2285  REF  23  LAST 1192    01,2377  4 0117 1           CS      POLISH
2286  REF   1               01,2400  0 2373 1           TC      XSTORE

2287  REF   1               01,2401  0 2454 0  LXA      TC      15ADRERS        LOAD INDEX REGISTER FROM ERASABLE.
2288  REF  24  LAST 1192    01,2402  50 117 0           INDEX   POLISH
2289                        01,2403  3 0000 1           CA      0
2290  REF   2  LAST 1192    01,2404  1 2373 0           TCF     XSTORE

2291  REF   2  LAST 1192    01,2405  0 2454 0  LXC      TC      15ADRERS        LOAD NDX REG FROM ERASABLE COMPLEMENTED.
2292  REF  25  LAST 1192    01,2406  50 117 0           INDEX   POLISH
2293                        01,2407  4 0000 0           CS      0
2294  REF   3  LAST 1192    01,2410  1 2373 0           TCF     XSTORE

2295  REF   3  LAST 1192    01,2411  0 2454 0  SXA      TC      15ADRERS        STORE INDEX REGISTER IN ERASABLE.
2296  REF   5  LAST 1192    01,2412  50 130 0           INDEX   INDEXLOC
2297  REF  59  LAST 1192    01,2413  3 0046 0           CA      X1
2298  REF  26  LAST 1192    01,2414  50 117 0  MSTORE1  INDEX   POLISH
2299                        01,2415  54 000 0           TS      0
2300  REF  50  LAST 1192    01,2416  1 6030 0           TCF     DANZIG
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2301  REF   4  LAST 1192  01,2417  0 2454 0  XCHX    TC     15ADRERS   EXCHANGE INDEX REGISTER WITH ERASABLE.
2302  REF  27  LAST 1192  01,2420  50 117 0          INDEX  POLISH
2303                       01,2421  3 0000 1          CA     0
2304  REF   6  LAST 1192  01,2422  50 130 0          INDEX  INDEXLOC
2305  REF  60  LAST 1192  01,2423  56 046 0          XCH    X1
2306  REF   1              01,2424  1 2414 0          TCF    MSTORE1

2307  REF   5  LAST 1193  01,2425  0 2454 0  XAD     TC     15ADRERS   ADD ERASABLE TO INDEX REGISTER.
2308  REF  28  LAST 1193  01,2426  50 117 0          INDEX  POLISH
2309                       01,2427  3 0000 1          CA     0
2310  REF   7  LAST 1193  01,2430  50 130 0  XAD2    INDEX  INDEXLOC
2311  REF  61  LAST 1193  01,2431  26 046 1          ADS    X1         IGNORING OVERFLOWS.
2312  REF  51  LAST 1192  01,2432  1 6030 0          TCF    DANZIG

2313  REF   3  LAST 1192  01,2433  0 2466 1  INCR    TC     TAGSUB     INCREMENT INDEX REGISTER.
2314  REF  29  LAST 1193  01,2434  3 0117 0          CA     POLISH
2315  REF   1              01,2435  1 2430 0          TCF    XAD2

2316  REF   6  LAST 1193  01,2436  0 2454 0  XSU     TC     15ADRERS   SUBTRACT ERASABLE FROM INDEX REGISTER.
2317  REF  30  LAST 1193  01,2437  50 117 0          INDEX  POLISH
2318                       01,2440  4 0000 0          CS     0
2319  REF   2  LAST 1193  01,2441  1 2430 0          TCF    XAD2

2320  REF   4  LAST 1193  01,2442  0 2466 1  TIX     TC     TAGSUB     BRANCH AND DECREMENT ON INDEX.
2321  REF   8  LAST 1193  01,2443  50 130 0          INDEX  INDEXLOC
2322  REF  36  LAST  919  01,2444  4 0050 0          CS     S1
2323  REF   9  LAST 1193  01,2445  50 130 0          INDEX  INDEXLOC
2324  REF  62  LAST 1193  01,2446  6 0046 0          AD     X1
2325                       01,2447  0 0006 1          EXTEND             NO OPERATION IF DECREMENTED INDEX IS
2326  REF  52  LAST 1193  01,2450  6 6030 1          BZMF   DANZIG      NEGATIVE OR ZERO.

2327  REF  10  LAST 1193  01,2451  50 130 0  DOTIXBR  INDEX  INDEXLOC
2328  REF  63  LAST 1193  01,2452  56 046 0          XCH    X1         IGNORING OVERFLOWS.

2329  REF   6  LAST 1182  01,2453  1 6615 1          TCF    GOTO       DO THE BRANCH USING THE CADR IN POLISH.
```

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P2330 SUBROUTINE TO CONVERT AN ERASABLE ADDRESS (11 BITS) TO AN EBANK SETTING AND SUBADDRESS.

```
2332  REF  31  LAST 1193  01,2454  4 0117 1  15ADRERS CS    POLISH
2333  REF   2  LAST 1121  01,2455  6 5034 0             AD    DEC45
2334  REF 314  LAST 1191  01,2456  10 000 0             CCS   A       DOES THE ADDRESS POINT TO THE WORK AREA?
2335  REF  31  LAST 1182  01,2457  3 0120 1             CA    FIXLOC  YES.  ADD FIXLOC.  EBANK OK AS IS.
2336                       01,2460  1 2465 0             TCF   +5

2337  REF   7  LAST 1121  01,2461  3 5051 0             CA    OCT1400 NO.  SET EBANK & MAKE UP SUBADDRESS.
2338  REF  32  LAST 1194  01,2462  56 117 0             XCH   POLISH
2339  REF  51  LAST 1129  01,2463  54 003 0             TS    EBANK
2340  REF  12  LAST 1129  01,2464  7 4373 0             MASK  LOW8
2341  REF  33  LAST 1194  01,2465  26 117 1  +5         ADS   POLISH  FALL INTO TAGSUB, AND RETURN VIA Q.
```

R2342 SUBROUTINE WHICH SETS THE ADDRESS OF THE SPECIFIED INDEX IN INDEXLOC. (ACTUALLY. THE ADDRESS -38D.)

```
2344  REF  32  LAST 1194  01,2466  3 0120 1  TAGSUB  CA    FIXLOC
2345  REF  11  LAST 1193  01,2467  54 130 1            TS    INDEXLOC

2346  REF  36  LAST 1161  01,2470  10 020 1            CCS   CYR     BIT 15 SPECIFIES INDEX.
2347  REF  12  LAST 1194  01,2471  24 130 0            INCR  INDEXLOC  0 MEANS USE X2.
2348  REF 275  LAST 1185  01,2472  0 0002 0            TC    Q
2349  REF 276  LAST 1194  01,2473  0 0002 0            TC    Q         1 FOR X1.
```

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P2350 MISCELLANEOUS OPERATION CODES WITH DIRECT ADDRESSES. INCLUDED HERE ARE:

R2352 1. ITA STORE QPRET (RETURN ADDRESS) IN ERASABLE.
R2354 2. CALL CALL A SUBROUTINE, LEAVING RETURN IN QPRET.
R2356 3. RTB RETURN TO BASIC LANGUAGE AT THE GIVEN ADDRESS.
R2358 4. BHIZ BRANCH IF THE HIGH ORDER OF MPAC IS ZERO (SINGLE PRECISION).
R2360 5. BOV BRANCH ON OVERFLOW.
R2361 6. GOTO SIMPLE SEQUENCE CHANGE.

```
 2362   REF  37  LAST 1194   01,2474  10 020 1  RTB/BHIZ CCS     CYR
 2363   REF  34  LAST 1194   01,2475  3 0117 0  RTB       CA      POLISH
 2364   REF   5  LAST  777   01,2476  0 4665 0            TC      SWCALL   -1     SO A "TC Q" FROM ROUTINE LEADS TO DANZIG

 2365   REF 633  LAST 1190   01,2477  10 154 0  BHIZ      CCS     MPAC
 2366   REF  53  LAST 1193   01,2500  1 6030 0            TCF     DANZIG
 2367   REF   7  LAST 1193   01,2501  1 6615 1            TCF     GOTO
 2368   REF  54  LAST 1195   01,2502  1 6030 0            TCF     DANZIG
 2369   REF   8  LAST 1195   01,2503  1 6615 1            TCF     GOTO

 2370   REF   9  LAST 1183   01,2504  10 121 1  BOV(B)    CCS     OVFIND          BRANCH ON OVERFLOW TO BASIC OR INTERP.
 2371                        01,2505  1 2507 0            TCF     +2
 2372   REF  55  LAST 1195   01,2506  1 6030 0            TCF     DANZIG
 2373   REF  10  LAST 1195   01,2507  54 121 1            TS      OVFIND
 2374   REF  38  LAST 1195   01,2510  10 020 1            CCS     CYR
 2375   REF   1              01,2511  1 2475 1            TCF     RTB             IF BASIC.
 2376                        01,2512   00360 1  BSTORB    OCT     360
 2377   REF   9  LAST 1195   01,2513  1 6615 1            TCF     GOTO
```

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```
2378   REF  39  LAST 1195   01,2514  10 020 1  BZE/GOTO CCS    CYR        SEE WHICH OP-CODE IS DESIRED.
2379   REF   6  LAST 1189   01,2515  0 6672 1            TC     BRANCH     DO BZE.
2380   REF  56  LAST 1195   01,2516  1 6030 0            TCF    DANZIG
2381   REF  10  LAST 1195   01,2517  1 6615 1            TCF    GOTO       DO GOTO.
2382   REF  57  LAST 1196   01,2520  1 6030 0            TCF    DANZIG

2383   REF  40  LAST 1196   01,2521  10 020 1  BPL/BMN  CCS    CYR
2384   REF   1              01,2522  1 2530 1            TCF    BPL
2385                        01,2523   12000 1  5B10     DEC    5 B+10     SHIFTS OP CODE IN SWITCH INSTRUCTION ADR

2386   REF   7  LAST 1196   01,2524  0 6672 1            TC     BRANCH     DO BMN.
2387   REF  58  LAST 1196   01,2525  1 6030 0            TCF    DANZIG
2388   REF  59  LAST 1196   01,2526  1 6030 0            TCF    DANZIG
2389   REF  11  LAST 1196   01,2527  1 6615 1            TCF    GOTO       ONLY IF NNZ.

2390   REF   8  LAST 1196   01,2530  0 6672 1  BPL      TC     BRANCH
2391   REF  12  LAST 1196   01,2531  1 6615 1            TCF    GOTO       IF POSITIVE OR ZERO.
2392   REF  13  LAST 1196   01,2532  1 6615 1            TCF    GOTO
2393   REF  60  LAST 1196   01,2533  1 6030 0            TCF    DANZIG

2394   REF  41  LAST 1196   01,2534  10 020 1  CALL/ITA CCS    CYR
2395   REF   1              01,2535  1 6607 1            TCF    CALL

2396   REF   7  LAST  363   01,2536  0 5747 0            TC     CCSHOLE
2397   REF   7  LAST 1193   01,2537  0 2454 0            TC     15ADRERS   STORE QPRET. (TAGSUB AFTER 15ADRERS IS
2398   REF  33  LAST 1194   01,2540  50 120 1            INDEX  FIXLOC     SLOW IN THIS CASE, BUT SAVES STORAGE.)
2399   REF  18  LAST 1182   01,2541  3 0052 0            CA     QPRET
2400   REF   2  LAST 1193   01,2542  1 2414 0            TCF    MSTOREI
```

```
P2401           THE FOLLOWING OPERATIONS ARE AVAILABLE FOR ALTERING AND TESTING INTERPRETIVE SWITCHES:

R2403   00      BONSET          SET A SWITCH AND DO A GOTO IF IT WAS ON.
R2404   01      SETGO           SET A SWITCH AND DO A GOTO.
R2405   02      BOFSET          SET A SWITCH AND DO A GOTO IF IT WAS OFF
R2406   03      SET             SET A SWITCH.

R2407   04      BONINV          INVERT A SWITCH AND BRANCH IF IT WAS ON.
R2408   05      INVGO           INVERT A SWITCH AND DO A GOTO.
R2409   06      BOFINV          INVERT A SWITCH AND BRANCH IF IT WAS OFF
R2410   07      INVERT          INVERT A SWITCH.

R2411   10      BONCLR          CLEAR A SWITCH AND BRANCH IF IT WAS ON.
R2412   11      CLRGO           CLEAR A SWITCH AND DO A GOTO.
R2413   12      BOFCLR          CLEAR A SWITCH AND BRANCH IF IT WAS OFF.
R2414   13      CLEAR           CLEAR A SWITCH.

R2415   14      BON             BRANCH IF A SWITCH WAS ON.
R2416   16      BOFF            BRANCH IF A SWITCH WAS OFF.


R2417           THE ADDRESS SUPPLIED WITH THE SWITCH INSTRUCTION IS INTERPRETED AS FOLLOWS:

R2419           BITS 1-4    SWITCH BIT NUMBER (1-15).
R2420           BITS 5-8    SWITCH OPERATION NUMBER.
R2421           BITS 9-     SWITCH WORD NUMBER (UP TO 64 SWITCH WORDS).

R2422           THE ADDRESS ITSELF IS MADE UP BY THE YUL SYSTEM ASSEMBLER. THE BRANCH INSTRUCTIONS REQUIRE TWO
R2424   ADDRESSES, THE SECOND TAKEN AS THE DIRECT (OR INDIRECT IF IN ERASABLE) ADDRESS OF THE BRANCH.


 2426   REF   3  LAST 1006   01,2543  3 5026 0  SWITCHES CAF    LOW4        LEAVE THE SWITCH BIT IN  SWBIT  .
 2427   REF  35  LAST 1195   01,2544  7 0117 1            MASK   POLISH
 2428   REF 315  LAST 1194   01,2545  50 000 1            INDEX  A
 2429   REF  46  LAST 1181   01,2546  3 5001 0            CAF    BIT15       (NUMBER FROM LEFT TO RIGHT.)
 2430   REF   1               01,2547  54 131 0            TS     SWBIT

 2431   REF  43  LAST 1097   01,2550  3 5011 1            CAF    BIT7        LEAVE THE SWITCH NUMBER IN SWWORD.
 2432                        01,2551  0 0006 1            EXTEND
 2433   REF  36  LAST 1197   01,2552  7 0117 1            MP     POLISH
 2434   REF   1               01,2553  54 130 1            TS     SWWORD

 2435                        01,2554  0 0004 0            INHINT              DURING SWITCH CHANGE SO RUPT CAN USE TOO
 2436   REF 316  LAST 1197   01,2555  50 000 1            INDEX  A            LEAVE THE SWITCH WORD ITSELF IN L.
 2437   REF  51  LAST  844   01,2556  3 0074 1            CA     STATE
 2438   REF 277  LAST 1194   01,2557  54 002 1            TS     Q            Q WILL BE USED AS A CHANNEL.
```

```
2439   REF  30  LAST 1066   01,2560  3 5005 1          CAF     BIT11
2440                        01,2561  0 0006 1          EXTEND                DISPATCH SWITCH BIT OPERATION AS IN BITS
2441   REF  37  LAST 1197   01,2562  7 0117 1          MP      POLISH        7-8 OF POLISH.
2442   REF   1               01,2563  7 2623 0          MASK    B3TOB4        GETS 4X2-BIT CODE.
2443   REF 317  LAST 1197   01,2564  50 000 1          INDEX   A
2444                        01,2565  1 2566 1          TCF     +1

2445   REF   2  LAST 1197   01,2566  3 0131 1  +1      CA      SWBIT         00 - SET SWITCH IN QUESTION.
2446                        01,2567  0 0006 1          EXTEND
2447   REF   1               01,2570  04 002 1          ROR     QCHAN
2448   REF   1               01,2571  1 2600 1          TCF     SWSTORE

2449   REF   3  LAST 1198   01,2572  3 0131 1  +5      CA      SWBIT         01 - INVERT SWITCH.
2450                        01,2573  0 0006 1          EXTEND
2451   REF   2  LAST 1198   01,2574  06 002 0          RXOR    QCHAN
2452   REF   2  LAST 1198   01,2575  1 2600 1          TCF     SWSTORE

2453   REF   4  LAST 1198   01,2576  4 0131 0  +9D      CS      SWBIT         10 - CLEAR.
2454   REF 278  LAST 1197   01,2577  7 0002 1          MASK    Q
2455   REF   2  LAST 1197   01,2600  50 130 0  SWSTORE  INDEX   SWWORD
2456   REF  52  LAST 1197   01,2601  54 074 0          TS      STATE         NEW SWITCH WORD.
```

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```
2457                              01,2602  0 0003 1  +13D    RELINT            11 - NOOP.
2458   REF  45  LAST 1033        01,2603  3 5003 1          CAF    BIT13
2459                              01,2604  0 0006 1          EXTEND            DISPATCH SEQUCE CHANGING OR BRANCHING
2460   REF  38  LAST 1198        01,2605  7 0117 1          MP     POLISH      CODE.
2461   REF   2  LAST 1198        01,2606  7 2623 0          MASK   B3TOB4
2462   REF 318  LAST 1198        01,2607  50 000 1          INDEX  A
2463                              01,2610  1 2611 1          TCF    +1          ORIGINALLY STORED IN BITS 5-6.

2464   REF 279  LAST 1198        01,2611  4 0002 1  +1      CS     Q           00 - BRANCH IF ON.
2465   REF   5  LAST 1198        01,2612  7 0131 0  TEST    MASK   SWBIT
2466   REF 319  LAST 1199        01,2613  10 000 0          CCS    A
2467   REF   1                   01,2614  1 2624 1          TCF    SWSKIP

2468   REF   1                   01,2615  1 6664 1  +5      TCF    SWBRANCH    01 - GO TO.

2469   REF   2  LAST 1199        01,2616  1 2624 1          TCF    SWSKIP      HERE ONLY ON BIT 15.

2470   REF   9  LAST 1196        01,2617  0 5747 0          TC     CCSHOLE
2471   REF   9  LAST 1199        01,2620  0 5747 0          TC     CCSHOLE

2472   REF 280  LAST 1199        01,2621  3 0002 0  +9D     CA     Q           10 - BRANCH IF OFF.
2473   REF   1                   01,2622  1 2612 1          TCF    TEST

2474                              01,2623   00014 1  B3TOB4  OCT    0014
2475   REF  28  LAST 1130        01,2624  24 164 1  SWSKIP  INCR   LOC
2476   REF   1                   01,2543            SW/     EQUALS SWITCHES
2477   REF  61  LAST 1196        01,2625  1 6030 0  +13D    TCF    DANZIG           11 - NOOP.
```

L FIXED-FIXED CONSTANT POOL USER'S PAGE NO. 1 E0 S3

```
 0001                          4776                    BLOCK  02

 00015 REF   1                                         COUNT  02/FCONS

R00016   THE FOLLOWING TABLE OF 18 VALUES IS INDEXED. DO NOT INSERT OR REMOVE ANY QUANTITIES.

 0002                          4776   37777 1  DPOSMAX  OCT    37777          MUST PRECEDE POSMAX
 0003                          4777   37777 1  POSMAX   OCT    37777

 0004   REF   8  LAST 1187     5000            LIMITS   =      NEG1/2

 0007                          5000   57777 1  NEG1/2   OCT    -20000         USED BY SIN ROUTINE (MUST BE TWO
A0008                                                                        LOCATIONS IN FRONT OF BIT14)
R0009            BIT TABLE

 0010                          5001   40000 0  BIT15    OCT    40000
 0011                          5002   20000 0  BIT14    OCT    20000
 0012                          5003   10000 0  BIT13    OCT    10000
 0013                          5004   04000 0  BIT12    OCT    04000
 0014                          5005   02000 0  BIT11    OCT    02000
 0015                          5006   01000 0  BIT10    OCT    01000
 0016                          5007   00400 0  BIT9     OCT    00400
 0017                          5010   00200 0  BIT8     OCT    00200
 0018                          5011   00100 0  BIT7     OCT    00100
 0019                          5012   00040 0  BIT6     OCT    00040
 0020                          5013   00020 0  BIT5     OCT    00020
 0021                          5014   00010 0  BIT4     OCT    00010
 0022                          5015   00004 0  BIT3     OCT    00004
 0023                          5016   00002 0  BIT2     OCT    00002
 0024                          5017   00001 0  BIT1     OCT    00001


R0025   DO NOT DESTROY THIS COMBINATION, SINCE IT IS USED IN DOUBLE PRECISION INSTRUCTIONS.
 0027                          5020   77777 0  NEGO     OCT    -0             MUST PRECEDE ZERO
 0028                          5021   00000 1  ZERO     OCT    0              MUST FOLLOW NEGO
A0029                                         BIT1     OCT    00001
A0030                                         NO.WDS   OCT    2              INTERPRETER
A0031                                         OCTAL3   OCT    3              INTERPRETER
A0032                                         R3D1     OCT    4              PINBALL
 0033                          5022   00005 1  FIVE     OCT    5
A0034                                         REVCNT   OCT    6              INTERPRETER
 0035                          5023   00007 0  SEVEN    OCT    7
A0036                                         BIT4     OCT    00010
A0037                                         R2D1     OCT    11             PINBALL
 00375 REF   6  LAST  375      4334            OCT11    =      R2D1           P20S
A0038                                         BINCON   DEC    10             PINBALL          (OCTAL 12)
 0039                          5024   00013 0  ELEVEN   DEC    11
A0040                                         OCT14    OCT    14             ALARM AND ABORT (FILLER)
 00401                         5025   00015 0  OCT15    OCT    15
A0041                                         R1D1     OCT    16             PINBALL
```

```
 0043                          5026   00017 1  LOW4      OCT    17
A0044                                         BIT5      OCT    00020
A0045                                         ND1       OCT    21        PINBALL
A0046                                         VD1       OCT    23        PINBALL
A0047                                         OCT24     OCT    24        SERVICE ROUTINES
A0048                                         MD1       OCT    25        PINBALL
 00485                        5027   00030 1  BITS4&5   OCT    30
A0049                                         OCT31     OCT    31        SERVICE ROUTINES
 0050                         5030   00032 0  CALLCODE  OCT    00032
A0051                                         LOW5      OCT    37        PINBALL
A0052                                         33DEC     DEC    33        PINBALL              (OCTAL 41)
A0053                                         34DEC     DEC    34        PINBALL              (OCTAL 42)
 0054                         5031   00045 0  TBUILDFX  DEC    37        BUILDUP FOR CONVIENCE IN DAPTESTING
 0055                         5032   00046 0  TDECAYFX  DEC    38        CONVENIENCE FOR DAPTESTING
A0056                                         BIT6      OCT    00040
 0057                         5033   00050 1  OCT50     OCT    50
 0058                         5034   00055 1  DEC45     DEC    45
 0059                         5035   00060 1  SUPER011  OCT    60        BITS FOR SUPERBNK SETTING 011.
 0060                         5036   00062 0  .5SEC     DEC    50
A0061                                         BIT7      OCT    00100

 0062  REF  44  LAST 1197     5011             SUPER100  =      BIT7      BITS FOR SUPERBNK SETTING 100
A0063                                                                    (LAST 4K OF ROPE)
 0064                         5037   00120 1  SUPER101  OCT    120       BITS FOR SUPERBNK SETTING 101
A0065                                         OCT121    OCT    121       SERVICE ROUTINES
A0066                                                                    (FIRST 8K OF ACM)
 0067                         5040   00140 1  SUPER110  OCT    140       BITS FOR SUPERBNK SETTING 110.
A0068                                                                    (LAST 8K OF ACM)
 0069                         5041   00144 0  1SEC      DEC    100
A0070                                         LOW7      OCT    177       INTERPRETER
A0071                                         BIT8      OCT    00200
A0072                                         OT215     OCT    215       ALARM AND ABORT
A0073                                         8,5       OCT    00220     P20-P25 SUNDANCE
 0074                         5042   00310 0  2SECS     DEC    200
A0075                                         LOW8      OCT    377       PINBALL
A0076                                         BIT9      OCT    00400
 0077                         5043   00401 1  GN/CCODE  OCT    00401     SET S/C CONTROL SWITCH TO G/N
 0079                         5044   00454 1  3SECS     DEC    300
 0080                         5045   00620 0  4SECS     DEC    400
 00801                        5046   00777 0  LOW9      OCT    777
A0081                                         BIT10     OCT    01000
A0082                                         5.5DEGS   DEC    .03056    P20-P25 SUNDANCE   (OCTAL 00765)
A0083                                         OCT1103   OCT    1103      ALARM AND ABORT
 0084                         5047   01124 1  C5/2      DEC    .0363551                     (OCTAL 01124)
 0085                         5050   01211 1  V05N09    VN     0509      (SAME AS OCTAL 1211)
 0086                         5051   01400 1  OCT1400   OCT    01400
 00865                        5052   01426 0  V06N22    VN     0622
A0087                                         MID5      OCT    1740      PINBALL
 00875                        5053   01776 0  BITS2-10  OCT    1776
 0088                         5054   01777 1  LOW10     OCT    1777
```

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A0089                                  BIT11    OCT    02000
A0090                                  2K+3     OCT    2003        PINBALL
 0091                  5055   02177 1  LOW7+2K  OCT    2177        OP CODE MASK + BANK 1 FBANK SETTING.
 0092                  5056   02400 1  EBANK5   OCT    02400
 0093                  5057   03000 1  PRIO3    OCT    03000
 0094                  5060   03400 0  EBANK7   OCT    03400
A0095                                  LOW11    OCT    3777        PINBALL
A0096                                  BIT12    OCT    04000
A0097                                  RELTAB   OCT    04025       T4RUPT
 0098                  5061   05000 1  PRIO5    OCT    05000
 0099                  5062   06000 1  PRIO6    OCT    06000
 0100                  5063   07000 0  PRIO7    OCT    07000

A0102                                  BIT13    OCT    10000
A0103                                           OCT    10003       T4RUPT     RELTAB +1D
A0104                                  13,7,2   OCT    10102       P20-P25 SUNDANCE
 0105                  5064   11000 1  PRIO11   OCT    11000
A0106                                  PRIO12   OCT    12000       BANKCALL
 0107                  5065   13000 0  PRIO13   OCT    13000
 0108                  5066   14000 1  PRIO14   OCT    14000
A0109                                           OCT    14031       T4RUPT     RELTAB +2D
 0110                  5067   15000 0  PRIO15   OCT    15000
 0111                  5070   16000 0  PRIO16   OCT    16000
A0112                                  85DEGS   DEC    .45556      P20-P25 SUNDANCE   (OCTAL 16450)
 0113                  5071   17000 1  PRIO17   OCT    17000
 0114                  5072   17770 1  OCT17770 OCT    17770
A0115                                  BIT14    OCT    20000
A0116                                           OCT    20033       T4RUPT     RELTAB +3D
 0117                  5073   21000 1  PRIO21   OCT    21000
 01175                 7657            BLOCK    03
 01176 REF   1                         COUNT    03/FCONS

 0118                  7657   22000 1  PRIO22   OCT    22000       SERVICE ROUTINES
 0119                  7660   23000 0  PRIO23   OCT    23000
 0120                  7661   24000 1  PRIO24   OCT    24000
A0121                                  5/8+1    OCT    24001       SINGLE PRECISION SUBROUTINES
A0122                                           OCT    24017       T4RUPT     RELTAB +4D
 0123                  7662   25000 0  PRIO25   OCT    25000
 0124                  7663   26000 0  PRIO26   OCT    26000
 0125                  7664   27000 1  PRIO27   OCT    27000
A0126                                  CHRPRIO  OCT    30000       PINBALL
A0127                                           OCT    30036       T4RUPT     RELTAB +5D
 0128                  7665   31000 0  PRIO31   OCT    31000
 0129                  7666   31103 1  C1/2     DEC    .7853134                       (OCTAL 31103)
 0130                  7667   32000 0  PRIO32   OCT    32000
 0131                  7670   33000 1  PRIO33   OCT    33000
 0132                  7671   34000 0  PRIO34   OCT    34000
A0133                                           OCT    34034       T4RUPT     RELTAB +6D
 0134                  7672   35000 1  PRIO35   OCT    35000
 0135                  7673   36000 1  PRIO36   OCT    36000
```

0136	7674	37000 0	PRIO37	OCT	37000		
0137	7675	37401 0	63/64+1	OCT	37401		
A0138			MID7	OCT	37600	PINBALL	
0139	7676	37766 1	OCT37766	OCT	37766		
0140	7677	37774 1	OCT37774	OCT	37774		
0141	7700	37776 0	OCT37776	OCT	37776		
A01411			DPOSMAX	OCT	37777		
A0142			BIT15	OCT	40000		
A0143			OCT40001	OCT	40001	INTERPRETER (CS 1 INSTRUCTION)	
0144	7701	40014 0	DLOADCOD	OCT	40014		
0145	7702	40015 1	DLOAD*	OCT	40015		
A0146				OCT	40023	T4RUPT RELTAB +7D	
01465	7703	40040 1	BIT15+6	OCT	40040		
01466	7704	40200 1	OCT40200	OCT	40200		
A0147				OCT	44035	T4RUPT RELTAB +8D	
A0148				OCT	50037	T4RUPT RELTAB +9D	
A0149				OCT	54000	T4RUPT RELTAB +10D	
01495	7705	57777 1	-BIT14	OCT	57777		
A0150			RELTAB11	OCT	60000	T4RUPT	
0151	7706	65552 0	C3/2	DEC	-.3216147		(OCTAL 65552)
0152	7707	70000 0	13,14,15	OCT	70000		
0153	7710	73777 1	-1/8	OCT	73777		
0154	7711	74000 1	HIGH4	OCT	74000		
0155	7712	74056 1	-ENDERAS	DEC	-2001		(OCTAL 74056)
A0156			HI5	OCT	76000	PINBALL	
0157	7713	77700 0	HIGH9	OCT	77700		
A0158			-ENDVAC	DEC	-45	INTERPRETER	(OCTAL 77722)
A0159			-OCT10	OCT	-10		(OCT 77767)
A0161			NEG4	DEC	-4		(OCTAL 77773)
0162	7714	77774 0	NEG3	DEC	-3		
0163	7715	77775 1	NEG2	OCT	77775		
0164	7716	77776 1	NEGONE	DEC	-1		

L FIXED-FIXED CONSTANT POOL USER'S PAGE NO. 5 EO S3

P0165 DEFINED BY EQUALS

R0166 IT WOULD BE TO THE USERS ADVANTAGE TO OCCASIONALLY CHECK ANY OF THESE SYMBOLS IN ORDER TO PREVENT ANY
R0168 ACCIDENTAL DEFINITION CHANGES.

0169	REF 5	LAST 335	7716	MINUS1	=	NEG1	
0170	REF 26	LAST 1164	7716	NEG1	=	NEGONE	
0171	REF 75	LAST 1109	5017	ONE	=	BIT1	
0172	REF 46	LAST 1089	5016	TWO	=	BIT2	
0173	REF 1		6214	THREE	=	OCTAL3	
0174	REF 43	LAST 1133	6214	LOW2	=	THREE	
0175	REF 32	LAST 1074	5015	FOUR	=	BIT3	
0176	REF 3	LAST 1113	6211	SIX	=	REVCNT	
0177	REF 17	LAST 1184	5023	LOW3	=	SEVEN	
0178	REF 36	LAST 1081	5014	EIGHT	=	BIT4	
0179	REF 7	LAST 1200	4334	NINE	=	R2D1	
0180	REF 3	LAST 388	4377	TEN	=	BINCON	
0181	REF 10	LAST 1059	5024	NOUTCON	=	ELEVEN	
0182	REF 18	LAST 944	4374	OCT23	=	VD1	
01825	REF 2	LAST 376	4376	OCT25	=	MD1	
0183	REF 36	LAST 1160	5006	PRIO1	=	BIT10	
0184	REF 8	LAST 1194	5051	EBANK3	=	OCT1400	
0185	REF 31	LAST 1198	5005	PRIO2	=	BIT11	
0186	REF 1		5037	OCT120	=	SUPER101	
0187	REF 1		5040	OCT140	=	SUPER110	
0188	REF 32	LAST 1204	5005	2K	=	BIT11	
0189	REF 33	LAST 1204	5005	EBANK4	=	BIT11	
0190	REF 32	LAST 1072	5004	PRIO4	=	BIT12	
0191	REF 2	LAST 505	5057	EBANK6	=	PRIO3	
0192	REF 46	LAST 1199	5003	QUARTER	=	BIT13	
0193	REF 47	LAST 1204	5003	PRIO10	=	BIT13	
01935	REF 1		7632	OCT10001	=	CCSL	
0194	REF 23	LAST 1190	5002	POS1/2	=	HALF	
0195	REF 67	LAST 1191	5002	PRIO20	=	BIT14	
0196	REF 68	LAST 1204	5002	HALF	=	BIT14	
0197	REF 5	LAST 386	4371	PRIO30	=	CHRPRIO	
0198	REF 13	LAST 1131	4371	BIT13-14	=	PRIO30	INTERPRETER USES IN PROCESSING STORECODE
01985	REF 3	LAST 1116	6440	OCT30002	=	TLOAD +1	
0199	REF 8	LAST 1101	7671	B12T14	=	PRIO34	
0200	REF 47	LAST 1197	5001	NEGMAX	=	BIT15	
0201	REF 48	LAST 1204	5001	VLOADCOD	=	BIT15	
0202	REF 1		6056	VLOAD*	=	OCT40001	
0203	REF 3	LAST 549	4105	OCT60000	=	RELTAB11	
0204	REF 5	LAST 333	4364	BANKMASK	=	HI5	

L INTERPRETIVE CONSTANTS USER'S PAGE NO. 1 E0 S3

```
0001  REF  1                26,2000                        SETLOC INTPRET1
0002                        26,3324                        BANK

0003  REF  1                                               COUNT  23/ICONS

0004                        26,3324   10000 0  DP1/4TH      2DEC   .25
0004                        26,3325   00000 1
0005                        26,3326   00000 1  UNITZ        2DEC   0
0005                        26,3327   00000 1
0006                        26,3330   00000 1  UNITY        2DEC   0
0006                        26,3331   00000 1
0007                        26,3332   20000 0  UNITX        2DEC   .5
0007                        26,3333   00000 1
0008                        26,3334   00000 1  ZEROVECS     2DEC   0
0008                        26,3335   00000 1
0009                        26,3336   00000 1               2DEC   0
0009                        26,3337   00000 1
0010                        26,3340   00000 1               2DEC   0
0010                        26,3341   00000 1
0011  REF  7  LAST  716     26,3332                DPHALF    =      UNITX
0012                        26,3342   37777 1  DPPOSMAX     OCT    37777
0013                        26,3343   37777 1               OCT    37777
```

L INTERPRETIVE CONSTANTS USER'S PAGE NO. 2 EO S3

P0014 INTERPRETIVE CONSTANTS IN THE OTHER HALF-MEMORY

```
0015  REF  1                04,2000                        SETLOC INTPRET2
0016                        04,3557                        BANK

0017  REF  1                                               COUNT  14/ICONS

0018                        04,3557  00000 1  ZUNIT        2DEC   0
0018                        04,3560  00000 1
0019                        04,3561  00000 1  YUNIT        2DEC   0
0019                        04,3562  00000 1
0020                        04,3563  20000 0  XUNIT        2DEC   .5
0020                        04,3564  00000 1
0021                        04,3565  00000 1  ZEROVEC      2DEC   0
0021                        04,3566  00000 1
0022                        04,3567  00000 1               2DEC   0
0022                        04,3570  00000 1
0023                        04,3571  00000 1               2DEC   0
0023                        04,3572  00000 1
0024                        04,3573  77777 0               OCT    77777          -0,-6,-12 MUST REMAIN IN THIS ORDER
0025                        04,3574  77771 0  DEC-6         DEC    -6
0026                        04,3575  77763 0  DEC-12        DEC    -12
0027                        04,3576  37777 1  LODPMAX       2OCT   3777737777     THESE TWO CONSTANTS MUST REMAIN
0027                        04,3577  37777 1
0028                        04,3600  37777 1  LODPMAX1      2OCT   3777737777     ADJACENT AND THE SAME FOR INTEGRATION
0028                        04,3601  37777 1
0029  REF  11  LAST  768    04,3565                         ZERODP   =     ZEROVEC
0030  REF   3  LAST   34    04,3563                         HALFDP   =     XUNIT
```

L SINGLE PRECISION SUBROUTINES

```
 0001                                5074                        BLOCK   02
R0002  SINGLE PRECISION SINE AND COSINE

 00025  REF   1                                                   COUNT   02/INTER
 0003   REF  24  LAST 1204        5074  6 5002 0  SPCOS         AD      HALF        ARGUMENTS SCALED AT PI
 0004   REF   1                   5075  55'075 0  SPSIN         TS      TEMK
 0005   REF   1                   5076  1 5100 1                TCF     SPT
 0006   REF   2  LAST 1207        5077  4 1075 0                CS      TEMK
 0007                             5100  6 0000 1  SPT           DOUBLE
 0008   REF   3  LAST 1207        5101  55'075 0                TS      TEMK
 0009   REF   1                   5102  1 5113 0                TCF     POLLEY
 0010   REF   4  LAST 1207        5103  57'075 1                XCH     TEMK
 0011   REF   5  LAST 1207        5104  51'075 1                INDEX   TEMK
 0012   REF   6  LAST 1133        5105  6 5000 1                AD      LIMITS
 0013                             5106  4 0000 0                COM
 0014   REF   6  LAST 1207        5107  6 1075 1                AD      TEMK
 0015   REF   7  LAST 1207        5110  55'075 0                TS      TEMK
 0016   REF   2  LAST 1207        5111  1 5113 0                TCF     POLLEY
 0017   REF   1                   5112  1 5131 0                TCF     ARG90
 0018                             5113  0 0006 1  POLLEY        EXTEND
 0019   REF   8  LAST 1207        5114  7 1075 0                MP      TEMK
 0020   REF   1                   5115  55'076 0                TS      SQ
 0021                             5116  0 0006 1                EXTEND
 0022   REF   1                   5117  7 5047 0                MP      C5/2
 0023   REF   1                   5120  6 7706 1                AD      C3/2
 0024                             5121  0 0006 1                EXTEND
 0025   REF   2  LAST 1207        5122  7 1076 0                MP      SQ
 0026   REF   1                   5123  6 7666 0                AD      C1/2
 0027                             5124  0 0006 1                EXTEND
 0028   REF   9  LAST 1207        5125  7 1075 0                MP      TEMK
 0029                             5126  20 001 1                DDOUBL
 0030   REF  10  LAST 1207        5127  55'075 0                TS      TEMK
 0031   REF 281  LAST 1199        5130  0 0002 0                TC      Q
 0032   REF 320  LAST 1199        5131  50 000 1  ARG90         INDEX   A
 0033   REF   7  LAST 1207        5132  4 5000 0                CS      LIMITS
 0034   REF 282  LAST 1207        5133  0 0002 0                TC      Q                   RESULT SCALED AT 1
R0040            SPROOT WAS DELETED IN REV 51 OF MASTER. ASS. CONT. HAS CARDS.
```

L EXECUTIVE USER'S PAGE NO. 1 E0 S3

```
 0001                          5134                    BLOCK  02
R0002          TO ENTER A JOB REQUEST REQUIRING NO VAC AREA:

 00025 REF   1                                         COUNT  02/EXEC

 00029                         5134  0 0004 0  NOVAC    INHINT
 0003  REF   1                 5135  6 5226 1          AD     FAKEPRET       LOC(MPAC +6) - LOC(QPRET)
 00031 REF   4 LAST  418       5136  54 063 0          TS     NEWPRIO        PRIORITY OF NEW JOB + NOVAC C(FIXLOC)

 0004                          5137  0 0006 1          EXTEND
 0005  REF 283 LAST 1207       5140  5 0002 0          INDEX  Q              Q WILL BE UNDISTURBED THROUGHOUT.
 0006                          5141  3 0001 0          DCA    0              2CADR OF JOB ENTERED.
 0007  REF   2 LAST  205       5142  52 066 0          DXCH   NEWLOC
 0008  REF   1                 5143  3 5225 1          CAF    EXECBANK
 0009  REF  26 LAST 1150       5144  56 004 0          XCH    FBANK
 0010  REF   1                 5145  54 061 1          TS     EXECTEM1
 0011  REF   1                 5146  1 2650 1          TCF    NOVAC2         ENTER EXECUTIVE BANK.

R0012          TO ENTER A JOB REQUEST REQUIRING A VAC AREA - E.G., ALL (PARTIALLY) INTERPRETIVE JOBS.

 0014                          5147  0 0004 0  FINDVAC   INHINT
 00145 REF   5 LAST 1208       5150  54 063 0          TS     NEWPRIO
 0015                          5151  0 0006 1          EXTEND
 0016  REF 284 LAST 1208       5152  5 0002 0          INDEX  Q
 0017                          5153  3 0001 0          DCA    0
 0018  REF   3 LAST 1208       5154  52 066 0  SPVACIN  DXCH   NEWLOC
 0019  REF   2 LAST 1208       5155  3 5225 1          CAF    EXECBANK
 0020  REF  27 LAST 1208       5156  56 004 0          XCH    FBANK
 0021  REF   1                 5157  1 2626 0          TCF    FINDVAC2       OFF TO EXECUTIVE SWITCHED-BANK.

R0021          TO ENTER A FINDVAC WITH THE PRIORITY IN NEWPRIO TO THE 2CADR ARRIVING IN A AND L:

R0021-25       USERS OF SPVAC MUST INHINT BEFORE STORING IN NEWPRIO.

 00213 REF 285 LAST 1208       5160  56 002 0  SPVAC    XCH    Q
 00214 REF   5 LAST 1049       5161  6 7715 0          AD     NEG2
 00215 REF 286 LAST 1208       5162  56 002 0          XCH    Q
 00216 REF   1                 5163  1 5154 0          TCF    SPVACIN

R0022          TO SUSPEND A BASIC JOB SO A HIGHER PRIORITY JOB MAY BE SERVICED:

 0024  REF 287 LAST 1208       5164  22 002 0  CHANG1   LXCH   Q
 0025  REF   3 LAST 1208       5165  3 5225 1          CAF    EXECBANK
 0026  REF  20 LAST 1130       5166  56 006 1          XCH    BBANK
 0027  REF   1                 5167  1 2727 0          TCF    CHANJOB

R0030          TO SUSPEND AN INTERPRETIVE JOB:

 0031  REF  29 LAST 1199       5170  4 0164 0  CHANG2   CS     LOC            NEGATIVE LOC SHOWS JOB = INTERPRETIVE.
R0031-5        ITRACE (4) REFERS TO "CHANG2".
```

```
0032   REF 158  LAST 1187     5171  54 001 1          TS     L
0033   REF   4  LAST 1208     5172  3 5225 1   +2     CAF    EXECBANK
00335  REF  21  LAST 1208     5173  54 006 0           TS     BBANK
0034   REF   2  LAST 1208     5174  1 2726 1           TCF    CHANJOB -1
```

```
P0035           TO VOLUNTARILY SUSPEND A JOB UNTIL THE COMPLETION OF SOME ANTICIPATED EVENT (I/O EVENT ETC.):

 0037   REF  30  LAST 1208      5175  54 164 0  JOBSLEEP TS     LOC
 0038   REF   5  LAST 1209      5176  3 5225 1           CAF    EXECBANK
 0039   REF  28  LAST 1208      5177  54 004 1           TS     FBANK
 0040   REF   1                 5200  1 3017 0           TCF    JOBSLP1

R0041           TO AWAKEN A JOB PUT TO SLEEP IN THE ABOVE FASHION:

 0042                           5201  0 0004 0  JOBWAKE  INHINT
 00421  REF   4  LAST 1208      5202  54 065 0           TS     NEWLOC
 0043   REF  61  LAST 1147      5203  4 5016 1           CS     TWO          EXIT IS VIA FINDVAC/NOVAC PROCEDURES.
 0044   REF 288  LAST 1208      5204  26 002 1           ADS    Q
 0045   REF   6  LAST 1210      5205  3 5225 1           CAF    EXECBANK
 0046   REF  29  LAST 1210      5206  56 004 0           XCH    FBANK
 0047   REF   1                 5207  1 3044 0           TCF    JOBWAKE2

R0048           TO CHANGE THE PRIORITY OF A JOB CURRENTLY UNDER EXECUTION:

 0049                           5210  0 0004 0  PRIOCHNG INHINT               NEW PRIORITY ARRIVES IN A. RETURNS TO
 0050   REF   6  LAST 1208      5211  54 063 0           TS     NEWPRIO       CALLER AS SOON AS NEW JOB PRIORITY IS
 0051   REF   7  LAST 1210      5212  3 5225 1           CAF    EXECBANK      HIGHEST. PREPARE FOR POSSIBLE BASIC-
 0052   REF  22  LAST 1209      5213  56 006 1           XCH    BBANK         STYLE CHANGE-JOB.
 0053   REF   9  LAST 1130      5214  54 165 1           TS     BANKSET
 0054   REF 289  LAST 1210      5215  3 0002 0           CA     Q
 0055   REF   1                 5216  1 3113 0           TCF    PRIOCH2

R0058           TO REMOVE A JOB FROM EXECUTIVE CONSIDERATIONS:

 0059   REF   8  LAST 1210      5217  3 5225 1  ENDOFJOB CAF    EXECBANK
 0060   REF  30  LAST 1210      5220  54 004 1           TS     FBANK
 0061   REF   1                 5221  1 3124 1           TCF    ENDJOB1

 0062   REF   2  LAST 1208      5222  3 0061 0  ENDFIND  CA     EXECTEM1      RETURN TO CALLER AFTER JOB ENTRY
 0063   REF  31  LAST 1210      5223  54 004 1           TS     FBANK         COMPLETE.
 0064   REF   1                 5224  1 6710 0           TCF    Q+2
 0066   REF   2  LAST 1208      5225   02626 1  EXECBANK CADR   FINDVAC2

 00665  REF 634  LAST 1195      5226   00110 1  FAKEPRET ADRES  MPAC -36D      LOC(MPAC +6) - LOC(QPRET)
```

```
P0067                LOCATE AN AVAILABLE VAC AREA.

 0068                                01,2626                    BANK   01
 00685  REF   1                                                 COUNT  01/EXEC

 0069   REF   3  LAST 1210   01,2626  54 061 1  FINDVAC2 TS     EXECTEM1     (SAVE CALLER'S BANK FIRST.)
 0070   REF   4  LAST  223   01,2627  10 400 1           CCS    VAC1USE
 0071   REF   1              01,2630  1 2643 0           TCF    VACFOUND
 0072   REF   3  LAST  223   01,2631  10 454 0           CCS    VAC2USE
 0073   REF   2  LAST 1211   01,2632  1 2643 0           TCF    VACFOUND
 0074   REF   3  LAST  223   01,2633  10 530 0           CCS    VAC3USE
 0075   REF   3  LAST 1211   01,2634  1 2643 0           TCF    VACFOUND
 0076   REF   3  LAST  223   01,2635  10 604 1           CCS    VAC4USE
 0077   REF   4  LAST 1211   01,2636  1 2643 0           TCF    VACFOUND
 0078   REF   3  LAST  223   01,2637  10 660 0           CCS    VAC5USE
 0079   REF   5  LAST 1211   01,2640  1 2643 0           TCF    VACFOUND
 0080   REF   4  LAST  571   01,2641  0 7755 1           TC     BAILOUT
 0081                        01,2642   01201 0           OCT    1201         NO VAC AREAS.

 0082   REF  62  LAST 1210   01,2643  6 5016 0  VACFOUND AD     TWO          RESERVE THIS VAC AREA BY STORING A ZERO
 0083                        01,2644  22 007 0           ZL                  IN ITS VAC USE REGISTER AND STORE THE
 0084   REF 321  LAST 1207   01,2645  50 000 1           INDEX  A            ADDRESS OF THE FIRST WORD OF IT IN THE
 0085                        01,2646  21'777 0           LXCH   0 -1         LOW NINE BITS OF THE PRIORITY WORD.
 0086   REF   7  LAST 1210   01,2647  26 063 0           ADS    NEWPRIO

 0087   REF 249  LAST 1191   01,2650  3 5021 1  NOVAC2   CAF    ZERO         NOVAC ENTERS HERE. FIND A CORE SET.
 0088   REF   5  LAST  422   01,2651  54 064 1           TS     LOCCTR
 0089   REF   1              01,2652  3 2657 1           CAF    NO.CORES     SEVEN SETS OF ELEVEN REGISTERS EACH.
 0090   REF   1              01,2653  54 062 1  NOVAC3   TS     EXECTEM2
 0091   REF   6  LAST 1211   01,2654  50 064 0           INDEX  LOCCTR
 0092   REF   9  LAST  204   01,2655  10 167 0           CCS    PRIORITY     EACH PRIORITY REGISTER CONTAINS -0 IF
 0093   REF   1              01,2656  1 2717 0           TCF    NEXTCORE     THE CORRESPONDING CORE SET IS AVAILABLE.
 0094                        01,2657   00006 1  NO.CORES DEC    6
 0095   REF   2  LAST 1211   01,2660  1 2717 0           TCF    NEXTCORE     AN ACTIVE JOB HAS A POSITIVE PRIORITY
A0096                                                                       BUT A DORMANT JOB'S PRIORITY IS NEGATIVE
```

```
0097   REF   8  LAST 1211   01,2661  3 0063 1  CORFOUND CA     NEWPRIO    SET THE PRIORITY OF THIS JOB IN THE CORE
0098   REF   7  LAST 1211   01,2662  50 064 0            INDEX  LOCCTR     SET'S PRIORITY REGISTER AND SET THE
0099   REF  10  LAST 1211   01,2663  54 167 0            TS     PRIORITY   JOB'S PUSH-DOWN POINTER AT THE BEGINNING
0100   REF   7  LAST  348   01,2664  7 5046 1            MASK   LOW9       OF THE WORK AREA AND OVERFLOW INDICATOR
0101   REF   8  LAST 1212   01,2665  50 064 0            INDEX  LOCCTR
0102   REF  19  LAST 1182   01,2666  54 166 1            TS     PUSHLOC    OFF TO PREPARE FOR INTERPRETIVE PROGRAMS

0103   REF   9  LAST 1212   01,2667  10 064 1            CCS    LOCCTR     IF CORE SET ZERO IS BEING LOADED, SET UP
0104   REF   1              01,2670  1 2704 1            TCF    SETLOC     OVFIND AND FIXLOC IMMEDIATELY .
0105   REF  11  LAST 1195   01,2671  54 121 1            TS     OVFIND
0106   REF  20  LAST 1212   01,2672  3 0166 0            CA     PUSHLOC
0107   REF  34  LAST 1196   01,2673  54 120 0            TS     FIXLOC

0108   REF   7  LAST 1108   01,2674  10 067 1  SPECTEST  CCS    NEWJOB     SEE IF ANY ACTIVE JOBS WAITING (RARE).
0109   REF   2  LAST 1212   01,2675  1 2704 1            TCF    SETLOC     MUST BE AWAKENED BUT UNCHANGED JOB.
0110   REF  10  LAST 1199   01,2676  0 5747 0            TC     CCSHOLE
0111   REF  11  LAST 1212   01,2677  0 5747 0            TC     CCSHOLE
0112   REF   8  LAST 1212   01,2700  54 067 1            TS     NEWJOB     +0 SHOWS ACTIVE JOB ALREADY SET.
0113   REF   5  LAST 1210   01,2701  52 066 0            DXCH   NEWLOC
0114   REF  31  LAST 1210   01,2702  52 165 1            DXCH   LOC
0115   REF   1              01,2703  1 5222 1            TCF    ENDFIND

0116   REF   6  LAST 1212   01,2704  52 066 0  SETLOC    DXCH   NEWLOC     SET UP THE LOCATION REGISTERS FOR THIS
0117   REF  10  LAST 1212   01,2705  50 064 0            INDEX  LOCCTR
0118   REF  32  LAST 1212   01,2706  52 165 1            DXCH   LOC
0119   REF   9  LAST 1212   01,2707  50 067 0            INDEX  NEWJOB     THIS INDEX INSTRUCTION INSURES THAT THE
0120   REF  11  LAST 1212   01,2710  4 0167 0            CS     PRIORITY   HIGHEST ACTIVE PRIORITY WILL BE COMPARED
0121   REF   9  LAST 1212   01,2711  6 0063 1            AD     NEWPRIO    WITH THE NEW PRIORITY TO SEE IF NEWJOB
0122                        01,2712  0 0006 1            EXTEND            SHOULD BE SET TO SIGNAL A SWITCH.
0123   REF   2  LAST 1212   01,2713  6 5222 0            BZMF   ENDFIND
0124   REF  11  LAST 1212   01,2714  3 0064 0            CA     LOCCTR     LOCCTR IS LEFT SET AT THIS CORE SET IF
0125   REF  10  LAST 1212   01,2715  54 067 1            TS     NEWJOB     THE CALLER WANTS TO LOAD ANY MPAC
0126   REF   3  LAST 1212   01,2716  1 5222 1            TCF    ENDFIND    REGISTERS, ETC.

0127   REF   1              01,2717  3 3054 0  NEXTCORE  CAF    COREINC
0128   REF  12  LAST 1212   01,2720  26 064 1            ADS    LOCCTR
0129   REF   2  LAST 1211   01,2721  10 062 1            CCS    EXECTEM2
0130   REF   1              01,2722  1 2653 1            TCF    NOVAC3
0131   REF   5  LAST 1211   01,2723  0 7755 1            TC     BAILOUT    NO CORE SETS.
0132                        01,2724   01202 0            OCT    1202
```

P0133 THE FOLLOWING ROUTINE SWAPS CORE SET 0 WITH THAT WHOSE RELATIVE ADDRESS IS IN NEWJOB.

```
01345  REF  33  LAST 1212   01,2725  22 164 1   -2        LXCH   LOC
0135   REF  10  LAST 1210   01,2726  30 165 0   -1        CAE    BANKSET        BANKSET, NOT BBANK, HAS RIGHT CONTENTS.
0136                        01,2727  0 0004 0   CHANJOB   INHINT
01362                       01,2730  0 0006 1              EXTEND
01364  REF  14  LAST 1106   01,2731  04 007 1              ROR    SUPERBNK       PICK UP CURRENT SBANK FOR BBCON
01366  REF 159  LAST 1209   01,2732  56 001 0              XCH    L              LOC IN A AND BBCON IN L.
01368  REF  11  LAST 1212   01,2733  50 067 0   +4        INDEX  NEWJOB         SWAP LOC AND BANKSET.
0137   REF  34  LAST 1213   01,2734  52 165 1              DXCH   LOC
0138   REF  35  LAST 1213   01,2735  52 165 1              DXCH   LOC

01382  REF  11  LAST 1213   01,2736  30 165 0              CAE    BANKSET
01384                       01,2737  0 0006 1              EXTEND
01388  REF  15  LAST 1213   01,2740  01 007 1              WRITE  SUPERBNK       SET SBANK FOR NEW JOB.
0139   REF 635  LAST 1210   01,2741  52 155 1              DXCH   MPAC           SWAP MULTI-PURPOSE ACCUMULATOR AREAS.
0140   REF  12  LAST 1213   01,2742  50 067 0              INDEX  NEWJOB
0141   REF 636  LAST 1213   01,2743  52 155 1              DXCH   MPAC
0142   REF 637  LAST 1213   01,2744  52 155 1              DXCH   MPAC
0143   REF 638  LAST 1213   01,2745  52 157 0              DXCH   MPAC +2
0144   REF  13  LAST 1213   01,2746  50 067 0              INDEX  NEWJOB
0145   REF 639  LAST 1213   01,2747  52 157 0              DXCH   MPAC +2
0146   REF 640  LAST 1213   01,2750  52 157 0              DXCH   MPAC +2
0147   REF 641  LAST 1213   01,2751  52 161 0              DXCH   MPAC +4
0148   REF  14  LAST 1213   01,2752  50 067 0              INDEX  NEWJOB
0149   REF 642  LAST 1213   01,2753  52 161 0              DXCH   MPAC +4
0150   REF 643  LAST 1213   01,2754  52 161 0              DXCH   MPAC +4
0151   REF 644  LAST 1213   01,2755  52 163 1              DXCH   MPAC +6
0152   REF  15  LAST 1213   01,2756  50 067 0              INDEX  NEWJOB
0153   REF 645  LAST 1213   01,2757  52 163 1              DXCH   MPAC +6
0154   REF 646  LAST 1213   01,2760  52 163 1              DXCH   MPAC +6

0155   REF 250  LAST 1211   01,2761  3 5021 1              CAF    ZERO
0156   REF  12  LAST 1212   01,2762  56 121 0              XCH    OVFIND         MAKE PUSHLOC NEGATIVE IF OVFIND NZ.
0157                        01,2763  0 0006 1              EXTEND
0158                        01,2764  1 2767 1              BZF    +3
0159   REF  21  LAST 1212   01,2765  4 0166 1              CS     PUSHLOC
0160   REF  22  LAST 1213   01,2766  54 166 1              TS     PUSHLOC

0161   REF  23  LAST 1213   01,2767  52 167 0              DXCH   PUSHLOC
0162   REF  16  LAST 1213   01,2770  50 067 0              INDEX  NEWJOB
0163   REF  24  LAST 1213   01,2771  52 167 0              DXCH   PUSHLOC
0164   REF  25  LAST 1213   01,2772  52 167 0              DXCH   PUSHLOC        SWAPS PUSHLOC AND PRIORITY.
0165   REF   8  LAST 1212   01,2773  3 5046 0              CAF    LOW9           SET FIXLOC TO BASE OF VAC AREA.
0166   REF  12  LAST 1212   01,2774  7 0167 0              MASK   PRIORITY
0167   REF  35  LAST 1212   01,2775  54 120 0              TS     FIXLOC

0168   REF  26  LAST 1213   01,2776  10 166 1              CCS    PUSHLOC        SET OVERFLOW INDICATOR ACCORDING TO
0169   REF 251  LAST 1213   01,2777  3 5021 1              CAF    ZERO
0170   REF   1              01,3000  1 3005 0              TCF    ENDPRCHG -1
```

```
0171   REF  27  LAST 1213   01,3001  4 0166 1          CS      PUSHLOC
0172   REF  28  LAST 1214   01,3002  54 166 1          TS      PUSHLOC
0173   REF 143  LAST 1177   01,3003  3 5017 1          CAF     ONE
0174   REF  13  LAST 1213   01,3004  56 121 0          XCH     OVFIND
0175   REF  17  LAST 1213   01,3005  54 067 1          TS      NEWJOB

0176                        01,3006  0 0003 1  ENDPRCHG RELINT
0177   REF  36  LAST 1213   01,3007  52 165 1          DXCH    LOC       BASIC JOBS HAVE POSITIVE ADDRESSES, SO
0178                        01,3010  0 0006 1          EXTEND            DISPATCH WITH A DTCB.
0179                        01,3011  6 3013 0          BZMF    +2        IF INTERPRETIVE, SET UP EBANK, ETC.
0180                        01,3012  52 006 0          DTCB
```

```
0181                          01,3013  4 0000 0          COM                EPILOGUE TO JOB CHANGE FOR INTERPRETIVE
0182   REF 144  LAST 1214     01,3014  6 5017 1          AD      ONE
0183   REF  37  LAST 1214     01,3015  54 164 0          TS      LOC        RESUME.
0186   REF   1                01,3016  1 6017 0          TCF     INTRSM

R0187          COMPLETE JOBSLEEP PREPARATIONS.

0188                          01,3017  0 0004 0 JOBSLP1  INHINT
0189   REF  13  LAST 1213     01,3020  4 0167 0          CS      PRIORITY   NNZ PRIORITY SHOWS JOB ASLEEP.
0190   REF  14  LAST 1215     01,3021  54 167 0          TS      PRIORITY
0191   REF   8  LAST 1149     01,3022  3 6043 0          CAF     LOW7
0192   REF  23  LAST 1210     01,3023  7 0006 0          MASK    BBANK
01921                         01,3024  0 0006 1          EXTEND
01922  REF  16  LAST 1213     01,3025  04 007 1          ROR     SUPERBNK   SAVE OLD SUPERBANK VALUE.
0193   REF  12  LAST 1213     01,3026  54 165 1          TS      BANKSET
0194   REF 252  LAST 1213     01,3027  4 5021 0          CS      ZERO
0195   REF 111  LAST 1185     01,3030  54 131 0 JOBSLP2  TS      BUF +1     HOLDS - HIGHEST PRIORITY.
0196   REF   1                01,3031  1 3141 1          TCF     EJSCAN     SCAN FOR HIGHEST PRIORITY ALA ENDOFJOB.

01961                         01,3032  0 0004 0 NUCHANG2 INHINT             QUICK... DONT LET NEWJOB CHANGE TO +0 .
019611 REF  18  LAST 1214     01,3033  10 067 1          CCS     NEWJOB
019612                        01,3034  1 3037 1          TCF     +3         NEWJOB STILL PNZ
019613                        01,3035  0 0003 1          RELINT             NEWJOB HAS CHANGED TO +0. WAKE UP JOB
019614 REF   1                01,3036  1 3233 1          TCF     ADVAN +2   VIA NUDIRECT. (VERY RARE CASE.)

01962  REF  63  LAST 1211     01,3037  3 5016 0          CAF     TWO
01963                         01,3040  0 0006 1          EXTEND
01964  REF  30  LAST  948     01,3041  05 011 1          WOR     DSALMOUT   TURN ON ACTIVITY LIGHT
01965  REF  38  LAST 1215     01,3042  52 165 1          DXCH    LOC        AND SAVE ADDRESS INFO FOR BENEFIT OF
01966  REF   3  LAST 1209     01,3043  1 2733 0          TCF     CHANJOB + 4  POSSIBLE SLEEPING JOB.
```

```
P0197           TO WAKE UP A JOB, EACH CORE SET IS FOUND TO LOCATE ALL JOBS WHICH ARE ASLEEP. IF THE FCADR IN THE
R0199   LOC REGISTER OF ANY SUCH JOB MATCHES THAT SUPPLIED BY THE CALLER, THAT JOB IS AWAKENED. IF NO JOB IS FOUND,
R0201   LOCCTR IS SET TO -1 AND NO FURTHER ACTION TAKES PLACE.

0202   REF   4  LAST 1211   01,3044  54 061 1  JOBWAKE2 TS     EXECTEM1
0203   REF 253  LAST 1215   01,3045  3 5021 1            CAF    ZERO          BEGIN CORE SET SCAN.
0204   REF  13  LAST 1212   01,3046  54 064 1            TS     LOCCTR
0205   REF   2  LAST 1211   01,3047  3 2657 1            CAF    NO.CORES
0206   REF   3  LAST 1212   01,3050  54 062 1  JOBWAKE4 TS     EXECTEM2
0207   REF  14  LAST 1216   01,3051  50 064 0            INDEX  LOCCTR
0208   REF  15  LAST 1215   01,3052  10 167 0            CCS    PRIORITY
0209   REF   1               01,3053  1 3056 0            TCF    JOBWAKE3      ACTIVE JOB - CHECK NEXT CORE SET.
0210                         01,3054   00014 1  COREINC  DEC    12            12 REGISTERS PER CORE SET.
0211   REF   1               01,3055  1 3065 0            TCF    WAKETEST      SLEEPING JOB - SEE IF CADR MATCHES.

0212   REF   2  LAST 1212   01,3056  3 3054 0  JOBWAKE3 CAF    COREINC
0213   REF  15  LAST 1216   01,3057  26 064 1            ADS    LOCCTR
0214   REF   4  LAST 1216   01,3060  10 062 1            CCS    EXECTEM2
0215   REF   1               01,3061  1 3050 0            TCF    JOBWAKE4
0216   REF 145  LAST 1215   01,3062  4 5017 0            CS     ONE           EXIT IF SLEEPING JOB NOT FOUND.
0217   REF  16  LAST 1216   01,3063  54 064 1            TS     LOCCTR
0218   REF   4  LAST 1212   01,3064  1 5222 1            TCF    ENDFIND

0219   REF   7  LAST 1212   01,3065  4 0065 0  WAKETEST CS     NEWLOC
0220   REF  17  LAST 1216   01,3066  50 064 0            INDEX  LOCCTR
0221   REF  39  LAST 1215   01,3067  6 0164 1            AD     LOC
0222                         01,3070  0 0006 1            EXTEND
0223                         01,3071  1 3073 1            BZF    +2            IF MATCH.
0224   REF   2  LAST 1216   01,3072  1 3056 0            TCF    JOBWAKE3      EXAMINE NEXT CORE SET IF NO MATCH.

0225   REF  18  LAST 1216   01,3073  50 064 0            INDEX  LOCCTR        RE-COMPLEMENT PRIORITY TO SHOW JOB AWAKE
0226   REF  16  LAST 1216   01,3074  4 0167 0            CS     PRIORITY
0227   REF  10  LAST 1212   01,3075  54 063 0            TS     NEWPRIO
0228   REF  19  LAST 1216   01,3076  50 064 0            INDEX  LOCCTR
0229   REF  17  LAST 1216   01,3077  54 167 0            TS     PRIORITY

0230   REF   1               01,3100  4 4364 0            CS     FBANKMSK      MAKE UP THE 2CADR OF THE WAKE ADDRESS
0231   REF   8  LAST 1216   01,3101  7 0065 0            MASK   NEWLOC        USING THE CADR IN NEWLOC AND THE EBANK
0232   REF   3  LAST 1128   01,3102  6 5005 1            AD     2K            HALF OF BBANK SAVED IN BANKSET.
0233   REF   9  LAST 1216   01,3103  56 065 1            XCH    NEWLOC
0234   REF   2  LAST 1216   01,3104  7 4364 0            MASK   FBANKMSK
0235   REF  20  LAST 1216   01,3105  50 064 0            INDEX  LOCCTR
0236   REF  13  LAST 1215   01,3106  6 0165 0            AD     BANKSET
0237   REF  10  LAST 1216   01,3107  54 066 0            TS     NEWLOC +1

0238   REF  21  LAST 1216   01,3110  10 064 1            CCS    LOCCTR        SPECIAL TREATMENT IF THIS JOB WAS
0239   REF   3  LAST 1212   01,3111  1 2704 1            TCF    SETLOC        ALREADY IN THE RUN (0) POSITION.
0240   REF   1               01,3112  1 2674 1            TCF    SPECTEST
```

P0241 PRIORITY CHANGE. CHANGE THE CONTENTS OF PRIORITY AND SCAN FOR THE JOB OF HIGHEST PRIORITY.

```
0243   REF  40  LAST 1216   01,3113  54 164 0  PRIOCH2  TS     LOC
0244   REF 254  LAST 1216   01,3114  3 5021 1           CAF    ZERO      SET FLAG TO TELL ENDJOB SCANNER IF THIS
0245   REF 112  LAST 1215   01,3115  54 130 1           TS     BUF       JOB IS STILL HIGHEST PRIORITY.
0246   REF   9  LAST 1213   01,3116  3 5046 0           CAF    LOW9
0247   REF  18  LAST 1216   01,3117  7 0167 0           MASK   PRIORITY
0248   REF  11  LAST 1216   01,3120  6 0063 1           AD     NEWPRIO
0249   REF  19  LAST 1217   01,3121  54 167 0           TS     PRIORITY
0250                        01,3122  4 0000 0           COM
0251   REF   1              01,3123  1 3030 0           TCF    JOBSLP2   AND TO EJSCAN.
```

P0252 RELEASE THIS CORE SET AND VAC AREA AND SCAN FOR THE JOB OF HIGHEST ACTIVE PRIORITY.

```
0254                                01,3124  0 0004 0  ENDJOB1  INHINT
0255   REF 255  LAST 1217          01,3125  4 5021 0            CS      ZERO
0256   REF 113  LAST 1217          01,3126  54 131 0            TS      BUF +1
0257   REF  20  LAST 1217          01,3127  56 167 1            XCH     PRIORITY
0258   REF  10  LAST 1217          01,3130  7 5046 1            MASK    LOW9
02581  REF 160  LAST 1213          01,3131  54 001 1            TS      L

02582  REF   2  LAST 1208          01,3132  4 5226 0            CS      FAKEPRET
025821 REF 161  LAST 1218          01,3133  6 0001 0            AD      L

02583                               01,3134  0 0006 1            EXTEND
02584  REF   2  LAST 1215          01,3135  6 3141 0            BZMF    EJSCAN          NOVAC ENDOFJOB

0259   REF 162  LAST 1218          01,3136  10 001 1            CCS     L
0260   REF 322  LAST 1211          01,3137  50 000 1            INDEX   A
0261                                01,3140  54 000 0            TS      0

0262   REF  21  LAST 1218          01,3141  10 203 1  EJSCAN    CCS     PRIORITY +12D
0263   REF   1                     01,3142  0 3206 0            TC      EJ1
0264   REF  12  LAST 1212          01,3143  0 5747 0            TC      CCSHOLE
0265                                01,3144  1 3145 0            TCF     +1

0266   REF  22  LAST 1218          01,3145  10 217 1            CCS     PRIORITY +24D   EXAMINE EACH PRIORITY REGISTER TO FIND
0267   REF   2  LAST 1218          01,3146  0 3206 0            TC      EJ1             THE JOB OF HIGHEST ACTIVE PRIORITY.
0268   REF  13  LAST 1218          01,3147  0 5747 0            TC      CCSHOLE
0269                                01,3150  1 3151 0            TCF     +1

0270   REF  23  LAST 1218          01,3151  10 233 1            CCS     PRIORITY +36D
0271   REF   3  LAST 1218          01,3152  0 3206 0            TC      EJ1
0272   REF  24  LAST 1218          01,3153   67610 1  -CCSPR    -CCS    PRIORITY
0273                                01,3154  1 3155 1            TCF     +1

0274   REF  25  LAST 1218          01,3155  10 247 1            CCS     PRIORITY +48D
0275   REF   4  LAST 1218          01,3156  0 3206 0            TC      EJ1
0276   REF  14  LAST 1218          01,3157  0 5747 0            TC      CCSHOLE
0277                                01,3160  1 3161 0            TCF     +1

0278   REF  26  LAST 1218          01,3161  10 263 1            CCS     PRIORITY +60D
0279   REF   5  LAST 1218          01,3162  0 3206 0            TC      EJ1
0280   REF  15  LAST 1218          01,3163  0 5747 0            TC      CCSHOLE
0281                                01,3164  1 3165 1            TCF     +1

0282   REF  27  LAST 1218          01,3165  10 277 1            CCS     PRIORITY +72D
0283   REF   6  LAST 1218          01,3166  0 3206 0            TC      EJ1
0284   REF  16  LAST 1218          01,3167  0 5747 0            TC      CCSHOLE
0285                                01,3170  1 3171 1            TCF     +1
```

```
P0286           EVALUATE THE RESULTS OF THE SCAN.

0287   REF 114  LAST 1218   01,3171  10 131 0          CCS    BUF +1          SEE IF THERE ARE ANY ACTIVE JOBS WAITING
0288   REF  17  LAST 1218   01,3172  0 5747 0          TC     CCSHOLE
0289   REF  18  LAST 1219   01,3173  0 5747 0          TC     CCSHOLE

0290                        01,3174  1 3176 0          TCF    +2
0291   REF   2  LAST  185   01,3175  1 3223 0          TCF    DUMMYJOB
0292   REF 115  LAST 1219   01,3176  10 130 1          CCS    BUF             BUF IS ZERO IF THIS IS A PRIOCHNG AND
0293                        01,3177  1 3201 0          TCF    +2              CHANGED PRIORITY IS STILL HIGHEST.
0294   REF   2  LAST 1213   01,3200  1 3005 0          TCF    ENDPRCHG -1

0295   REF 323  LAST 1218   01,3201  50 000 1          INDEX  A               OTHERWISE, SET NEWJOB TO THE RELATIVE
0296                        01,3202  2'7777 0          CAF    0 -1            ADDRESS OF THE NEW JOB'S CORE SET.
0297   REF   1              01,3203  6 3153 0          AD     -CCSPR
0298   REF  19  LAST 1215   01,3204  54 067 1          TS     NEWJOB
0299   REF   4  LAST 1215   01,3205  1 2725 1          TCF    CHANJOB -2

0300   REF 116  LAST 1219   01,3206  54 132 0  EJ1     TS     BUF +2
0301   REF 117  LAST 1219   01,3207  6 0131 1          AD     BUF +1          - OLD HIGH PRIORITY.
0302   REF 324  LAST 1219   01,3210  10 000 0          CCS    A
0303   REF 118  LAST 1219   01,3211  4 0132 0          CS     BUF +2
0304   REF   1              01,3212  1 3216 0          TCF    EJ2             NEW HIGH PRIORITY.
0305                        01,3213  13 214 1          NODP
0306   REF 290  LAST 1210   01,3214  50 002 0          INDEX  Q
0307                        01,3215  0 0002 0          TC     2               PROCEED WITH SEARCH.

0308   REF 119  LAST 1219   01,3216  54 131 0  EJ2     TS     BUF +1
0309                        01,3217  0 0006 1          EXTEND
0310   REF 120  LAST 1219   01,3220  22 130 0          QXCH   BUF             FOR LOCATING CCS PRIORITY + X INSTR.
0311   REF 121  LAST 1219   01,3221  50 130 0          INDEX  BUF
0312                        01,3222  0 0002 0          TC     2
```

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P0314           IDLING AND COMPUTER ACTIVITY (GREEN) LIGHT MAINTENANCE. THE IDLING ROUTINE IS NOT A JOB IN ITSELF.
R0316   BUT RATHER A SUBROUTINE OF THE EXECUTIVE.

 0318   REF   4  LAST  263      1361                          EBANK= SELFRET          SELF-CHECK STORAGE IN EBANK.

 0319   REF 256  LAST 1218   01,3223  4 5021 0  DUMMYJOB CS     ZERO                 SET NEWJOB TO -0 FOR IDLING.
 0320   REF  20  LAST 1219   01,3224  54 067 1           TS     NEWJOB
 0321                        01,3225  0 0003 1           RELINT
 0322   REF  64  LAST 1215   01,3226  4 5016 1           CS     TWO                  TURN OFF THE ACTIVITY LIGHT.
 0323                        01,3227  0 0006 1           EXTEND
 0324   REF  31  LAST 1215   01,3230  03 011 1           WAND   DSALMOUT
 0328   REF  21  LAST 1220   01,3231  10 067 1  ADVAN    CCS    NEWJOB               IS A NEWJOB ACTIVE ?
 0329   REF   1              01,3232  1 3032 1           TCF    NUCHANG2             YES... ONE REQUIRING A CHANGE JOB.
 0330   REF  65  LAST 1220   01,3233  3 5016 0           CAF    TWO                  NEW JOB ALREADY IN POSITION FOR
 0331   REF   1              01,3234  1 3242 1           TCF    NUDIRECT             EXECUTION.

 03317  REF   5  LAST 1220   01,3235  3 1361 1           CA     SELFRET
 03318  REF 163  LAST 1218   01,3236  54 001 1           TS     L                    PUT RETURN ADDRESS IN L.
 0332   REF   1              01,3237  3 3241 0           CAF    SELFBANK
 0333   REF   4  LAST  632   01,3240  1 5230 1           TCF    SUPDXCHZ + 1          AND DISPATCH JOB.

 03338  REF   6  LAST 1220      1361                          EBANK= SELFRET
 0334   REF   3  LAST  263   01,3241   66102 1  SELFBANK BBCON  SELFCHK

 0335                        01,3242  0 0006 1  NUDIRECT EXTEND                     TURN THE GREEN LIGHT BACK ON.
 0336   REF  32  LAST 1220   01,3243  05 011 1           WOR    DSALMOUT
 0337   REF  41  LAST 1217   01,3244  52 165 1           DXCH   LOC                  JOBS STARTED IN THIS FASHION MUST BE
 03372  REF   5  LAST 1220   01,3245  1 5227 1           TCF    SUPDXCHZ

 03378                          5227                     BLOCK  2                    IN FIXED-FIXED SO OTHERS MAY USE.

 03379  REF   2 LAST 1208 TO 1211:    59    59*          COUNT  027EXEC

R033791 SUPDXCHZ - ROUTINE TO TRANSFER TO SUPERBANK.
R033792 CALLING SEQUENCE
A033793                                                  TCF    SUPDXCHZ             WITH 2CADR OF DESIRED LOCATION IN A + L.

 0338   REF 164  LAST 1220       5227  56 001 0  SUPDXCHZ XCH    L                    BASIC.
 03381                          5230  0 0006 1  +1       EXTEND
 03382  REF  17  LAST 1215      5231  01 007 1           WRITE  SUPERBNK
 03383  REF  24  LAST 1215      5232  54 006 0           TS     BBANK
 03384  REF 165  LAST 1220      5233  0 0001 0           TC     L

 0339                           5234   77677 1  NEG100   OCT    77677
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L WAITLIST USER'S PAGE NO. 1 E0 S3

R0001 PROGRAM DESCRIPTION
R0003 MOD NO - 2
R0005 MOD BY - MILLER (DTMAX INCREASED TO 162.5 SEC)
R00072 MOD 3 BY KERNAN (INHINT INSERTED AT WAITLIST) 2/28/68 SKIPPER REV 4

R00073 MOD 4BY KERNAN (TWIDDLE IN 54) 3/28/68 SKIPPER REV 13.
R000799

DATE - 10 OCTOBER 1966
LOG SECTION - WAITLIST
ASSEMBLY SUNBURST REV 5

R0008 FUNCTIONAL DESCRIPTION-
R0009 PART OF A SECTION OF PROGRAMS,-WAITLIST, TASKOVER, T3RUPT, USED TO CALL A PROGRAM, (CALLED A TASK),
R0011 WHICH IS TO BEGIN IN C(A) CENTISECONDS. WAITLIST UPDATES TIME3, LST1 AND LST2. THE MEANING OF THESE LISTS
R0013 FOLLOW.

R0014 C(TIME3) = 16384 -(T1-T) CENTISECONDS, (T=PRESENT TIME, T1-TIME FOR TASK1)
R0016

R0017 C(LST1) = -(T2-T1)+1
R0018 C(LST1 +1) = -(T3-T2)+1
R0019 C(LST1 +2) = -(T4-T3)+1
R0020 .
R0021 .
R0022 C(LST1 +6) = -(T8-T7)+1
R0023 C(LST1 +7) = -(T9-T8)+1

R0024 C(LST2) = 2CADR OF TASK1
R0025 C(LST2 +2) = 2CADR OF TASK2
R0026 .
R0027 .
R0028 C(LST2 +14)= 2CADR OF TASK8
R0029 C(LST2 +16)= 2CADR OF TASK9

R0030 WARNINGS-
R0031 --------
R0032 1) 1 <= C(A) <= 162500 (1 CENTISECOND TO 162.5 SEC)
R0033 2) 9 TASKS MAXIMUM
R0034 3) TASKS CALLED UNDER INTERRUPT INHIBITED
R0035 4) TASKS END BY TC TASKOVER

R0036 CALLING SEQUENCE-

R0037 L-1 CA DELTAT (TIME IN CENTISECONDS TO TASK START)
R0039 L TC WAITLIST
R0040 L+1 2CADR DESIRED TASK
R0041 L+2 (MINOR OF 2CADR)
R0042 L+3 RELINT (RETURNS HERE)

R00421 TWIDDLE-
R00422 -------
R00423 TWIDDLE IS FOR USE WHEN THE TASK BEING SET UP IS IN THE SAME EBANK AND FBANK AS THE USER. IN
R00425 SUCH CASES, IT IMPROVES UPON WAITLIST BY ELIMINATING THE NEED FOR THE BBCON HALF OF THE 2CADR,

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R00427              SAVING A WORD.   TWIDDLE IS LIKE WAITLIST IN EVERY RESPECT EXCEPT CALLING SEQUENCE, TO WIT-

R0043               L-1     CA      DELTAT
R00431              L       TC      TWIDDLE
R00432              L+1     ADRES   DESIRED TASK
R00433              L+2     RELINT                  (RETURNS HERE)

R00439  NORMAL EXIT MODES-

R0044               AT L+3 OF CALLING SEQUENCE

R0045   ALARM OR ABORT EXIT MODES-

R0046               TC      ABORT
R0047               OCT     1203    (WAITLIST OVERFLOW - TOO MANY TASKS)

R0048   ERASABLE INITIALIZATION REQUIRED-

R0049               ACCOMPLISHED BY FRESH START,--LST2,..., LST2 +16 =ENDTASK
R0050                                        LST1,..., LST1 +7  =NEG1/2

R0051   OUTPUT--

R0052               LST1 AND LST2 UPDATED WITH NEW TASK AND ASSOCIATED TIME.
R0053   DEBRIS-

R0054                   CENTRALS- A,Q,L
R0055                   OTHER   - WAITEXIT, WAITADR, WAITTEMP, WAITBANK
R0056   DETAILED ANALYSIS OF TIMING-

R0057           CONTROL WILL NOT BE RETURNED TO THE SPECIFIED ADDRESS (2CADR)   IN EXACTLY DELTA T CENTISECONDS.
R0059       THE APPROXIMATE TIME MAY BE CALCULATED AS FOLLOWS

R0060               LET TO = THE TIME OF THE TC WAITLIST
R0061               LET TS = TO +1470 + COUNTER INCREMENTS (SET UP TIME)
R0062               LET X  = TS -(100TS)/100  (VARIANCE FROM COUNTERS)
R0063               LET Y  = LENGTH OF TIME OF INHIBIT INTERRUPT AFTER T3RUPT
R0064               LET Z  = LENGTH OF TIME TO PROCESS TASKS WHICH ARE DUE THIS T3RUPT BUT DISPATCHED EARLIER.
R0066       (Z=0, USUALLY)
R0067               LET DELTO = THE ACTUAL TIME TAKEN TO GIVE CONTROL TO 2CADR
R0068             THEN   DELTO = TS+DELTA T -X +Y +Z +1.05MS* +COUNTERS*
R0069       *-THE TIME TAKEN BY WAITLIST ITSELF AND THE COUNTER TICKING DURING THIS WAITLIST TIME.
R0071

R0072           IN SHORT, THE ACTUAL TIME TO RETURN CONTROL TO A 2CADR IS AUGMENTED BY THE TIME TO SET UP THE TASK:S
R0074       INTERRUPT, ALL COUNTERS TICKING, THE T3RUPT PROCESSING TIME, THE WAITLIST PROCESSING TIME AND THE POSSIBILITY
R0076       OF OTHER TASKS INHIBITING THE INTERRUPT.
```

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0078   REF  14  LAST  193   E3,1400                          EBANK= LST1          TASK  LISTS IN SWITCHED E BANK.

0079   REF   1                                               COUNT  02/WAIT

00795                                5235  0 0004 0  TWIDDLE  INHINT
0080   REF 166  LAST 1220           5236  54 001 1           TS     L             SAVE DELAY TIME IN L
0081   REF  35  LAST 1185           5237  3 4777 1           CA     POSMAX
0082   REF 291  LAST 1219           5240  26 002 1           ADS    Q             CREATING OVERFLOW AND Q-1 IN Q
0083   REF  25  LAST 1220           5241  3 0006 1           CA     BBANK
00832                                5242  0 0006 1           EXTEND
00834  REF  18  LAST 1220           5243  04 007 1           ROR    SUPERBNK
0084   REF 167  LAST 1223           5244  56 001 0           XCH    L

00849                                5245  0 0004 0  WAITLIST INHINT
008495                               5246  0 0006 1           EXTEND
008496 REF   1                       5247  6 5261 1           BZMF   WATLSTO-
0085   REF 292  LAST 1223           5250  56 002 0           XCH    Q             SAVE DELTA T IN Q AND RETURN IN
0086   REF   1                      5251  54 061 1           TS     WAITEXIT      WAITEXIT.
0087                                5252  0 0006 1           EXTEND
0088   REF   2  LAST 1223           5253  5 0061 0           INDEX  WAITEXIT      IF TWIDDLING, THE TS SKIPS TO HERE
0089                                5254  3 0001 0           DCA    0             PICK UP 2CADR OF TASK.
0090   REF   1                      5255  54 063 0  -1       TS     WAITADR       BBCON WILL REMAIN IN L
0091   REF   1                      5256  3 5266 0  DLY2     CAF    WAITBB        ENTRY FROM FIXDELAY AND VARDELAY.
0092   REF  26  LAST 1223           5257  56 006 1           XCH    BBANK
0093   REF   1                      5260  1 3246 0           TCF    WAIT2

00935  REF   7  LAST 1184           5261  0 5721 0  WATLSTO- TC     POOOOO
00936                                5262   01204 0           OCT    1204          WAITLIST CALL WITH ZERO OR NEG DT

R0094                RETURN TO CALLER AFTER TASK INSERTION:

0095   REF   3  LAST 1223           5263  52 062 1  LVWTLIST DXCH   WAITEXIT
0096   REF  66  LAST 1220           5264  6 5016 0           AD     TWO
0097                                5265  52 006 0           DTCB

0099   REF  15  LAST 1223  E3.1400                            EBANK= LST1
0100   REF   2  LAST 1223           5266   02063 0  WAITBB   BBCON  WAIT2

R0101                RETURN TO CALLER +2 AFTER WAITING DT SPECIFIED AT CALLER +1.

0102   REF 293  LAST 1223           5267  50 002 0  FIXDELAY INDEX  Q             BOTH ROUTINES MUST BE CALLED UNDER
0103                                5270  3 0000 1           CAF    0             WAITLIST CONTROL AND TERMINATE THE TASK
0104   REF 294  LAST 1223           5271  24 002 0           INCR   Q             IN WHICH THEY WERE CALLED.

R0105                RETURN TO CALLER +1 AFTER WAITING THE DT AS ARRIVING IN A.

0106   REF 295  LAST 1223           5272  56 002 0  VARDELAY XCH    Q             DT TO Q. TASK ADRES TO WAITADR.
0107   REF   2  LAST 1223           5273  54 063 0           TS     WAITADR
0108   REF  27  LAST 1223           5274  3 0006 1           CA     BBANK         BBANK IS SAVED DURING DELAY.
0109                                5275  0 0006 1           EXTEND
```

```
0110   REF  19  LAST 1223      5276  04 007 1            ROR     SUPERBNK       ADD SBANK TO BBCON.
0111   REF 168  LAST 1223      5277  54 001 1            TS      L
0112   REF   1                5300  3 5303 1            CAF     DELAYEX
0113   REF   4  LAST 1223      5301  54 061 1            TS      WAITEXIT       GO TO TASKOVER AFTER TASK ENTRY.
0114   REF   1                5302  1 5256 1            TCF     DLY2

0115   REF  57  LAST 1089      5303  1 5322 0  DELAYEX   TCF     TASKOVER -2    RETURNS TO TASKOVER
```

R0116 ENDTASK MUST BE ENTERED IN FIXED-FIXED SO IT IS DISTINGUISHABLE BY ITS ADRES ALONE.

```
0118   REF  16  LAST 1223   E3,1400                          EBANK= LST1
0119   REF   1               5304   72471 0  ENDTASK -2CADR  SVCT3
0119   REF   1               5305   73714 1

0120   REF  18  LAST 1067    5306  10 076 1  SVCT3    CCS     FLAGWRD2      DRIFT FLAG
0121   REF  58  LAST 1224    5307  1 5324 0            TCF     TASKOVER
0122   REF  59  LAST 1225    5310  1 5324 0            TCF     TASKOVER
0123                         5311  1 5312 0            TCF     +1

01231  REF   2  LAST  192    5312  11'322 1            CCS     IMUCADR       DON'T DO NBDONLY IF SOMEONE ELSE IS IN
01232  REF   1               5313  1 7717 0            TCF     SVCT3X
01233                        5314  1 5317 0            TCF     +3
01234  REF   2  LAST 1225    5315  1 7717 0            TCF     SVCT3X
01235  REF   3  LAST 1225    5316  1 7717 0            TCF     SVCT3X
0124   REF   1               5317  3 7672 0      +3    CAF     PRIO35        COMPENSATE FOR NBD COEFFICIENTS ONLY.
0125   REF  30  LAST 1015    5320  0 5134 1            TC      NOVAC             ENABLE EVERY 81.93 SECONDS
0126   REF   7  LAST  822   E3,1460                          EBANK= NBDX
0127   REF   1               5321   03542 1             2CADR  NBDONLY
0127   REF   1               5322   14063 1
01275  REF  60  LAST 1225    5323  1 5324 0            TCF     TASKOVER

01276  REF   1               6000                       SETLOC FFTAG6
01277                        7717                       BANK

0128   REF  13  LAST  827    7717  0 5267 1  SVCT3X   TC      FIXDELAY      DELAY MAX OF 2 TIMES FOR IMU ZERO
01282                        7720   00764 1             DEC     500
01285  REF   2  LAST 1225    7721  0 5306 1            TC      SVCT3         CHECK DRIFT FLAG AGAIN
```

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```
P0129           BEGIN TASK INSERTION.

 0130                        01,3246                    BANK   01
 0131  REF   1                                         COUNT  01/WAIT

 0132  REF   1               01,3246  54 062 1  WAIT2   TS     WAITBANK      BBANK OF CALLING PROGRAM.
 0133  REF   2  LAST  190    01,3247  4 0026 1          CS     TIME3
 0134  REF  25  LAST 1158    01,3250  6 5010 0          AD     BIT8          BIT 8 = OCT 200
 0135  REF 325  LAST 1219    01,3251  10 000 0          CCS    A             TEST 200 - C(TIME3).  IF POSITIVE,
A0136                                    IT MEANS THAT TIME3 OVERFLOW HAS OCCURRED PRIOR TO CS  TIME3 AND THAT
A0137                                    C(TIME3) = T - T1, INSTEAD OF 1.0 - (T1 - T).  THE FOLLOWING FOUR
A0138                                    ORDERS SET C(A) = TD - T1 + 1 IN EITHER CASE.

 0139  REF   2  LAST 1204    01,3252  6 6056 1          AD     OCT40001      OVERFLOW HAS OCCURRED.  SET C(A) =
 0140  REF 326  LAST 1226    01,3253  4 0000 0          CS     A             T - T1 + 1.0 - 201

R0141  NORMAL CASE (C(A) NNZ) YIELDS SAME C(A):  -( -(1.0-(T1-T)) + 200) - 1

 0142  REF   1               01,3254  6 3402 1          AD     OCT40201
 0143  REF 296  LAST 1223    01,3255  6 0002 0          AD     Q             RESULT = TD - T1 + 1.

 0144  REF 327  LAST 1226    01,3256  10 000 0          CCS    A             TEST TD - T1 + 1

 0145  REF  17  LAST 1225    01,3257  6 1400 1          AD     LST1          IF TD - T1 POS, GO TO WTLST5 WITH
 0146  REF   1               01,3260  1 3322 0          TCF    WTLST5        C(A) = (TD - T1) + C(LST1) = TD-T2+1

 0147                        01,3261  13 262 0          NOOP
 0148  REF 297  LAST 1226    01,3262  4 0002 1          CS     Q

R0149  NOTE THAT THIS PROGRAM SECTION IS NEVER ENTERED WHEN T-T1 G/E -1,
R0150  SINCE TD-T1+1 = (TD-T) + (T-T1+1), AND DELTA T = TD-T G/E +1 .  (G/E
R0151  SYMBOL MEANS GREATER THAN OR EQUAL TO).  THUS THERE NEED BE NO CON-
R0152  CERN OVER A PREVIOUS OR IMMINENT OVERFLOW OF TIME3 HERE.

 0153  REF   8  LAST 1087    01,3263  6 5002 0          AD     POS1/2        WHEN TD IS NEXT, FORM QUANTITY
 0154  REF   9  LAST 1226    01,3264  6 5002 0          AD     POS1/2          1.0 - DELTA T = 1.0 - (TD - T)
 0155  REF   3  LAST 1226    01,3265  56 026 0          XCH    TIME3
 0156  REF  12  LAST 1148    01,3266  6 5001 0          AD     NEGMAX
 0157  REF 298  LAST 1226    01,3267  6 0002 0          AD     Q             1.0 - DELTAT T NOW COMPLETE.
 0158                        01,3270  0 0006 1          EXTEND               ZERO INDEX Q.
 0159                        01,3271  22 007 0          QXCH   7             (ZQ)
```

```
0160   REF  18  LAST 1226   01,3272  57'400 1  WTLST4   XCH    LST1
0161   REF  19  LAST 1227   01,3273  57'401 0           XCH    LST1 +1
0162   REF  20  LAST 1227   01,3274  57'402 0           XCH    LST1 +2
0163   REF  21  LAST 1227   01,3275  57'403 1           XCH    LST1 +3
0164   REF  22  LAST 1227   01,3276  57'404 0           XCH    LST1 +4
0165   REF  23  LAST 1227   01,3277  57'405 1           XCH    LST1 +5
0166   REF  24  LAST 1227   01,3300  57'406 1           XCH    LST1 +6
0167   REF  25  LAST 1227   01,3301  57'407 0           XCH    LST1 +7

0168   REF   3  LAST 1223   01,3302  3 0063 1           CA     WAITADR     (MINOR PART OF TASK CADR HAS BEEN IN L.)
0169   REF 299  LAST 1226   01,3303  50 002 0           INDEX  Q
0170                        01,3304  1 3305 0           TCF    +1

0171   REF  19  LAST  191   01,3305  53'411 0           DXCH   LST2
0172   REF  20  LAST 1227   01,3306  53'413 1           DXCH   LST2 +2
0173   REF  21  LAST 1227   01,3307  53'415 1           DXCH   LST2 +4
0174   REF  22  LAST 1227   01,3310  53'417 0           DXCH   LST2 +6
0175   REF  23  LAST 1227   01,3311  53'421 0           DXCH   LST2 +8D
0176   REF  24  LAST 1227   01,3312  53'423 1           DXCH   LST2 +10D    AT END, CHECK THAT C(LST2+10) IS STD
0177   REF  25  LAST 1227   01,3313  53'425 1           DXCH   LST2 +12D
0178   REF  26  LAST 1227   01,3314  53'427 0           DXCH   LST2 +14D
0179   REF  27  LAST 1227   01,3315  53'431 1           DXCH   LST2 +16D
0180   REF   3  LAST  191   01,3316  6 5304 0           AD     ENDTASK       END ITEM, AS CHECK FOR EXCEEDING
A0181                                                                       THE LENGTH OF THE LIST.
0182                        01,3317  0 0006 1           EXTEND               DUMMY TASK ADRES SHOULD BE IN FIXED-
0183   REF   1              01,3320  1 5263 1           BZF    LVWTLIST      FIXED SO ITS ADRES ALONE DISTINGUISHES
0184   REF   1              01,3321  1 3375 1           TCF    WTABORT       IT.
```

```
0185   REF 328  LAST 1226   01,3322  10 000 0  WTLST5  CCS   A          TEST  TD - T2 + 1
0186   REF  26  LAST 1227   01,3323  6 1401 0          AD    LST1 +1
0187                        01,3324  1 3330 0          TCF   +4
0188   REF 146  LAST 1216   01,3325  6 5017 1          AD    ONE
0189   REF   1              01,3326  0 3403 0          TC    WTLST2
0190                        01,3327   00001 0          OCT   1

0191   REF 329  LAST 1228   01,3330  10 000 0  +4      CCS   A          TEST  TD - T3 + 1
0192   REF  27  LAST 1228   01,3331  6 1402 0          AD    LST1 +2
0193                        01,3332  1 3336 0          TCF   +4
0194   REF 147  LAST 1228   01,3333  6 5017 1          AD    ONE
0195   REF   2  LAST 1228   01,3334  0 3403 0          TC    WTLST2
0196                        01,3335   00002 0          OCT   2

0197   REF 330  LAST 1228   01,3336  10 000 0  +4      CCS   A          TEST  TD - T4 + 1
0198   REF  28  LAST 1228   01,3337  6 1403 1          AD    LST1 +3
0199                        01,3340  1 3344 0          TCF   +4
0200   REF 148  LAST 1228   01,3341  6 5017 1          AD    ONE
0201   REF   3  LAST 1228   01,3342  0 3403 0          TC    WTLST2
0202                        01,3343   00003 1          OCT   3

0203   REF 331  LAST 1228   01,3344  10 000 0  +4      CCS   A          TEST  TD - T5 + 1
0204   REF  29  LAST 1228   01,3345  6 1404 0          AD    LST1 +4
0205                        01,3346  1 3352 1          TCF   +4
0206   REF 149  LAST 1228   01,3347  6 5017 1          AD    ONE
0207   REF   4  LAST 1228   01,3350  0 3403 0          TC    WTLST2
0208                        01,3351   00004 0          OCT   4

0209   REF 332  LAST 1228   01,3352  10 000 0  +4      CCS   A          TEST  TD - T6 + 1
0210   REF  30  LAST 1228   01,3353  6 1405 1          AD    LST1 +5
0211                        01,3354  1 3360 0          TCF   +4
0212   REF 150  LAST 1228   01,3355  6 5017 1          AD    ONE
0213   REF   5  LAST 1228   01,3356  0 3403 0          TC    WTLST2
0214                        01,3357   00005 1          OCT   5

0215   REF 333  LAST 1228   01,3360  10 000 0  +4      CCS   A          TEST  TD - T7 + 1
0216   REF  31  LAST 1228   01,3361  6 1406 1          AD    LST1 +6
0217                        01,3362  1 3366 0          TCF   +4
0218   REF 151  LAST 1228   01,3363  6 5017 1          AD    ONE
0219   REF   6  LAST 1228   01,3364  0 3403 0          TC    WTLST2
0220                        01,3365   00006 1          OCT   6
```

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```
0221   REF 334  LAST 1228   01,3366  10 000 0   +4        CCS    A
0222   REF  32  LAST 1228   01,3367  6 1407 0             AD     LST1 +7
0223                        01,3370  1 3374 0             TCF    +4
0224   REF 152  LAST 1228   01,3371  6 5017 1             AD     ONE
0225   REF   7  LAST 1228   01,3372  0 3403 0             TC     WTLST2
0226                        01,3373   00007 0             OCT    7

0227   REF 335  LAST 1229   01,3374  10 000 0   +4        CCS    A
0228   REF   6  LAST 1212   01,3375  0 7755 1   WTABORT   TC     BAILOUT      NO ROOM IN THE INN.
0229                        01,3376   01203 1             OCT    1203

0230   REF 153  LAST 1229   01,3377  6 5017 1             AD     ONE
0231   REF   8  LAST 1229   01,3400  0 3403 0             TC     WTLST2
0232                        01,3401   00010 0             OCT    10

0233                        01,3402   40201 0   OCT40201  OCT    40201
```

```
P0234   THE ENTRY TO WTLST2 JUST PRECEDING OCT  N  IS FOR T  LE TO LE T   -1.
R0235                                                    N          N+1

R0236   (LE MEANS LESS THAN OR EQUAL TO).  AT ENTRY, C(A) = -(TD - T   + 1)
R0237                                                              N+1

R0238   THE LST1 ENTRY -(T   - T +1) IS TO BE REPLACED BY -(TD - T + 1), AND
R0239                  N+1   N                                   N

R0240   THE ENTRY -(T   - TD + 1) IS TO BE INSERTED IMMEDIATELY FOLLOWING.
R0241             N+1

 0242   REF   1              01,3403  54 064 1  WTLST2  TS     WAITTEMP        C(A) = -(TD - T   + 1)
 0243   REF 300  LAST 1227   01,3404  50 002 0           INDEX  Q
 0244                        01,3405  3 0000 1           CAF    0
 0245   REF 301  LAST 1230   01,3406  54 002 1           TS     Q               INDEX VALUE INTO Q.

 0246   REF 154  LAST 1229   01,3407  3 5017 1           CAF    ONE
 0247   REF   2  LAST 1230   01,3410  6 0064 0           AD     WAITTEMP
 0248   REF 302  LAST 1230   01,3411  50 002 0           INDEX  Q               C(A) = -(TD - T ) + 1.
 0249   REF  33  LAST 1229   01,3412  27'377 1           ADS    LST1 -1                        N

 0250   REF   3  LAST 1230   01,3413  4 0064 1           CS     WAITTEMP
 0251   REF 303  LAST 1230   01,3414  50 002 0           INDEX  Q
 0252   REF   1              01,3415  1 3272 1           TCF    WTLST4

R0253   C(TIME3) = 1.0 - (T1 - T)

R0254   C(LST1  ) = - (T2 - T1) + 1
R0255   C(LST1+1) = - (T3 - T2) + 1
R0256   C(LST1+2) = - (T4 - T3) + 1
R0257   C(LST1+3) = - (T5 - T4) + 1
R0258   C(LST1+4) = - (T6 - T5) + 1

R0259   C(LST2  ) = 2CADR  TASK1
R0260   C(LST2+2) = 2CADR  TASK2
R0261   C(LST2+4) = 2CADR  TASK3
R0262   C(LST2+6) = 2CADR  TASK4
R0263   C(LST2+8) = 2CADR  TASK5
R0264   C(LST2+10) = 2CADR  TASK6
```

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P0265 ENTERS HERE ON T3 RUPT TO DISPATCH WAITLISTED TASK.

```
0266                                01,3416  0 0006 1  T3RUPT   EXTEND
0267  REF  20  LAST 1224           01,3417  04 007 1            ROR     SUPERBNK      READ CURRENT SUPERBANK VALUE AND
0268  REF  22  LAST 1096           01,3420  54 016 1            TS      BANKRUPT      SAVE WITH E AND F BANK VALUES.
0269                                01,3421  0 0006 1            EXTEND
0270  REF  18  LAST 1096           01,3422  22 012 1            QXCH    QRUPT

0271  REF   9  LAST 1200           01,3423  3 5000 1  T3RUPT2   CAF     NEG1/2        DISPATCH WAITLIST TASK.
0272  REF  34  LAST 1230           01,3424  57'407 0            XCH     LST1 +7
0273  REF  35  LAST 1231           01,3425  57'406 1            XCH     LST1 +6
0274  REF  36  LAST 1231           01,3426  57'405 1            XCH     LST1 +5
0275  REF  37  LAST 1231           01,3427  57'404 0            XCH     LST1 +4       1.  MOVE UP LST1 CONTENTS, ENTERING
0276  REF  38  LAST 1231           01,3430  57'403 1            XCH     LST1 +3           A VALUE OF 1/2 +1 AT THE BOTTOM
0277  REF  39  LAST 1231           01,3431  57'402 0            XCH     LST1 +2           FOR T6-T5, CORRESPONDING TO THE
0278  REF  40  LAST 1231           01,3432  57'401 0            XCH     LST1 +1           INTERVAL 81.91 SEC FOR ENDTASK.
0279  REF  41  LAST 1231           01,3433  57'400 1            XCH     LST1
0280  REF  36  LAST 1223           01,3434  6 4777 1            AD      POSMAX        2. SET T3 = 1.0 - T2 -T USING LIST 1.
0281  REF   4  LAST 1226           01,3435  26 026 1            ADS     TIME3         SO T3 WONT TICK DURING UPDATE.
0282  REF   3  LAST  588           01,3436  54 734 0            TS      RUPTAGN
0283  REF 257  LAST 1220           01,3437  4 5021 0            CS      ZERO
0284  REF   4  LAST 1231           01,3440  54 734 0            TS      RUPTAGN       SETS RUPTAGN TO +1 ON OVERFLOW.

0285                                01,3441  0 0006 1            EXTEND                DISPATCH TASK.
0286  REF   4  LAST 1227           01,3442  4 5305 0            DCS     ENDTASK
0287  REF  28  LAST 1227           01,3443  53'431 1            DXCH    LST2 +16D
0288  REF  29  LAST 1231           01,3444  53'427 0            DXCH    LST2 +14D
0289  REF  30  LAST 1231           01,3445  53'425 1            DXCH    LST2 +12D
0290  REF  31  LAST 1231           01,3446  53'423 1            DXCH    LST2 +10D
0291  REF  32  LAST 1231           01,3447  53'421 0            DXCH    LST2 +8D
0292  REF  33  LAST 1231           01,3450  53'417 0            DXCH    LST2 +6
0293  REF  34  LAST 1231           01,3451  53'415 1            DXCH    LST2 +4
0294  REF  35  LAST 1231           01,3452  53'413 1            DXCH    LST2 +2
0295  REF  36  LAST 1231           01,3453  53'411 0            DXCH    LST2

0296  REF 169  LAST 1224           01,3454  56 001 0            XCH     L
0297                                01,3455  0 0006 1            EXTEND
0298  REF  21  LAST 1231           01,3456  01 007 1            WRITE   SUPERBNK      SET SUPERBANK FROM BBCON OF 2CADR
0299  REF 170  LAST 1231           01,3457  56 001 0            XCH     L             RESTORE TO L FOR DXCH Z.
0300                                01,3460  52 006 0            DTCB
```

```
P0301                RETURN, AFTER EXECUTION OF T3 OVERFLOW TASK:

0302                                 5324                        BLOCK   02
0303   REF   2 LAST 1223 TO 1226:    58    58*                   COUNT   02/WAIT

0304   REF   5  LAST 1231           5324  10 734 0  TASKOVER CCS     RUPTAGN       IF +1 RETURN TO T3RUPT. IF -0 RESUME.
0305   REF   2  LAST 1223           5325  3 5266 0            CAF     WAITBB
0306   REF  28  LAST 1223           5326  54 006 0            TS      BBANK
0307   REF   1                      5327  1 3423 0            TCF     T3RUPT2       DISPATCH NEXT TASK IF IT WAS DUE.

0308   REF  23  LAST 1231           5330  3 0016 0            CA      BANKRUPT
0309                                5331  0 0006 1            EXTEND
0310   REF  22  LAST 1231           5332  01 007 1            WRITE   SUPERBNK      RESTORE SUPERBANK BEFORE RESUME IS DONE

0311                                5333  0 0006 1  RESUME    EXTEND
0312   REF  19  LAST 1231           5334  22 012 1            QXCH    QRUPT
0313   REF  24  LAST 1232           5335  3 0016 0  NOQRSM    CA      BANKRUPT
0314   REF  29  LAST 1232           5336  56 006 1            XCH     BBANK
0315   REF  11  LAST  132           5337  52 011 0  NOQBRSM   DXCH    ARUPT
03155                               5340  0 0003 1            RELINT
0316                                5341  5 0017 1            RESUME
```

```
P0317   LONGCALL

R0318   PROGRAM DESCRIPTION                                  DATE- 17 MARCH 1967
R0319   PROGRAM WRITTEN BY W.H. VANDEVER                     LOG SECTION WAITLIST
R0320   MOD BY- R. MELANSON TO ADD DOCUMENTATION             ASSEMBLY SUNDISK REV. 100

R0321   FUNCTIONAL DESCRIPTION-
R0322   LONGCALL IS CALLED WITH THE DELTA TIME ARRIVING IN A,L SCALED AS TIME2,TIME1 WITH THE 2CADR OF THE TASK
R0324   IMMEDIATELY FOLLOWING THE TC LONGCALL.  FOR EXAMPLE, IT MIGHT BE DONE AS FOLLOWS WHERE TIMELOC IS THE NAME OF
R0326   A DP REGISTER CONTAINING A DELTA TIME AND WHERE TASKTODO IS THE NAME OF THE LOCATION AT WHICH LONGCALL IS TO
R0328   START

R0329   CALLING SEQUENCE-
A0330                                                   EXTEND
A0331                                                   DCA     TIMELOC
A0332                                                   TC      LONGCALL
A0333                                                   2CADR   TASKTODO

R0334   NORMAL EXIT MODE-
R0335      1). TC    WAITLIST
R0336      2). DTCB  (TO L+3 OF CALLING ROUTINE 1ST PASS THRU LONGCYCL)
R0337      3). DTCB  (TO TASKOVER ON SUBSEQUENT PASSES THRU LONGCYCL)

R0338   ALARM OR ABORT EXIT MODE-
R0339      NONE

R0340   OUTPUT-
R0341      LONGTIME AND LONGTIME+1 = DELTA TIME
R0342      LONGEXIT AND LONGEXIT+1 = RETURN 2CADR
R0343      LONGCADR AND LONGCADR+1 = TASK 2CADR
R0344      A = SINGLE PRECISION TIME FOR WAITLIST

R0345   ERASABLE INITIALIZATION-
R0346      A = MOST SIGNIFICANT PART OF DELTA TIME
R0347      L = LEAST SIGNIFICANT PART OF DELTA TIME
R0348      Q = ADDRESS OF 2CADR TASK VALUE

R0349   DEBRIS-
R0350      A,Q,L
R0351      LONGCADR AND LONGCADR+1
R0352      LONGEXIT AND LONGEXIT+1
R0353      LONGTIME AND LONGTIME+1

R0354   *** THE FOLLOWING IS TO BE IN FIXED-FIXED AND UNSWITCHED ERRASIBLE ***

 0355                          5342                      BLOCK  02
 0356   REF  42  LAST 1231   E3,1400                     EBANK= LST1
 0357   REF   1               5342  53'140 1  LONGCALL DXCH   LONGTIME       OBTAIN THE DELTA TIME

 0358                          5343  0 0006 1            EXTEND                OBTAIN THE 2CADR
```

```
0359  REF 304  LAST 1230      5344  5 0002 0          NDX     Q
0360                          5345  3 0001 0          DCA     0
0361  REF   1                 5346  53'134 1          DXCH    LONGCADR

0362                          5347  0 0006 1          EXTEND                  NOW GO TO THE APPROPRIATE SWITCHED BANK
0363  REF   1                 5350  3 5353 1          DCA     LGCL2CDR        FOR THE REST OF LONGCALL
0364                          5351  52 006 0          DTCB

0365  REF  43  LAST 1233   E3,1400                     EBANK=  LST1
0366  REF   1               5352   03461 1  LGCL2CDR  2CADR   LNGCALL2
0366  REF   1               5353   02063 0

R0367  *** THE FOLLOWING MAY BE IN A SWITCHED BANK, INCLUDING ITS ERASABLE ***

0368                      01,3461                     BANK    01
0369  REF   2 LAST 1226 TO 1232:   139   139*        COUNT   01/WAIT

0370  REF   1               01,3461  23'435 1  LNGCALL2 LXCH    LONGEXIT +1     SAVE THE CORRECT BB FOR RETURN
0371  REF  67  LAST 1223    01,3462  3 5016 0          CA      TWO             OBTAIN THE RETURN ADDRESS
0372  REF 305  LAST 1234    01,3463  26 002 1          ADS     Q
0373  REF   2  LAST 1234    01,3464  55'434 1          TS      LONGEXIT

R0374          *** WAITLIST TASK LONGCYCL ***
0375                        01,3465  0 0006 1  LONGCYCL EXTEND                  CAN WE SUCCESFULLY TAKE ABOUT 1.25
0376  REF   1               01,3466  4 3477 1          DCS     DPBIT14         MINUTES OFF OF LONGTIME
0377  REF   2  LAST 1233    01,3467  21'140 1          DAS     LONGTIME

0378  REF   3  LAST 1234    01,3470  11'140 1          CCS     LONGTIME +1     THE REASONIBG BEHIND THIS PART IS
0379  REF   1               01,3471  1 3510 1          TCF     MUCHTIME        INVOLVED, TAKING INTO ACCOUNT THAT THE
A0380                                                                          WORDS MAY NOT BE SIGNED CORRECTED (DP
A0381                                                                          BASIC INSTRUCTIONS
A0382                                                                          DO NOT SIGN CORRECT) AND THAT WE SUBTRAC
A0383                                                                          TED BIT14 (1 OVER HALF THE POS. VALUE
A0384                                                                          REPRESENTIBLE IN SINGLE WORD)
0385                        01,3472  13 473 0          NOOP                    CAN:T GET HERE    **********
0386                        01,3473  1 3474 1          TCF     +1
0387  REF   4  LAST 1234    01,3474  11'137 1          CCS     LONGTIME
0388  REF   2  LAST 1234    01,3475  1 3510 1          TCF     MUCHTIME
0389                        01,3476   00000 1  DPBIT14  OCT     00000
0390                        01,3477   20000 0          OCT     20000

A0391                                                                         LONGCALL
0392  REF  69  LAST 1204    01,3500  3 5002 0  LASTTIME CA      BIT14           GET BACK THE CORRECT DELTA TFOR WAITLIST
0393  REF   5  LAST 1234    01,3501  27'140 1          ADS     LONGTIME +1
0395  REF  50  LAST 1088    01,3502  0 5245 1          TC      WAITLIST
0396  REF  44  LAST 1234    E3,1400                    EBANK=  LST1
0397  REF   1               01,3503   03515 0          2CADR   GETCADR         THE ENTRY TO OUR LONGCADR
0397  REF   1               01,3504   02063 0

0399  REF   1               01,3505  3 3517 1  LONGRTRN CA      TSKOVCDR        SET IT UP SO THAT ONLY THE FIRST EXIT IS
```

L WAITLIST

```
0400    REF   3  LAST 1234   01,3506  53'435 0           DXCH    LONGEXIT        TO THE CALLER OF LONGCALL
0401                         01,3507  52 006 0           DTCB                    THE REST ARE TO TASKOVER

0402    REF  70  LAST 1234   01,3510  3 5002 0  MUCHTIME CA      BIT14           WE HAVE OVER OUR ABOUT 1.25 MINUTES
0404    REF  51  LAST 1234   01,3511  0 5245 1           TC      WAITLIST        SO SET UP FOR ANOTHER CYCLE THROUGH HERE
0405    REF  45  LAST 1234   E3,1400                     EBANK=  LST1
0406    REF   1              01,3512   03465 0          2CADR   LONGCYCL
0406    REF   1              01,3513   02063 0

0408    REF   1              01,3514  1 3505 0           TCF     LONGRTRN        NOW EXIT PROPERLY

R0409                *** WAITLIST TASK  GETCADR ***
0410    REF   2  LAST 1234   01,3515  53'134 1  GETCADR  DXCH    LONGCADR        GET THE LONGCALL THAT WE WISHED TO START
0411                         01,3516  52 006 0           DTCB                    AND TRANSFER CONTROL TO IT

0412    REF  61  LAST 1225   01,3517   05324 1  TSKOVCDR GENADR  TASKOVER
```

L LATITUDE LONGITUDE SUBROUTINES USER'S PAGE NO. 1 EO S3

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R0001   SUBROUTINE TO CONVERT RAD VECTOR AT GIVEN TIME TO LAT,LONG AND ALT

R0002   CALLING SEQUENCE

R0003     L-1    CALL
R0004     L              LAT-LONG
R0005   SUBROUTINES USED

R0006    R-TO-RP,ARCTAN,SETGAMMA,SETRE
R0007   ERASABLE INIT. REQ.

R0008     AXO,-AYO,AZO,TEPHEM (SET AT LAUNCH TIME)
R0009   ALPHAV = POSITION VECTOR METERS B-29
R0010     MPAC-- TIME  (CSECS B-28)
R0011    ERADFLAG =1, TO COMPUTE EARTH RADIUS, =0 FOR FIXED EARTH RADIUS
R0012    LUNAFLAG=0 FOR EARTH,1 FOR MOON
R0013   OUTPUT

R0014     LATITUDE IN LAT   (REVS. B-0)
R0015     LONGITUDE IN LONG   (REVS. B-0)
R0016   ALTITUDE IN ALT METERS B-29
 0017                        30,3750                    BANK   30
 0018   REF   1              13,2000                    SETLOC LATLONG
 0019                        13,2370                    BANK
 0020   REF   1                                         COUNT  13/LT-LG

 0021   REF  17 LAST  904    E4,1551                    EBANK= ALPHAV
 0022                        13,2370   40220 0 LAT-LONG STQ    SETPD
 0023   REF   2 LAST  540    13,2371   02242 1          INCORPEX
 0024                        13,2372   00001 0          OD
 0025                        13,2373   24007 0          STOVL  6D              SAVE TIME IN 6-7D FOR R-TO-RP
 0026   REF  18 LAST 1236    13,2374   02152 0          ALPHAV
 0027                        13,2375   51406 1          PUSH   ABVAL           0-5D= R FOR R-TO-RP
 0028   REF   2 LAST   89    13,2376   16310 1          STODL  ALPHAM          ABS. VALUE OF R FOR ALT FORMULA BELOW
 0029   REF  12 LAST 1206    13,2377   11566 1          ZEROVEC                SET MPAC=0 FOR EARTH,NON-ZERO FOR MOON
 0030                        13,2400   71414 0          BOFF   COS             USE COS(0) TO GET NON-ZERO IN MPAC
 0031   REF  21 LAST  904    13,2401   01743 0          LUNAFLAG               0=EARTH,1=MOON
 0032   REF   1              13,2402   26403 1          CALLRTRP
 0033                        13,2403   77624 1 CALLRTRP CALL
 0034   REF   3 LAST  608    13,2404   55371 1          R-TO-RP                RP VECTOR CONVERTED FROM R B-29
 0035                        13,2405   77656 1          UNIT                   UNIT RP B-1
 0036   REF  19 LAST 1236    13,2406   36152 1          STCALL ALPHAV          U2= 1/2 SINL FOR SETRE SUBR BELOW
 0037   REF   1              13,2407   26571 0          SETGAMMA                SET GAMMA=B2/A2 FOR EARTH,=1 FOR MOON
 0038                        13,2410   77624 1          CALL                    SCALED B-1
 0039   REF   2 LAST  601    13,2411   26601 1          SETRE                  CALC RE METERS B-29
 0040                        13,2412   63545 0          DLOAD  DSQ
 0041   REF  20 LAST 1236    13,2413   02152 0          ALPHAV
 0042                        13,2414   63525 0          PDDL   DSQ
 0043   REF  21 LAST 1236    13,2415   02154 0          ALPHAV +2
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0044                                13,2416   75415 0     DAD     SQRT
0045                                13,2417   76405 1     DMP     SL1R
0046  REF   1                     13,2420   00011 1             GAMRP
0047  REF   5  LAST  885          13,2421   14021 1     STODL   COSTH           COS(LAT) B-1
0048  REF  22  LAST 1236          13,2422   02156 1             ALPHAV +4
0049  REF   5  LAST  885          13,2423   34023 1     STCALL  SINTH           SIN(LAT) B-1
0050  REF   1                     13,2424   26531 1             ARCTAN
0051  REF  11  LAST  904          13,2425   15104 0     STODL   LAT             LAT BO
0052  REF  23  LAST 1237          13,2426   02152 0             ALPHAV
0053  REF   6  LAST 1237          13,2427   14021 1     STODL   COSTH           COS(LONG) B-1
0054  REF  24  LAST 1237          13,2430   02154 0             ALPHAV +2
0055  REF   6  LAST 1237          13,2431   34023 1     STCALL  SINTH           SIN(LONG) B-1
0056  REF   2  LAST 1237          13,2432   26531 1             ARCTAN
0057  REF   8  LAST  904          13,2433   15106 1     STODL   LONG            LONG. REVS B-0 IN RANGE -1/2 TO 1/2
0058  REF   3  LAST 1236          13,2434   02310 1             ALPHAM
0059                                13,2435   77625 0     DSU                     ALT= R-RE METERS B-29
0060  REF   7  LAST  810          13,2436   02241 1             ERADM
0061  REF   7  LAST  643          13,2437   35110 1     STCALL  ALT             EXIT WITH ALT METERS B-29
0062  REF   3  LAST 1236          13,2440   02242 1             INCORPEX
```

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R0063   SUBROUTINE TO CONVERT LAT.LONG.ALT AT GIVEN TIME TO RADIUS VECTOR
R0064   CALLING SEQUENCE

R0065     L-1    CALL
R0066     L              LALOTORV
R0067   SUBROUTINES USED

R0068    SETGAMMA,SETRE,RP-TO-R
R0069   ERASABLE INIT. REQ.

R0070     AXO,AYO,AZO,TEPHEM  SET AT LAUNCH TIME
R0071     LAT-- LATITUDE  (REVS B0)
R0072     LONG-- LONGITUDE  (REVS B0)
R0073   ALT--ALTITUDE (METERS) B-29
R0074     MPAC-- TIME  (CSECS B-28)
R0075     ERADFLAG =1 TO COMPUTE EARTH RADIUS, =0 FOR FIXED EARTH RADIUS
R0076    LUNAFLAG=0 FOR EARTH,1 FOR MOON
R0077   OUTPUT

R0078   R-VECTOR IN ALPHAV (METERS B-29)
 0079                          13,2441   40220 0  LALOTORV STQ     SETPD          LAT.LONG.ALT TO R VECTOR
 0080   REF   4  LAST 1237    13,2442   02242 1                   INCORPEX
 0081                          13,2443   00001 0                   0D
 0082                          13,2444   34007 1                STCALL 6D         6-7D= TIME FOR RP-TO-R
 0083   REF   2  LAST 1236    13,2445   26571 0                   SETGAMMA       GAMMA=B2/A2 FOR EARTH,1 FOR MOON B-1
 0084                          13,2446   73545 1           DLOAD   SIN                    COS(LONG)COS(LAT) IN MPAC
 0085   REF  12  LAST 1237    13,2447   01104 0                   LAT                UNIT RP= SIN(LONG)COS(LAT)    2-3D
 0086                          13,2450   65275 1           DMPR    PDDL           PD 2          GAMMA*SIN(LAT)         0-1D
 0087   REF   2  LAST 1237    13,2451   00011 1                   GAMRP
 0088   REF  13  LAST 1238    13,2452   01104 0                   LAT                  0-1D= GAMMA*SIN(LAT) B-2
 0089                          13,2453   65346 0           COS     PDDL           PD 4     2-3D=COS(LAT) B-1 TEMPORARILY
 0090   REF   9  LAST 1237    13,2454   01106 1                   LONG
 0091                          13,2455   57356 0           SIN     DMPR           PD 2
 0092                          13,2456   71525 0           PDDL    COS            PD 4    2-3D=SIN(LONG)COS(LAT) B-2
 0093   REF  14  LAST 1238    13,2457   01104 0                   LAT
 0094                          13,2460   71525 0           PDDL    COS            PD 6     4-5D=COS(LAT) B-1 TEMPORARILY
 0095   REF  10  LAST 1238    13,2461   01106 1                   LONG
 0096                          13,2462   55475 1           DMPR    VDEF           PD 4    MPAC= COS(LONG)COS(LAT) B-2
 0097                          13,2463   41456 0           UNIT    PUSH           0-5D= UNIT RP FOR RP-TO-R SUBR.
 0098   REF  25  LAST 1237    13,2464   36152 1           STCALL  ALPHAV         ALPHAV +4= SINL FOR SETRE SUBR.
 0099   REF   3  LAST 1236    13,2465   26601 1                   SETRE          RE METERS B-29
 0100                          13,2466   43145 0           DLOAD   BOFF           SET MPAC=0 FOR EARTH,NON-ZERO FOR MOON
 0101   REF  13  LAST 1236    13,2467   11566 1                   ZEROVEC
 0102   REF  22  LAST 1236    13,2470   01743 0                   LUNAFLAG
 0103   REF   1               13,2471   26473 0                   CALLRPRT
 0104                          13,2472   77746 1           COS
 0105                          13,2473   77624 1  CALLRPRT CALL                  USE COS(0) TO GET NON-ZERO IN MPAC
 0106   REF   5  LAST  778    13,2474   55344 1                   RP-TO-R        EXIT WITH UNIT R VECTOR IN MPAC
 0107   REF  26  LAST 1238    13,2475   16152 0           STODL   ALPHAV
 0108   REF   8  LAST 1237    13,2476   02241 1                   ERADM
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0109                          13,2477   74215 1          DAD     VXSC          (RE + ALT)(UNIT R) METERS B-30
0110   REF   8  LAST 1237     13,2500   01110 0                  ALT
0111   REF  27  LAST 1238     13,2501   02152 0                  ALPHAV
0112                          13,2502   77772 0          VSL1                  R METERS B-29
0113   REF  28  LAST 1239     13,2503   36152 1          STCALL  ALPHAV        EXIT WITH R IN METERS B-29
0114   REF   5  LAST 1238     13,2504   02242 1                  INCORPEX
R0115  SUBROUTINE TO COMPUTE EARTH RADIUS

R0116  INPUT

R0117    1/2 SIN LAT IN ALPHAV +4

R0118  OUTPUT

R0119    EARTH RADIUS IN ERADM AND MPAC  (METERS B-29)

0120                          13,2505   63545 0  GETERAD  DLOAD   DSQ
0121   REF  29  LAST 1239     13,2506   02156 1                   ALPHAV +4     SIN**2(L)
0122                          13,2507   44352 0          SL1     BDSU
0123   REF   1                13,2510   11564 0                  DP1/2         COS**2(L)
0124                          13,2511   44275 1          DMPR    BDSU
0125   REF   1                13,2512   26526 1                  EE
0126   REF   2  LAST 1239     13,2513   11564 0                  DP1/2
0127                          13,2514   75465 1          BDDV    SQRT
0128   REF   1                13,2515   26522 0                  B2XSC
0129                          13,2516   77622 1          SR4R
0130   REF   9  LAST 1238     13,2517   02241 1          STORE   ERADM
0131                          13,2520   77616 0          RVQ

R01311 THE FOLLOWING CONSTANTS WERE COMPUTED WITH A=6378166,B=6356784 METERS
R01312 B2XSC= B**2 SCALED B-51
R01313 B2/A2= B**2/A**2 SCALED B-1
R01314 EE=(1-B**2/A**2) SCALED B-0
0132                          13,2521   00446 1  B2XSC    2DEC    .0179450689      B**2 SCALED B-51
0132                          13,2522   00305 1
0133   REF   4  LAST 1206     04,3563            DP1/2    =       XUNIT
0134                          13,2523   17711 0  B2/A2    2DEC    .9933064884 B-1  GAMMA= B**2/A**2 B-1
0134                          13,2524   05254 1
0135                          13,2525   00155 0  EE       2DEC    6.6935116 E-3    (1-B**2/A**2) B-0
0135                          13,2526   25250 1
0136                          13,2527   00302 0  ERAD     2DEC    6373338 B-29     PAD RADIUS
0136                          13,2530   17755 0
```

P0137 ARCTAN SUBROUTINE

R0138 CALLING SEQUENCE

R0139 SIN THETA IN SINTH B-1
R0140 COS THETA IN COSTH B-1
R0141 CALL ARCTAN

R0142 OUTPUT
R0143 ARCTAN THETA IN MPAC AND THETA B-0 IN RANGE -1/2 TO +1/2

```
0144                          13,2531   77600 1  ARCTAN    BOV
0145  REF   1                 13,2532   26533 0                CLROVFLW
0146                          13,2533   63545 0  CLROVFLW  DLOAD   DSQ
0147  REF   7  LAST 1237      13,2534   00023 0                SINTH
0148                          13,2535   63525 0           PDDL   DSQ
0149  REF   7  LAST 1237      13,2536   00021 1                COSTH
0150                          13,2537   77615 0           DAD
0151                          13,2540   75454 0           BZE    SQRT
0152  REF   1                 13,2541   26557 1                ARCTANXX      ATAN=0/0  SET THETA=0
0153                          13,2542   40065 0           BDDV   BOV
0154  REF   8  LAST 1240      13,2543   00023 0                SINTH
0155  REF   1                 13,2544   26564 1                ATAN=90
0156                          13,2545   67542 0           SR1    ASIN
0157  REF   4  LAST  760      13,2546   00025 0           STORE  THETA
0158                          13,2547   50125 1           PDDL   BMN
0159  REF   8  LAST 1240      13,2550   00021 1                COSTH
0160  REF   1                 13,2551   26553 0                NEGCOS
0161                          13,2552   43545 1           DLOAD  RVQ
0162                          13,2553   57545 1  NEGCOS   DLOAD  DCOMP
0163                          13,2554   43244 1           BPL    DAD
0164  REF   1                 13,2555   26561 1                NEGOUT
0165  REF   3  LAST 1239      13,2556   11564 0                DP1/2
0166  REF   5  LAST 1240      13,2557   00025 0  ARCTANXX STORE  THETA
0167                          13,2560   77616 0           RVQ

0168                          13,2561   52025 1  NEGOUT    DSU    GOTO
0169  REF   4  LAST 1240      13,2562   11564 0                DP1/2
0170  REF   2  LAST 1240      13,2563   26557 1                ARCTANXX
0171                          13,2564   75345 1  ATAN=90   DLOAD  SIGN
0172  REF   1                 13,2565   11612 1                LODP1/4
0173  REF   9  LAST 1240      13,2566   00023 0                SINTH
0174  REF   6  LAST 1240      13,2567   00025 0           STORE  THETA
0175                          13,2570   77616 0           RVQ

0176  REF   2  LAST  753      04,3565             2ZERO   =      DPZERO
```

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P0177   ..... SETGAMMA SUBROUTINE .....
R0178   SUBROUTINE TO SET GAMMA FOR THE LAT-LONG AND LALOTORV SUBROUTINES

R0179    GAMMA = B**2/A**2 FOR EARTH (B-1)
R0180    GAMMA = 1 FOR MOON (B-1)

R0181   CALLING SEQUENCE
R0182    L       CALL
R0183    L+1             SETGAMMA

R0184   INPUT
R0185    LUNAFLAG=0 FOR EARTH,=1 FOR MOON

R0186   OUTPUT
R0187    GAMMA IN GAMRP  (B-1)

 0188                        13,2571   43145 0  SETGAMMA DLOAD  BOFF            BRANCH FOR EARTH
 0189   REF   1              13,2572   26524 0                  B2/A2           EARTH GAMMA
 0190   REF  23  LAST 1236   13,2573   01743 0                  LUNAFLAG
 0191   REF   1              13,2574   26577 0                  SETGMEX
 0192                        13,2575   77735 0           SLOAD
 0193   REF   1              13,2576   11564 0                  1B1             MOON GAMMA
 0194   REF   3  LAST 1238   13,2577   00011 1  SETGMEX  STORE   GAMRP
 0195                        13,2600   77616 0           RVQ
 0196                        0010      GAMRP    =       8D
```

L LATITUDE LONGITUDE SUBROUTINES USER'S PAGE NO. 7 E4 S3

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P0197   .....SETRE SUBROUTINE .....
R0198   SUBROUTINE TO SET RE (EARTH OR MOON RADIUS)

R0199   RE= RM FOR MOON
R0200    RE= RREF FOR FIXED EARTH RADIUS OR COMPUTED RF FOR FISCHER ELLIPSOID

R0201   CALLING SEQUENCE
R0202    L       CALL
R0203    L+1             SETRE

R0204   SUBROUTINES USED
R0205    GETERAD

R0206   INPUT
R0207    ERADFLAG=0 FOR FIXED RE, 1 FOR COMPUTED RE
R0208    ALPHAV +4= 1/2 SINL IF GETERAD IS CALLED
R0209    LUNAFLAG=0 FOR EARTH,=1 FOR MOON

R0210   OUTPUT
R0211    ERADM= 504RM FOR MOON (METERS B-29)
R0212    ERADM= ERAD OR COMPUTED RF FOR EARTH (METERS B-29)

 0213                        13,2601   71220 1  SETRE    STQ    DLOAD
 0214   REF   1              13,2602   00051 0                  SETREX
 0215   REF   1              13,2603   26626 1                  504RM
 0216                        13,2604   71214 0          BON     DLOAD          BRANCH FOR MOON
 0217   REF  24  LAST 1241   13,2605   01703 1                  LUNAFLAG
 0218   REF   1              13,2606   26616 1                  TSTRLSRM
 0219   REF   1              13,2607   26530 0                  ERAD
 0220                        13,2610   45014 0          BOFF    CALL           ERADFLAG=0 FOR FIXED RE,1 FOR COMPUTED
 0221   REF  12  LAST  904   13,2611   00742 0                  ERADFLAG
 0222   REF   1              13,2612   26614 0                  SETRXX
 0223   REF   4  LAST  894   13,2613   26505 0                  GETERAD
 0224   REF  10  LAST 1239   13,2614   36241 0  SETRXX  STCALL  ERADM          EXIT WITH RE OR RM METERS B-29
 0225   REF   2  LAST 1242   13,2615   00051 0                  SETREX
 0226                        13,2616   77214 0  TSTRLSRM BON    VLOAD          ERADFLAG=0,SET RO=RLS
 0227   REF  13  LAST 1242   13,2617   00702 1                  ERADFLAG                =1     RO=RM
 0228   REF   2  LAST 1242   13,2620   26614 0                  SETRXX
 0229   REF   9  LAST  742   13,2621   02026 1                  RLS
 0230                        13,2622   64446 0          ABVAL   SR2R           SCALE FROM B-27 TO B-29
 0231                        13,2623   77650 1          GOTO
 0232   REF   3  LAST 1242   13,2624   26614 0                  SETRXX
 0233   REF  12  LAST  753     0051              SETREX  =       S2
 0234                        13,2625   00065 1  504RM   2DEC    1738090 B-29   METERS B-29 (MOON RADIUS)
 0234                        13,2626   01265 1
```

L PLANETARY INERTIAL ORIENTATION USER'S PAGE NO. 1 EO S3

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P0001   ..... RP-TO-R SUBROUTINE .....
R0002   SUBROUTINE TO CONVERT RP (VECTOR IN PLANETARY COORDINATE SYSTEM,EITHER
R0003    EARTH-FIXED OR MOON-FIXED) TO R (SAME VECTOR IN THE BASIC REF. SYSTEM)

R0004    R=MT(T)*(RP+LPXRP)    MT= M MATRIX TRANSPOSE

R0005   CALLING SEQUENCE
R0006    L       CALL
R0007    L+1             RP-TO-R

R0008   SUBROUTINES USED
R0009    EARTHMX,MOONMX,EARTHL

R0010      ITEMS AVAILABLE FROM LAUNCH DATA
R0011       504LM= THE LIBRATION VECTOR L OF THE MOON AT TIME TIMSUBL,EXPRESSED
R0012       IN THE MOON-FIXED COORD. SYSTEM   RADIANS  B0
R0013         ITEMS NECESSARY FOR SUBR. USED (SEE DESCRIPTION OF SUBR.)

R0014   INPUT
R0015    MPAC= 0 FOR EARTH,NON-ZERO FOR MOON
R0016    0-5D= RP VECTOR
R0017    6-7D= TIME

R0018   OUTPUT
R0019    MPAC= R VECTOR METERS B-29 FOR EARTH, B-27 FOR MOON

0020   REF   1                26,2000                        SETLOC PLANTIN
0021                          26,3344                        BANK

0022   REF   1                                               COUNT* $$/LUROT

0023                          26,3344   46020 1  RP-TO-R     STQ    BHIZ
0024   REF   1                26,3345   00050 1                 RPREXIT
0025   REF   1                26,3346   55361 0                 RPTORA
0026                          26,3347   77624 1          CALL                  COMPUTE M MATRIX FOR MOON
0027   REF   1                26,3350   55421 0                 MOONMX        LP=LM FOR MOON  RADIANS B0
0028                          26,3351   77775 1          VLOAD
0029   REF   1                26,3352   02012 0                 504LM
0030                          26,3353   53235 0  RPTORB  VXV    VAD
0031   REF   1                26,3354   00001 0                 504RPR
0032   REF   2  LAST 1243     26,3355   00001 0                 504RPR
0033                          26,3356   52105 1          VXM    GOTO
0034   REF   1                26,3357   00025 0                 MMATRIX       MPAC=R=MT(T)*(RP+LPXRP)
0035   REF   1                26,3360   55407 1                 RPRPXXXX      RESET PUSHLOC TO 0 BEFORE EXITING
0036                          26,3361   77624 1  RPTORA  CALL                  EARTH COMPUTATIONS
0037   REF   1                26,3362   55573 0                 EARTHMX       M MATRIX B-1
0038                          26,3363   77624 1          CALL
0039   REF   1                26,3364   55625 0                 EARTHL        L VECTOR RADIANS B0
0040                          26,3365   76521 0          MXV    VSL1          LP=M(T)*L  RAD B-0
0041   REF   2  LAST 1243     26,3366   00025 0                 MMATRIX
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0042                        26,3367   77650 1          GOTO
0043   REF   1              26,3370   55353 1                   RPTORB
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R0044   ..... R-TO-RP SUBROUTINE .....
R0045   SUBROUTINE TO CONVERT R (VECTOR IN REFERENCE COORD. SYSTEM) TO RP
R0046    (VECTOR IN PLANETARY COORD SYSTEM) EITHER EARTH-FIXED OR MOON-FIXED

R0047    RP=M(T)*(R-LXR)

R0048   CALLING SEQUENCE
R0049    L       CALL
R0050    L+1             R-TO-RP

R0051   SUBROUTINES USED
R0052    EARTHMX,MOONMX,EARTHL

R0053   INPUT
R0054    MPAC= 0 FOR EARTH,NON-ZERO FOR MOON
R0055    0-5D= R VECTOR
R0056    6-7D= TIME

R0057      ITEMS AVAILABLE FROM LAUNCH DATA
R0058       504LM= THE LIBRATION VECTOR L OF THE MOON AT TIME TIMSUBL,EXPRESSED
R0059       IN THE MOON-FIXED COORD. SYSTEM   RADIANS B0
R0060         ITEMS NECESSARY FOR SUBROUTINES USED (SEE DESCRIPTION OF SUBR.)

R0061   OUTPUT
R0062    MPAC=RP VECTOR METERS B-29 FOR EARTH, B-27 FOR MOON

0063                          26,3371  46020 1  R-TO-RP  STQ    BHIZ
0064   REF  2  LAST 1243      26,3372  00050 1           RPREXIT
0065   REF  1                 26,3373  55413 1           RTORPA
0066                          26,3374  77624 1           CALL
0067   REF  2  LAST 1243      26,3375  55421 0           MOONMX
0068                          26,3376  61375 1           VLOAD  VXM
0069   REF  2  LAST 1243      26,3377  02012 0           504LM          LP=LM
0070   REF  3  LAST 1243      26,3400  00025 0           MMATRIX
0071                          26,3401  77772 0           VSL1           L=MT(T)*LP  RADIANS B0
0072                          26,3402  51235 1  RTORPB   VXV    BVSU
0073   REF  3  LAST 1243      26,3403  00001 0           504RPR
0074   REF  4  LAST 1245      26,3404  00001 0           504RPR
0075                          26,3405  77721 0           MXV            M(T)*(R-LXR) B-2
0076   REF  4  LAST 1245      26,3406  00025 0           MMATRIX
0077                          26,3407  40372 0  RPRPXXXX VSL1   SETPD
0078                          26,3410  00001 0           0D
0079                          26,3411  77650 1           GOTO
0080   REF  3  LAST 1245      26,3412  00050 1           RPREXIT
0081                          26,3413  77624 1  RTORPA   CALL           EARTH COMPUTATIONS
0082   REF  2  LAST 1243      26,3414  55573 0           EARTHMX
0083                          26,3415  77624 1           CALL
0084   REF  2  LAST 1243      26,3416  55625 0           EARTHL
0085                          26,3417  77650 1           GOTO           MPAC=L=(-AX,-AY,0) RAD B-0
0086   REF  1                 26,3420  55402 1           RTORPB
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P0087   ..... MOONMX SUBROUTINE .....
R0088   SUBROUTINE TO COMPUTE THE TRANSFORMATION MATRIX M FOR THE MOON

R0089   CALLING SEQUENCE
R0090    L       CALL
R0091    L+1             MOONMX

R0092   SUBROUTINES USED
R0093    NEWANGLE

R0094   INPUT
R0095    6-7D= TIME
R0096      ITEMS AVAILABLE FROM LAUNCH DATA
R0097       BSUBO,BDOT
R0098       TIMSUBO,NODIO,NODDOT,FSUBO,FDOT
R0099       COSI= COS(I) B-1
R0100       SINI= SIN(I) B-1
R0101         I  IS THE ANGLE BETWEEN THE MEAN LUNAR EQUATORIAL PLANE AND THE
R0102         PLANE OF THE ECLIPTIC  (1 DEGREE  32.1 MINUTES)

R0103   OUTPUT
R0104    MMATRIX= 3X3 M MATRIX B-1   (STORED IN VAC AREA)

 0105                        26,3421   40220 0  MOONMX   STQ    SETPD
 0106   REF   1              26,3422   00051 0           EARTHMXX
 0107                        26,3423   00011 1           8D
 0108                        26,3424   77770 1  AXT,1                  B REQUIRES SL 0, SL 5 IN NEWANGLE
 0109                        26,3425   00005 1           5
 0110                        26,3426   65345 0  DLOAD    PDDL           PD 10D              8-9D=BSUBO
 0111   REF   1              26,3427   15655 0           BSUBO                              10-11D= BDOT
 0112   REF   1              26,3430   15647 0           BDOT
 0113                        26,3431   45006 0  PUSH     CALL           PD 12D
 0114   REF   1              26,3432   55546 0           NEWANGLE       EXIT WITH PD 8D AND MPAC= B  REVS 8O
 0115                        26,3433   71406 0  PUSH     COS            PD 10D
 0116   REF   1              26,3434   14041 1  STODL    COB            PD 8D    COS(B) B-1
 0117                        26,3435   77756 0  SIN                             SIN(B) B-1
 0118   REF   1              26,3436   14043 0  STODL    SOB                      SETUP INPUT FOR NEWANGLE
 0119   REF   1              26,3437   15653 0           FSUBO                                8-9D=FSUBO
 0120                        26,3440   41525 0  PDDL     PUSH           PD 10D THEN 12D   10-11D=FDOT
 0121   REF   1              26,3441   15645 1           FDOT
 0122                        26,3442   45170 0  AXT,1    CALL           F REQUIRES SL 1, SL 6 IN NEWANGLE
 0123                        26,3443   00004 0           4
 0124   REF   2  LAST 1246  26,3444   55546 0           NEWANGLE       EXIT WITH PD 8D AND MPAC= F REVS 8O
 0125   REF   1              26,3445   14027 1  STODL    AVECTR +2      SAVE F TEMP
 0126   REF   1              26,3446   15651 1           NODIO                                8-9D=NODIO
 0127                        26,3447   41525 0  PDDL     PUSH           PD 10D THEN 12D   10-11D=NODDOT
 0128   REF   1              26,3450   15643 1           NODDOT                               MPAC=T
 0129                        26,3451   45170 0  AXT,1    CALL           NODE REQUIRES SL 0, SL 5 IN NEWANGLE
 0130                        26,3452   00005 1           5
 0131   REF   3  LAST 1246  26,3453   55546 0           NEWANGLE       EXIT WITH PD 8D AND MPAC= NODI REVS 8O
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0132                                26,3454  71406 0    PUSH   COS          PD 10D   8-9D= NODI  REVS  80
0133                                26,3455  77606 1    PUSH                PD 12D 10-11D= COS(NODI)  B-1
0134  REF   2  LAST 1246            26,3456  00025 0    STORE  AVECTR
0135                                26,3457  76405 1    DMP    SL1R
0136  REF   2  LAST 1246            26,3460  00041 1           COB                                  COS(NODI)    B-1
0137  REF   1                       26,3461  14035 1    STODL  BVECTR +2    PD 10D   20-25D=AVECTR= COB*SIN(NODI)
0138                                26,3462  76405 1    DMP    SL1R                                 SOB*SIN(NODI)
0139  REF   2  LAST 1246            26,3463  00043 0           SOB
0140  REF   2  LAST 1247            26,3464  14037 0    STODL  BVECTR +4    PD 8D
0141                                26,3465  41556 1    SIN    PUSH         PD 10D                      -SIN(NODI)   B-1
0142                                26,3466  77676 0    DCOMP                      26-31D=BVECTR= COB*COS(NODI)
0143  REF   3  LAST 1247            26,3467  14033 1    STODL  BVECTR       PD 8D                       SOB*COS(NODI)
0144  REF   3  LAST 1247            26,3470  00027 1           AVECTR +2    MOVE F FROM TEMP LOC. TO 504F
0145  REF   1                       26,3471  14007 0    STODL  504F
0146                                26,3472  76405 1    DMP    SL1R
0147  REF   3  LAST 1247            26,3473  00041 1           COB
0148  REF   4  LAST 1247            26,3474  14027 1    STODL  AVECTR +2
0149  REF   1                       26,3475  00011 1           SINNODI      8-9D=SIN(NODI)  B-1
0150                                26,3476  76405 1    DMP    SL1R
0151  REF   3  LAST 1247            26,3477  00043 0           SOB
0152  REF   5  LAST 1247            26,3500  14031 0    STODL  AVECTR +4                                0
0153  REF  26  LAST  934            26,3501  15335 0           HI6ZEROS                 8-13D= CVECTR= -SOB  B-1
0154                                26,3502  57525 1    PDDL   DCOMP        PD 10D                      COB
0155  REF   4  LAST 1247            26,3503  00043 0           SOB
0156                                26,3504  63325 0    PDDL   PDVL         PD 12D THEN PD 14D
0157  REF   4  LAST 1247            26,3505  00041 1           COB
0158  REF   4  LAST 1247            26,3506  00033 1           BVECTR
0159                                26,3507  63361 0    VXSC   PDVL         PD 20D          BVECTR*SINI  B-2
0160  REF   1                       26,3510  15641 0           SINI
0161  REF   1                       26,3511  00011 1           CVECTR
0162                                26,3512  53361 0    VXSC   VAD          PD 14D          CVECTR*COSI  B-2
0163  REF   1                       26,3513  15637 1           COSI
0164                                26,3514  77772 0    VSL1
0165  REF   5  LAST 1245            26,3515  24041 1    STOVL  MMATRIX +12D PD 8D  M2=BVECTR*SINI+CVECTR*COSI  B-1
0166                                26,3516  63361 0    VXSC   PDVL         PD 14D
0167  REF   2  LAST 1247            26,3517  15641 0           SINI                            CVECTR*SINI  B-2
0168  REF   5  LAST 1247            26,3520  00033 1           BVECTR
0169                                26,3521  52361 1    VXSC   VSU          PD 8D           BVECTR*COSI  B-2
0170  REF   2  LAST 1247            26,3522  15637 1           COSI
0171                                26,3523  65372 1    VSL1   PDDL         PD 14D
0172  REF   2  LAST 1247            26,3524  00007 0           504F         8-13D=DVECTR=BVECTR*COSI-CVECTR*SINI B-1
0173                                26,3525  74346 0    COS    VXSC
0174  REF   1                       26,3526  00011 1           DVECTR
0175                                26,3527  73525 1    PDDL   SIN          PD 20D  14-19D= DVECTR*COSF  B-2
0176  REF   3  LAST 1247            26,3530  00007 0           504F
0177                                26,3531  52361 1    VXSC   VSU          PD 14D           AVECTR*SINF  B-2
0178  REF   6  LAST 1247            26,3532  00025 0           AVECTR
0179                                26,3533  77772 0    VSL1
0180  REF   6  LAST 1247            26,3534  14033 1    STODL  MMATRIX +6   M1= AVECTR*SINF-DVECTR*COSF  B-1
0181  REF   4  LAST 1247            26,3535  00007 0           504F
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0182                              26,3536  74356 1          SIN     VXSC            PD 8D
0183                              26,3537  71525 0          PDDL    COS             PD 14D  8-13D=DVECTR*SINF B-2
0184  REF   5  LAST 1247         26,3540  00007 0                  504F
0185                              26,3541  53361 0          VXSC    VAD             PD 8D          AVECTR*COSF B-2
0186  REF   7  LAST 1247         26,3542  00025 0                  AVECTR
0187                              26,3543  57572 0          VSL1    VCOMP
0188  REF   7  LAST 1247         26,3544  34025 1          STCALL  MMATRIX         MO= -(AVECTR*COSF+DVECTR*SINF)  B-1
0189  REF   2  LAST 1246         26,3545  00051 0                  EARTHMXX
R0190 COMPUTE X=XO+(XDOT)(T+TO)
R0191 8-9D= XO (REVS B-0),PUSHLOC SET AT 12D
R0192 10-11D=XDOT (REVS/CSEC) SCALED B+23 FOR WEARTH,B+28 FOR NODDOT AND BDOT
R0193                          AND B+27 FOR FDOT
R0194  X1=DIFFERENCE IN 23 AND SCALING OF XDOT,=0 FOR WEARTH,5 FOR NODDOT AND
R0195                                          BDOT AND 4 FOR FDOT
R0196 6-7D=T (CSEC B-28), TIMSUBO= (CSEC B-42 TRIPLE PREC.)

0197                              26,3546  54345 1 NEWANGLE DLOAD   SR              ENTER PD 12D
0198                              26,3547  00007 0                  6D
0199                              26,3550  20617 0                  14D
0200                              26,3551  72371 1          TAD     TLOAD           CHANGE MODE TO TP
0201  REF   1                     26,3552  01707 0                  TIMSUBO
0202  REF 647  LAST 1213          26,3553  00155 0                  MPAC
0203  REF   1                     26,3554  14017 1          STODL   TIMSUBM         T+TO CSEC B-42
0204  REF   2  LAST 1248         26,3555  00020 0                  TIMSUBM +1
0205                              26,3556  77605 1          DMP                     PD 10D  MULT BY XDOT IN 10-11D
0206                              26,3557  43257 0          SL*     DAD             PD 8D   ADD XO IN 8-9D AFTER SHIFTING
0207                              26,3560  20206 1                  5,1                     SUCH THAT SCALING IS B-0
0208                              26,3561  67206 1          PUSH    SLOAD           PD 10D SAVE PARTIAL (XO+XDOT*T) IN 8-9D
0209  REF   3  LAST 1248         26,3562  00017 1                  TIMSUBM
0210                              26,3563  41261 1          SL      DMP
0211                              26,3564  20212 1                  9D
0212                              26,3565  00013 0                  10D             XDOT
0213                              26,3566  43257 0          SL*     DAD             PD 8D   SHIFT SUCH THAT THIS PART OF X
0214                              26,3567  20213 0                  10D,1                   IS SCALED REVS/CSEC B-0
02141                             26,3570  77600 1          BOV                     TURN OFF OVERFLOW IF SET BY SHIFT
02142                             26,3571  55572 1                  +1              INSTRUCTION BEFORE EXITING
0215                              26,3572  77616 0          RVQ                     MPAC=X= XO+(XDOT)(T+TO)  REVS BO
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P0216   ..... EARTHMX SUBROUTINE .....
R0217   SUBROUTINE TO COMPUTE THE TRANSFORMATION MATRIX M FOR THE EARTH

R0218   CALLING SEQUENCE
R0219    L       CALL
R0220    L+1             EARTHMX

R0221   SUBROUTINES USED
R0222    NEWANGLE

R0223   INPUT
R0224      INPUT AVAILABLE FROM LAUNCH DATA     AZO  REVS B-0
R0225                                           TEPHEM  CSEC B-42
R0226    6-7D= TIME CSEC B-28

R0227   OUTPUT
R0228    MMATRIX= 3X3 M MATRIX B-1   (STORED IN VAC AREA)

 0229                       26,3573   40220 0  EARTHMX  STQ     SETPD           SET   8-9D=AZO
 0230  REF   3  LAST 1248   26,3574   00051 0                   EARTHMXX
 0231                       26,3575   00011 1                   8D              10-11D=WEARTH
 0232                       26,3576   77770 1           AXT,1                   FOR SL 5, AND SL 10  IN NEWANGLE
 0233                       26,3577   00000 1                   0
 0234                       26,3600   65345 0           DLOAD   PDDL              LEAVING PD SET AT 12D FOR NEWANGLE
 0235  REF   1              26,3601   01712 1                   AZO
 0236  REF   1              26,3602   15657 1                   WEARTH
 0237                       26,3603   45006 0           PUSH    CALL
 0238  REF   4  LAST 1246   26,3604   55546 0                   NEWANGLE
 0239                       26,3605   41401 1           SETPD   PUSH            18-19D=504AZ
 0240                       26,3606   00023 0                   18D                             COS(AZ) SIN(AZ) 0
 0241                       26,3607   65346 0           COS     PDDL            20-37D=  MMATRIX= -SIN(AZ) COS(AZ) 0 B-1
 0242  REF   1              26,3610   00023 0                   504AZ                             0       0      1
 0243                       26,3611   65356 1           SIN     PDDL
 0244  REF  27  LAST 1247   26,3612   15335 0                   HI6ZEROS
 0245                       26,3613   73525 1           PDDL    SIN
 0246  REF   2  LAST 1249   26,3614   00023 0                   504AZ
 0247                       26,3615   65276 1           DCOMP   PDDL
 0248  REF   3  LAST 1249   26,3616   00023 0                   504AZ
 0249                       26,3617   63346 0           COS     PDVL
 0250  REF  28  LAST 1249   26,3620   15335 0                   HI6ZEROS
 0251                       26,3621   41525 0           PDDL    PUSH
 0252  REF  11  LAST  881   26,3622   15333 0                   HIDPHALF
 0253                       26,3623   77650 1           GOTO
 0254  REF   4  LAST 1249   26,3624   00051 0                   EARTHMXX
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P0255   ..... EARTHL SUBROUTINE .....
R0256   SUBROUTINE TO COMPUTE L VECTOR FOR EARTH

R0257   CALLING SEQUENCE
R0258    L       CALL
R0259    L+1             EARTHL

R0260   INPUT
R0261    AXO,AYO SET AT LAUNCH TIME WITH AYO IMMEDIATELY FOLLOWING AXO IN CORE

R0262   OUTPUT
R0263              -AX
R0264     MPAC=    -AY     RADIANS B-0
R0265               0

 0266                              26,3625   57545 1  EARTHL   DLOAD   DCOMP
 0267   REF   2  LAST  627        26,3626   01716 0           AXO
 0268   REF   1                   26,3627   14017 1           STODL   504LPL
 0269   REF   2  LAST  627        26,3630   01714 1           -AYO
 0270   REF   2  LAST 1250        26,3631   14021 1           STODL   504LPL +2
 0271   REF  29  LAST 1249        26,3632   15335 0           HI6ZEROS
 0272   REF   3  LAST 1250        26,3633   24023 0           STOVL   504LPL +4
 0273   REF   4  LAST 1250        26,3634   00017 1           504LPL
 0274                              26,3635   77616 0           RVQ
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P0275   CONSTANTS AND ERASABLE ASSIGNMENTS
 0276   REF   5  LAST 1240    04,3563             1B1      =      DP1/2          1  SCALED B-1
 0277                         26,3636   17775 1   COSI     2DEC   .99964173 B-1  COS (5521.5  SEC) B-1
 0277                         26,3637   02052 1
 0278                         26,3640   00333 1   SINI     2DEC   .02676579 B-1  SIN (5521.5  SEC) B-1
 0278                         26,3641   10374 0
 0279   REF  37  LAST 1193       0050             RPREXIT  =      S1             R-TO-RP AND RP-TO-R SUBR EXIT
 0280   REF  13  LAST 1242       0051             EARTHMXX =      S2             EARTHMX,MOONMX SUBR. EXITS
 0281                             0000             504RPR   =      0D             6 REGS  R OR RP VECTOR
 0282                             0010             SINNODI  =      8D             2       SIN(NODI)
 0283                             0010             DVECTR   =      8D             6       D VECTOR MOON
 0284                             0010             CVECTR   =      8D             6       C VECTR MOON
 0285                             0022             504AZ    =      18D            2      AZ
 0286                             0016             TIMSUBM  =      14D            3       TIME SUB M (MOON) T+TO IN GETAZ
 0287                             0016             504LPL   =      14D            6       L OR LP VECTOR
 0288                             0024             AVECTR   =      20D            6       A VECTOR (MOON)
 0289                             0032             BVECTR   =      26D            6       B VECTOR (MOON)
 0290                             0024             MMATRIX  =      20D            18      M MATRIX
 0291                             0040             COB      =      32D            2       COS(B) B-1
 0292                             0042             SOB      =      34D            2       SIN(B) B-1
 0293                             0006             504F     =      6D             2       F (MOON)
 0297                         26,3642   77665 1   NODDOT   2DEC   -.457335121 E-2 REVS/CSEC B+28=-1.07047011 E-8  RAD/SEC
 0297                         26,3643   42175 1
 0298                         26,3644   22211 0   FDOT     2DEC   .570863327      REVS/CSEC B+27= 2.67240410 E-6  RAD/SEC
 0298                         26,3645   00625 0
 0299                         26,3646   77777 0   BDOT     2DEC   -3.07500686 E-8 REVS/CSEC B+28=-7.19757301 E-14 RAD/SEC
 0299                         26,3647   77767 1
 0300                         26,3650   37436 1   NODIO    2DEC   .986209434      REVS B-0     = 6.19653663041 RAD
 0300                         26,3651   01613 1
 0301                         26,3652   32417 1   FSUBO    2DEC   .829090536      REVS B-0     = 5.20932947829 RAD
 0301                         26,3653   32160 1
 0302                         26,3654   02052 1   BSUBO    2DEC   .0651201393     REVS B-0     = 0.40916190299 RAD
 0302                         26,3655   35552 0
 0303                         26,3656   37116 0   WEARTH   2DEC   .973561595      REVS/CSEC B+23= 7.29211494 E-5  RAD/SEC
 0303                         26,3657   32523 1
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P0001    INCORP1--PERFORMS THE SIX DIMENSIONAL STATE VECTOR DEVIATION FOR POSITI
R0002   ON AND VELOCITY OR THE NINE DIMENSIONAL DEVIATION OF POSITION,VELOCITY,A
R0003   ND RADAR OR LANDMARK BIAS.THE OUTPUT OF THE BVECTOR ROUTINE ALONG WITH T
R0004   HE ERROR TRANSITION MATRIX(W) ARE USED AS INPUT TO THE ROUTINE.THE DEVIA
R0005   TION IS OBTAINED BY COMPUTING AN ESTIMATED TRACKING MEASUREMENT FROM THE
R0006   CURRENT STATE VECTOR AND COMPARING IT WITH AN ACTUAL TRACKING MEASUREMEN
R0007   T AND APPLYING A STATISTICAL WEIGHTING VECTOR.
R0008   INPUT
R0009      DMENFLG = 0 6DIMENSIONAL BVECTOR  1= 9DIMENSIONAL
R0010            W = ERROR TRANSITION MATRIX 6X6 OR 9X9
R0011      VARIANCE = VARIANCE (SCALAR)
R0012        DELTAQ = MEASURED DEVIATION(SCALAR)
R0013       BVECTOR = 6 OR 9 DIMENSIONAL BVECTOR

R0014   OUTPUT
R0015        DELTAX = STATE VECTOR DEVIATIONS 6 OR 9 DIMENSIONAL
R0016            ZI = VECTOR USED FOR THE INCORPORATION 6 OR 9 DIMENSIONAL
R0017       GAMMA = SCALAR
R0018       OMEGA = OMEGA WEIGHTING VECTOR 6 OR 9 DIMENTIONAL
R0019   CALLING SEQUENCE
R0020      L  CALL INCORP1

R0021   NORMAL EXIT
R0022      L+1 OF CALLING SEQUENCE

0023                          37,3773                    BANK   37
0024   REF   1                36,2000                    SETLOC MEASINC
0025                          36,3254                    BANK

0026   REF   1                                           COUNT* $$/INCOR

0027   REF  57 LAST  633      E5,1400                    EBANK= W

0028                          36,3254   77620 0  INCORP1  STQ
0029   REF  10 LAST  586      36,3255   02317 0           EGRESS
0030                          36,3256   66370 0  AXT,1    SSP
0031                          36,3257   00066 1           54D
0032   REF  38 LAST 1251      36,3260   00051 0           S1
0033                          36,3261   00022 1           18D              IX1 = 54  S1= 18
0034                          36,3262   66374 1  AXT,2    SSP
0035                          36,3263   00022 1           18D
0036   REF  14 LAST 1251      36,3264   00052 0           S2
0037                          36,3265   00006 1           6                IX2 = 18  S2=6
0038                          36,3266   63775 1  ZI23     VLOAD  MXV*
0039   REF  20 LAST  625      36,3267   03502 0           BVECTOR          BVECTOR (0)
0040   REF  58 LAST 1252      36,3270   02467 0           W +54D,1
0041   REF   2 LAST   97      36,3271   12745 1           STORE  ZI +18D,2
0042                          36,3272   77775 1           VLOAD
0043   REF  21 LAST 1252      36,3273   03510 0           BVECTOR +6       BVECTOR (1)
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0044                                36,3274   52717 1           MXV*    VAD*
0045  REF  59  LAST 1252            36,3275   02555 0                   W +108D,1
0046  REF   3  LAST 1252            36,3276   75032 1                   ZI +18D,2
0047  REF   4  LAST 1253            36,3277   12745 1           STORE   ZI +18D,2
0048                                36,3300   77775 1           VLOAD
0049  REF  22  LAST 1252            36,3301   03516 0                   BVECTOR +12D    BVECTOR (2)
0050                                36,3302   52717 1           MXV*    VAD*
0051  REF  60  LAST 1253            36,3303   02643 1                   W +162D,1
0052  REF   5  LAST 1253            36,3304   75032 1                   ZI +18D,2       B(0)*W+B(1)*(W+54)+B(2)*(W+108)FIRST PAS
0053  REF   6  LAST 1253            36,3305   12745 1           STORE   ZI +18D,2       ZI THEN Z2 THEN Z3
0054                                36,3306   77700 0           TIX,1
0055  REF   1                       36,3307   75310 1                   INCOR1
0056                                36,3310   43104 0  INCOR1   TIX,2   BON
0057  REF   1                       36,3311   75266 1                   Z123            LOOP FOR Z1,Z2,Z3
0058  REF   8  LAST  626            36,3312   02706 1                   DMENFLG
0059  REF   1                       36,3313   75317 0                   INCOR1A
0060                                36,3314   77775 1           VLOAD
0061  REF  25  LAST  891            36,3315   15335 0                   ZEROVECS
0062  REF   7  LAST 1253            36,3316   02737 0           STORE   ZI +12D
0063                                36,3317   77201 1  INCOR1A  SETPD   VLOAD
0064                                36,3320   00001 0                   0
0065  REF   8  LAST 1253            36,3321   02723 0                   ZI
0066                                36,3322   47036 1           VSQ     RTB
0067  REF   7  LAST  920            36,3323   45565 0                   TPMODE
0068                                36,3324   47515 0           PDVL    VSQ
0069  REF   9  LAST 1253            36,3325   02731 0                   ZI +6
0070                                36,3326   76234 0           RTB     TAD
0071  REF   8  LAST 1253            36,3327   45565 0                   TPMODE
0072                                36,3330   47515 0           PDVL    VSQ
0073  REF  10  LAST 1253            36,3331   02737 0                   ZI +12D
0074                                36,3332   76234 0           RTB     TAD
0075  REF   9  LAST 1253            36,3333   45565 0                   TPMODE
0076                                36,3334   77171 0           TAD     AXT,2
0077  REF  12  LAST  626            36,3335   03526 0                   VARIANCE
0078                                36,3336   00000 1                   0
0079  REF   1                       36,3337   01257 0           STORE   TRIPA           ZI*2 + Z2*2 + Z3*2 + VARIANCE
0080                                36,3340   40151 0           TLOAD   BOV
0081  REF  13  LAST 1253            36,3341   03526 0                   VARIANCE        CLEAR OVFIND
0082                                36,3342   75343 1                   +1
0083  REF   1                       36,3343   01262 0           STORE   TEMPVAR         TEMP STORAGE FOR VARIANCE
0084                                36,3344   77654 0           BZE
0085  REF   1                       36,3345   75354 1                   INCOR1C
0086                                36,3346   40112 1  INCOR1B  SL2     BOV
0087  REF   2  LAST 1253            36,3347   75354 1                   INCOR1C
0088  REF   2  LAST 1253            36,3350   01262 0           STORE   TEMPVAR
0089                                36,3351   52114 1           INCR,2  GOTO
0090                                36,3352   00001 0           DEC     1
0091  REF   1                       36,3353   75346 1                   INCOR1B
0092                                36,3354   61551 1  INCOR1C  TLOAD   ROUND
0093  REF   2  LAST 1253            36,3355   01257 0                   TRIPA
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0094                                36,3356  75405 1          DMP     SQRT
0095  REF   3  LAST 1253            36,3357  01262 0                  TEMPVAR
0096                                36,3360  76257 0          SL*     TAD
0097                                36,3361  57576 1                  0,2
0098  REF   3  LAST 1253            36,3362  01257 0                  TRIPA
0099                                36,3363  63101 1          NORM    INCR,2
0100  REF  33  LAST 1121            36,3364  00050 1                  X2
0101                                36,3365  77775 1          DEC     -2
0102                                36,3366  77134 1          SXA,2   AXT,2
0103  REF   2  LAST   89            36,3367  02215 0                  NORMGAM        NORMALIZATION COUNT -2 FOR GAMMA
0104                                36,3370  00242 0                  162D
0105                                36,3371  40265 1          BDDV    SETPD
0106  REF   6  LAST  576            36,3372  15325 1                  DP1/4TH
0107                                36,3373  00001 0                  0
0108  REF   2  LAST  121            36,3374  03456 0          STORE   GAMMA
0109                                36,3375  60351 0          TLOAD   NORM
0110  REF   4  LAST 1254            36,3376  01257 0                  TRIPA
0111  REF  64  LAST 1193            36,3377  00047 1                  X1
0112                                36,3400  65345 0          DLOAD   PDDL           PD 0-1 = NORM (A)
0113  REF 648  LAST 1248            36,3401  00155 0                  MPAC
0114  REF   5  LAST  626            36,3402  03524 1                  DELTAQ
0115                                36,3403  77701 1          NORM
0116  REF  39  LAST 1252            36,3404  00051 0                  S1
0117                                36,3405  70460 1          XSU,1   SR1
0118  REF  40  LAST 1254            36,3406  00050 1                  S1
0119                                36,3407  41471 0                  DDV     PUSH   PD 0-1 = DELTAQ/A
01193                               36,3410  77650 1                  GOTO
01196 REF   1                       36,3411  31377 0                          NEWZCOMP
0120                                36,3412  77731 1     -3   SSP
0121  REF  15  LAST 1252            36,3413  00052 0                  S2
0122                                36,3414  00066 1                  54D
0123                                36,3415  60775 1     INCOR2  VLOAD   VXM*   COMPUTE OMEGA1,2,3
0124  REF  11  LAST 1253            36,3416  02723 0                  ZI
0125  REF  61  LAST 1253            36,3417  75134 0                  W +162D,2
0126                                36,3420  77206 0                  PUSH    VLOAD
0127  REF  12  LAST 1254            36,3421  02731 0                  ZI +6
0128                                36,3422  53303 1                  VXM*    VAD
0129  REF  62  LAST 1254            36,3423  75112 1                  W +180D,2
0130                                36,3424  77206 0                  PUSH    VLOAD
0131  REF  13  LAST 1254            36,3425  02737 0                  ZI +12D
0132                                36,3426  53303 1                  VXM*    VAD
0133  REF  63  LAST 1254            36,3427  75070 1                  W +198D,2
0134                                36,3430  61006 0                  PUSH    TIX,2  PD 2-7=OMEGA1,8-13=OMEGA2,14-19=OMEGA3
0135  REF   1                       36,3431  75415 0                          INCOR2
0136                                36,3432  45575 1                  VLOAD   STADR
0137  REF   2  LAST  121            36,3433  74303 1                  STORE   OMEGA +12D
0138                                36,3434  45575 1                  VLOAD   STADR
0139  REF   3  LAST 1254            36,3435  74311 1                  STORE   OMEGA +6
0140                                36,3436  45575 1                  VLOAD   STADR
0141  REF   4  LAST 1254            36,3437  74317 1                  STORE   OMEGA
```

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0142                                 36,3440  77214 0          BON     VLOAD
0143  REF   9  LAST 1253             36,3441  02706 1                  DMENFLG
0144  REF   1                       36,3442  75445 0                  INCOR2AB
0145  REF  26  LAST 1253             36,3443  15335 0                  ZEROVECS
0146  REF   5  LAST 1254             36,3444  03474 0          STORE   OMEGA +12D
0147                                 36,3445  66374 1  INCOR2AB AXT,2   SSP
0148                                 36,3446  00022 1                  18D
0149  REF  16  LAST 1254             36,3447  00052 0                  S2
0150                                 36,3450  00006 1                  6
0151                                 36,3451  77773 1  INCOR3   VLOAD*
0152  REF   6  LAST 1255             36,3452  74275 1                  OMEGA +18D,2
0153                                 36,3453  53761 1          VXSC    VSL*
0154                                 36,3454  00001 0                  0                    DELTAQ/A
0155                                 36,3455  20201 0                  0,1
0156  REF  12  LAST  626             36,3456  11301 0          STORE   DELTAX +18D,2
0157                                 36,3457  77304 0          TIX,2   VLOAD
0158  REF   1                       36,3460  75451 0                  INCOR3
0159  REF  13  LAST 1255             36,3461  01265 1                  DELTAX +6
0160                                 36,3462  77732 1          VSL3
0161  REF  14  LAST 1255             36,3463  01265 1          STORE   DELTAX +6
0162                                 36,3464  77650 1          GOTO
0163  REF  11  LAST 1252             36,3465  02317 0                  EGRESS
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P0164    INCORP2 -INCORPORATES THE COMPUTED STATE VECTOR DEVIATIONS INTO THE
R0165   ESTIMATED STATE VECTOR. THE STATE VECTOR UPDATED MAY BE FOR EITHER THE
R0166   LEM OR THE CSM.DETERMINED BY FLAG VEHUPFLG.(ZERO = LEM) (1 = CSM)
R0167   INPUT
R0168      PERMANENT STATE VECTOR FOR EITHER THE LEM OR CSM
R0169      VEHUPFLG = UPDATE VEHICLE 0=LEM  1=CSM
R0170      W =        ERROR TRANSITION MATRIX
R0171      DELTAX   =  COMPUTED STATE VECTOR DEVIATIONS
R0172      DMENFLG =  SIZE OF W MATRIX (ZERO =6X6) (1=9X9)
R0173      GAMMA    =  SCALAR FOR INCORPORATION
R0174      ZI       =  VECTOR USED IN INCORPORATION
R0175      OMEGA    =  WEIGHTING VECTOR

R0176   OUTPUT
R0177      UPDATED PERMANENT STATE VECTOR

R0178   CALLING SEQUENCE
R0179      L  CALL INCORP2

R0180   NORMAL EXIT
R0181      L+1 OF CALLING SEQUENCE

 0182   REF   1              36,2000                    SETLOC MEASINC1
 0183                       36,3466                    BANK
 0184   REF   2 LAST 1252 TO 1256:   138   138*        COUNT* $$/INCOR

 0185                       36,3466   45020 1  INCORP2  STQ     CALL
 0186   REF  12  LAST 1255  36,3467   02317 0           EGRESS
 0187   REF  22  LAST  915  36,3470   27442 0           INTSTALL
 0188                       36,3471   74375 0           VLOAD   VXSC        CALC. GAMMA * OMEGA1,2,3
 0189   REF   7  LAST 1255  36,3472   03460 0           OMEGA
 0190   REF   3  LAST 1254  36,3473   03456 0           GAMMA
 0191   REF   2  LAST   97  36,3474   26643 1           STODL   OMEGAM1
 0192   REF   8  LAST 1256  36,3475   03466 0           OMEGA +6
 0193                       36,3476   77761 1           VXSC
 0194   REF   4  LAST 1256  36,3477   03456 0           GAMMA
 0195   REF   2  LAST   97  36,3500   26651 1           STODL   OMEGAM2
 0196   REF   9  LAST 1256  36,3501   03474 0           OMEGA +12D
 0197                       36,3502   77761 1           VXSC
 0198   REF   5  LAST 1256  36,3503   03456 0           GAMMA
 0199   REF   2  LAST   97  36,3504   02657 1           STORE   OMEGAM3
 0200                       36,3505   77776 1           EXIT
 0201   REF   1              36,3506  3 3767 1           CAF     540D       INITIAL IX 1 SETTING FOR W MATRIX
 0202   REF   2  LAST   80  36,3507   55'252 1          TS      WIXA
 0203   REF   2  LAST   80  36,3510   55'253 0          TS      WIXB
 0204   REF 258  LAST 1231  36,3511   3 5021 1          CAF     ZERO
 0205   REF   2  LAST   80  36,3512   55'254 1          TS      ZIXA       INITIAL IX 2 SETTING FOR Z COMPONENT
 0206   REF   2  LAST   80  36,3513   55'255 0          TS      ZIXB
 0207   REF  93  LAST 1081  36,3514   0 5412 0  FAZA    TC      PHASCHNG
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0208                                36,3515   04022 0          OCT     04022
0209  REF  51  LAST  829           36,3516   0 5546 0         TC      UPFLAG
0210  REF   2  LAST  513           36,3517    00236 0         ADRES   REINTFLG
0212  REF   3  LAST 1256           36,3520   3 1253 1  FAZA1  CA      WIXB        START FIRST PHASE OF INCORP2
0213  REF   3  LAST 1256           36,3521   55'252 1         TS      WIXA         TO UPDATE 6 OR 9 DIM. W MATRIX IN TEMP
0214  REF   3  LAST 1256           36,3522   3 1255 1         CA      ZIXB
0215  REF   3  LAST 1256           36,3523   55'254 1         TS      ZIXA
0216  REF 229  LAST 1128           36,3524   0 6006 1         TC      INTPRET
0217                                36,3525    73150 1         LXA,1   LXA,2
0218  REF   4  LAST 1257           36,3526    01252 0                 WIXA
0219  REF   4  LAST 1257           36,3527    01254 0                 ZIXA
0220                                36,3530    70731 0         SSP     DLOAD*
0221  REF  41  LAST 1254           36,3531    00051 0                 S1
0222                                36,3532    00006 1                 6
0223  REF  14  LAST 1254           36,3533    75054 1                 ZI,2
0224                                36,3534    60276 1         DCOMP   NORM        CALC UPPER 3X9 PARTITION OF W MATRIX
0225  REF  17  LAST 1255           36,3535    00052 0                 S2
0226                                36,3536    65161 1         VXSC    XCHX,2
0227  REF   3  LAST 1256           36,3537    02643 1                 OMEGAM1
0228  REF  18  LAST 1257           36,3540    00051 0                 S2
0229                                36,3541    57144 1         LXC,2   XAD,2
0230  REF  34  LAST 1254           36,3542    00047 1                 X2
0231  REF   3  LAST 1254           36,3543    02215 0                 NORMGAM
0232                                36,3544    65057 0         VSL*    XCHX,2
0233                                36,3545    57576 1                 0,2
0234  REF  19  LAST 1257           36,3546    00051 0                 S2
0235                                36,3547    77653 1         VAD*
0236  REF  64  LAST 1254           36,3550    02467 0                 W +54D,1
0237  REF   2  LAST   97           36,3551    02665 0         STORE   HOLDW
0238                                36,3552    57543 1         DLOAD*  DCOMP       CALC MIDDLE 3X9 PARTITION OF W MATRIX
0239  REF  15  LAST 1257           36,3553    75054 1                 ZI,2
0240                                36,3554    74301 0         NORM    VXSC
0241  REF  20  LAST 1257           36,3555    00052 0                 S2
0242  REF   3  LAST 1256           36,3556    02651 1                 OMEGAM2
0243                                36,3557    71124 0         XCHX,2  LXC,2
0244  REF  21  LAST 1257           36,3560    00051 0                 S2
0245  REF  35  LAST 1257           36,3561    00047 1                 X2
0246                                36,3562    53674 1         XAD,2   VSL*
0247  REF   4  LAST 1257           36,3563    02215 0                 NORMGAM
0248                                36,3564    57576 1                 0,2
0249                                36,3565    52724 1         XCHX,2  VAD*
0250  REF  22  LAST 1257           36,3566    00051 0                 S2
0251  REF  65  LAST 1257           36,3567    02555 0                 W +108D,1
0252  REF   3  LAST 1257           36,3570    02673 1         STORE   HOLDW +6
0253                                36,3571    77614 1         BOFF
0254  REF  10  LAST 1255           36,3572    02746 0                 DMENFLG     BRANCH IF 6 DIMENSIONAL
0255  REF   1                      36,3573    75613 1                 FAZB
0256                                36,3574    57543 1         DLOAD*  DCOMP       CALC LOWER 3X9 PARTITION OF W MATRIX
0257  REF  16  LAST 1257           36,3575    75054 1                 ZI,2
0258                                36,3576    74301 0         NORM    VXSC
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0259   REF  23  LAST 1257   36,3577   00052 0                 S2
0260   REF   3  LAST 1256   36,3600   02657 1                 OMEGAM3
0261                        36,3601   71124 0          XCHX,2 LXC,2
0262   REF  24  LAST 1258   36,3602   00051 0                 S2
0263   REF  36  LAST 1257   36,3603   00047 1                 X2
0264                        36,3604   53674 1          XAD,2  VSL*
0265   REF   5  LAST 1257   36,3605   02215 0                 NORMGAM
0266                        36,3606   57576 1                 0,2
0267                        36,3607   52724 1          XCHX,2 VAD*
0268   REF  25  LAST 1258   36,3610   00051 0                 S2
0269   REF  66  LAST 1257   36,3611   02643 1                 W +162D,1
0270   REF   4  LAST 1257   36,3612   02701 0          STORE  HOLDW +12D
0271                        36,3613   77624 1  FAZB    CALL
0272   REF  20  LAST  626   36,3614   56750 0                 GRP2PC
0273                        36,3615   77776 1          EXIT
0274   REF   5  LAST 1257   36,3616 3 1252 0  FAZB1   CA     WIXA          START 2ND PHASE OF INCORP2 TO TRANSFER
0275   REF   1              36,3617 6 3770 1          AD     6DD               TEMP REG TO PERM W MATRIX
0276   REF   4  LAST 1257   36,3620   55'253 0          TS     WIXB
0277   REF   5  LAST 1257   36,3621 3 1254 0          CA     ZIXA
0278   REF   2  LAST  190   36,3622 6 7715 0          AD     MINUS2
0279   REF   4  LAST 1257   36,3623   55'255 0          TS     ZIXB
0280   REF 230  LAST 1257   36,3624 0 6006 1          TC     INTPRET
0281                        36,3625   66350 1          LXA,1  SSP
0282   REF   6  LAST 1258   36,3626   01252 0                 WIXA
0283   REF  42  LAST 1257   36,3627   00051 0                 S1
0284                        36,3630   00006 1                 6
0285                        36,3631   77775 1          VLOAD
0286   REF   5  LAST 1258   36,3632   02665 0                 HOLDW
0287   REF  67  LAST 1258   36,3633   06467 1          STORE  W +54D,1
0288                        36,3634   77775 1          VLOAD
0289   REF   6  LAST 1258   36,3635   02673 1                 HOLDW +6
0290   REF  68  LAST 1258   36,3636   06555 1          STORE  W +108D,1
0291                        36,3637   77214 0          BOFF   VLOAD
0292   REF  11  LAST 1257   36,3640   02746 0                 DMENFLG
0293   REF   1              36,3641   75651 1                 FAZB5
0294   REF   7  LAST 1258   36,3642   02701 0                 HOLDW +12D
0295   REF  69  LAST 1258   36,3643   06643 0          STORE  W +162D,1
0296                        36,3644   52100 1  FAZB2   TIX,1  GOTO
0297                        36,3645   75647 0                 +2
0298   REF   1              36,3646   75657 1                 FAZC              DONE WITH W MATRIX. UPDATE STATE VECTOR
0299                        36,3647   77634 0          RTB
0300   REF   1              36,3650   75514 0                 FAZA
0301                        36,3651   43335 0  FAZB5   SLOAD  DAD
0302   REF   5  LAST 1258   36,3652   01256 1                 ZIXB
0303   REF   1              36,3653   35772 0                 12DD
0304                        36,3654   52030 0          BHIZ   GOTO
0305   REF   2  LAST 1258   36,3655   75657 1                 FAZC
0306   REF   1              36,3656   75644 0                 FAZB2
0307                        36,3657   77624 1  FAZC    CALL
0308   REF  21  LAST 1258   36,3660   56750 0                 GRP2PC
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0309                                36,3661   53375 0          VLOAD  VAD          START 3RD PHASE OF INCORP2
0310  REF   8  LAST  609             36,3662   01701 0                 X789         7TH,8TH,9TH,COMPONENT OF STATE VECTOR
0311  REF  15  LAST 1255             36,3663   01273 0                 DELTAX +12D  INCORPORATION FOR X789
0312  REF   2  LAST  121             36,3664   03450 0          STORE  TX789
0313                                36,3665   47014 1          BON    RTB
0314  REF  13  LAST  626             36,3666   00707 1                 VEHUPFLG
0315  REF   1                       36,3667   75757 0                 DOCSM
0316  REF   1                       36,3670   27014 1                 MOVEPLEM
0317                                36,3671   77004 0  FAZAB    BOVB   AXT,2
0318  REF   9  LAST  926             36,3672   57352 1                 TCDANZIG
0319                                36,3673   00000 1                 0
0320                                36,3674   77014 1          BOFF   AXT,2
0321  REF   7  LAST  583             36,3675   04343 1                 MOONTHIS
0322                                36,3676   75700 1                 +2
0323                                36,3677   00002 0                 2
0324                                36,3700   53775 1          VLOAD  VSR*
0325  REF  16  LAST 1259             36,3701   01257 0                 DELTAX       B27 IF MOON ORBIT, B29 IF EARTH
0326                                36,3702   57205 1                 0 -7,2
0327                                36,3703   40055 0          VAD    BOV
0328  REF   4  LAST  289             36,3704   01521 0                 TDELTAV
0329  REF   1                       36,3705   75717 1                 FAZAB1
0330  REF   5  LAST 1259             36,3706   25521 0          STOVL  TDELTAV
0331  REF  17  LAST 1259             36,3707   01265 1                 DELTAX +6    B5 IF MOON ORBIT, B7 IF EARTH
0332                                36,3710   53257 1          VSR*   VAD
0333                                36,3711   57202 0                 0 -4,2
0334  REF   4  LAST  290             36,3712   01527 0                 TNUV
0335                                36,3713   77600 1          BOV
0336  REF   1                       36,3714   75723 0                 FAZAB2
0337  REF   5  LAST 1259             36,3715   35527 1          STCALL TNUV
0338  REF   1                       36,3716   75732 0                 FAZAB3
0339                                36,3717   53375 0  FAZAB1  VLOAD  VAD
0340  REF  13  LAST  915             36,3720   01535 0                 RCV
0341  REF  18  LAST 1259             36,3721   01257 0                 DELTAX
0342  REF  14  LAST 1259             36,3722   01535 0          STORE  RCV
0343                                36,3723   53375 0  FAZAB2  VLOAD  VAD
0344  REF  12  LAST  915             36,3724   01543 1                 VCV
0345  REF  19  LAST 1259             36,3725   01265 1                 DELTAX +6
0346  REF  13  LAST 1259             36,3726   01543 1          STORE  VCV
0347                                36,3727   45134 0          SXA,2  CALL
0348  REF   3  LAST  265             36,3730   02150 1                 PBODY
0349  REF   1                       36,3731   23421 1                 RECTIFY
03491                               36,3732   77624 1  FAZAB3  CALL
03492 REF  22  LAST 1258             36,3733   56750 0                 GRP2PC
0350                                36,3734   47014 1          BON    RTB
0351  REF  14  LAST 1259             36,3735   00707 1                 VEHUPFLG
0352  REF   1                       36,3736   75762 0                 DOCSM1
0353  REF   1                       36,3737   26773 0                 MOVEALEM
0354                                36,3740   77624 1          CALL
0355  REF   2  LAST  265             36,3741   20263 1                 SVDWN2       STORE DOWNLINK STATE VECTOR
0356                                36,3742   77624 1  FAZAB4  CALL
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0357   REF  23  LAST 1259   36,3743   56750 0                GRP2PC    PHASE CHANGE
0358                        36,3744   77214 0          BOFF  VLOAD
0359   REF  12  LAST 1258   36,3745   02746 0                DMENFLG
0360   REF   1              36,3746   75751 0                FAZAB5    6 DIMENSIONAL
0361   REF   3  LAST 1259   36,3747   03450 0                TX789     9 DIMENSIONAL
0362   REF   9  LAST 1259   36,3750   01701 0          STORE X789
0363                        36,3751   66150 0 FAZAB5   LXA,1  SXA,1
0364   REF  13  LAST 1256   36,3752   02317 0                EGRESS
0365   REF  19  LAST 1196   36,3753   00052 0                QPRET
0366                        36,3754   77776 1          EXIT
0367   REF  57  LAST 1068   36,3755   0 4701 0         TC    POSTJUMP  EXIT
0368   REF   3  LAST  634   36,3756   27457 1          CADR  INTWAKE
0369                        36,3757   52034 1 DOCSM    RTB   GOTO
0370   REF   1              36,3760   26747 1                MOVEPCSM
0371   REF   1              36,3761   75671 0                FAZAB
0372                        36,3762   45034 1 DOCSM1   RTB   CALL
0373   REF   2  LAST   35   36,3763   26720 0                MOVEACSM
0374   REF   2  LAST  265   36,3764   20237 0                SVDWN1    STORE DOWNLINK STATE VECTOR
0375                        36,3765   77650 1          GOTO
0376   REF   1              36,3766   75742 1                FAZAB4
0377   REF  27  LAST 1255   26,3334             ZEROO  =     ZEROVECS
0378                        36,3767   00066 1 54DD     DEC   54
0379                        36,3770   77771 0 6DD      DEC   -6
0380                        36,3771   00014 1 12DD     DEC   12

0400   REF   1              14,2000                  SETLOC MEASINC2
0401                        14,3377                  BANK
0402   REF   1                                       COUNT* $$/INCOR

0403                        14,3377   51575 1 NEWZCOMP VLOAD ABVAL
0404   REF  17  LAST 1257   14,3400   02723 0                ZI
0405   REF   1              14,3401   24045 0          STOVL NORMZI
0406   REF  18  LAST 1260   14,3402   02731 0                ZI +6
0407                        14,3403   41446 1          ABVAL PUSH
0408                        14,3404   50025 0          DSU   BMN
0409   REF   2  LAST 1260   14,3405   00045 0                NORMZI
0410                        14,3406   31411 1                +3
0411                        14,3407   45545 1          DLOAD STADR
0412   REF   3  LAST 1260   14,3410   77732 1          STORE NORMZI
0413                        14,3411   51575 1          VLOAD ABVAL
0414   REF  19  LAST 1260   14,3412   02737 0                ZI +12D
0415                        14,3413   45206 1          PUSH  DSU
0416   REF   4  LAST 1260   14,3414   00045 0                NORMZI
0417                        14,3415   71240 1          BMN   DLOAD
0418   REF   1              14,3416   73635 0                NEWZCMP1
04185                       14,3417   77626 0          STADR
0419   REF   5  LAST 1260   14,3420   43732 0          STCALL NORMZI     LARGEST ABVAL
0420   REF   2  LAST 1260   14,3421   73635 0                NEWZCMP1

0421   REF   1              35,2000                  SETLOC MEASINC3
0422                        35,3635                  BANK
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0423                                35,3635   66145 1  NEWZCMP1 DLOAD   SXA,1
0424  REF   6  LAST 1260           35,3636   00045 0                   NORMZI
0425  REF   7  LAST 1261           35,3637   00044 1                   NORMZI          SAVE X1
0426                                35,3640   62101 0           NORM    INCR,1
0427  REF  65  LAST 1254           35,3641   00047 1                   X1
0428                                35,3642   00002 0           DEC     2
0429                                35,3643   53775 1           VLOAD   VSL*
0430  REF  20  LAST 1260           35,3644   02723 0                   ZI
0431                                35,3645   20201 0                   0,1
0432  REF  21  LAST 1261           35,3646   26723 0           STOVL   ZI
0433  REF  22  LAST 1261           35,3647   02731 0                   ZI +6
0434                                35,3650   77657 0           VSL*
0435                                35,3651   20201 0                   0,1
0436  REF  23  LAST 1261           35,3652   26731 0           STOVL   ZI +6
0437  REF  24  LAST 1261           35,3653   02737 0                   ZI +12D
0438                                35,3654   66057 0           VSL*    SXA,1
0439                                35,3655   20201 0                   0,1
0440  REF   8  LAST 1261           35,3656   00045 0                   NORMZI +1       SAVE SHIFT
0441  REF  25  LAST 1261           35,3657   02737 0           STORE   ZI +12D
0442                                35,3660   54150 1           LXA,1   XSU,1
0443  REF   6  LAST 1258           35,3661   02215 0                   NORMGAM
0444  REF   9  LAST 1261           35,3662   00045 0                   NORMZI +1
0445                                35,3663   77660 1           XSU,1
0446  REF  10  LAST 1261           35,3664   00045 0                   NORMZI +1
0447                                35,3665   70130 1           SXA,1   LXC,1
0448  REF   7  LAST 1261           35,3666   02215 0                   NORMGAM
0449  REF  11  LAST 1261           35,3667   00045 0                   NORMZI +1
0450                                35,3670   40270 0           XAD,1   SETPD
0451  REF  12  LAST 1261           35,3671   00044 1                   NORMZI
0452                                35,3672   00003 1                   2D
0453                                35,3673   77650 1           GOTO
0454  REF   2  LAST 1254           35,3674   75412 1                   INCOR2 -3
0455                                  0044              NORMZI  =       36D
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L CONIC SUBROUTINES USER'S PAGE NO. 1 EO S3

P0001 PROGRAM DESCRIPTION - ENTIRE CONIC SUBROUTINE LOG SECTION DATE - 1 SEPTEMBER 1967
R0003 MOD NO. - 0 LOG SECTION - CONIC SUBROUTINES
R0005 MOD BY KRAUSE ASSEMBLY - COLOSSUS REVISION 88
R0007

R0008 FUNCTIONAL DESCRIPTION -

R0009 THE FOLLOWING SET OF SUBROUTINES SOLVE VARIOUS PROBLEMS INVOLVING THE TRAJECTORY PRODUCED BY A CENTRAL
R0011 INVERSE-SQUARE FORCE ACTING ON A POINT MASS, AS OUTLINED IN THE CMC AND LGC LUNAR LANDING MISSION GSOP, SECTION
R0013 5.5.1.2. A GENERAL USAGE POINT-OF-VIEW WAS TAKEN IN FORMULATING, MECHANIZING, AND SCALING THE SUBROUTINES,
R0015 RATHER THAN OPTIMIZING EACH FOR A PARTICULAR USE. THEREFORE, MULTIPLE USAGE CAN BE MADE OF THE SUBROUTINES
R0017 INVOLVING ANY REALISTIC SET OF CONSTRAINTS. IT SHOULD BE NOTED THAT ONLY ONE SET OF CODING IS USED, WHETHER THE
R0019 EARTH, MOON, OR ANY OTHER CELESTIAL BODY IS SPECIFIED AS THE CENTRAL BODY OF THE PROBLEM, PROVIDED ONE OBSERVES
R0021 THE INHERENT SCALE CHANGE REQUIRED IN POSITION, VELOCITY, MU, AND TIME, AS OUTLINED IN MISSION PROGRAMMING
R0023 DEFINITION MEMO NO. 10. THIS CAN BE ACCOMPLISHED BY SIMPLY ADDING TO THE MUTABLE AND INITIALIZING THE SUBROU-
R0025 TINES APPROPRIATELY.
R0026 DUE TO THE UNIFORMITY OF THE EQUATIONS INVOLVED, CODING WAS MINIMIZED BY TREATING INDIVIDUAL EQUATIONS AND
R0028 BLOCKS OF EQUATIONS AS SUBROUTINES OF LOWER RANK WHENEVER POSSIBLE. AS A RESULT, THREE BY-PRODUCTS SUBROUTINES,
R0030 DIRECTLY USABLE AS INDEPENDENT SUBROUTINES, WERE GENERATED.

R0031 RESTRICTIONS -

R0032 THE ONLY LIMITATION IN THE SCOPE OF PROBLEM WHICH CAN BE SOLVED BY A PARTICULAR SUBROUTINE IS THE SCALING
R0034 LIMIT OF EACH PARAMETER AS SPECIFIED IN THE GSOP. THESE SCALING LIMITS WERE CHOSEN SO THAT ALL FEASIBLE TRAJEC-
R0036 TORIES COULD BE HANDLED.
R0037 SINCE THE SUBROUTINES (EXCEPT KEPLER) USE COMMON SUBROUTINES OF LOWER RANK WHICH USE ERASABLE OTHER THAN
R0039 THE PUSHLIST (DUE TO ITS LIMITED SIZE) AND COMMON INTERPRETIVE SWITCHES, THE CONIC SUBROUTINES CANNOT BE ALLOWED
R0041 TO INTERRUPT EACH OTHER. IT IS UP TO THE USER TO GUARANTEE THIS CONDITION.
R0043

L CONIC SUBROUTINES USER'S PAGE NO. 2 EO S3

P0044 PROGRAM DESCRIPTION - KEPLER SUBROUTINE DATE - 11 OCTOBER 1967
R0046 MOD NO. -1 LOG SECTION - CONIC SUBROUTINES
R0048 MOD BY KRAUSE ASSEMBLY - COLOSSUS 103 AND SUNDANCE 222
R0050 MOD NO. - 2 (AUGUST 1968) BY ROBERTSON: TO PERMIT BACKDATING BY MORE THAN ONE ORBITAL PERIOD.

R00502 MOD NO. - 3 (DEC 1968) BY ROBERTSON: SUPPRESSION OF X-MODULO-ING

R00503 MOD. NO. - 4 (JAN 1969) BY ROBERTSON: CLEAR OVFIND AT KEPLER ENTRY

R0051 FUNCTIONAL DESCRIPTION -
R0052 THIS SUBROUTINE, GIVEN AN INITIAL STATE VECTOR AND THE DESIRED TRANSFER TIME THROUGH WHICH THE STATE IS TO
R0054 BE UPDATED ALONG A CONIC TRAJECTORY, COMPUTES THE NEW, UPDATED STATE VECTOR. THE TRAJECTORY MAY BE ANY CONIC
R0056 SECTION - CIRCULAR, ELLIPTIC, PARABOLIC, HYPERBOLIC, OR RECTILINEAR WITH RESPECT TO THE EARTH OR THE MOON. THE
R0058 USE OF THE SUBROUTINE CAN BE EXTENDED USING OTHER PRIMARY BODIES BY SIMPLE ADDITIONS TO THE MUTABLE WITHOUT
R0060 INTRODUCING ANY CODING CHANGES, ACCEPTING THE INHERENT SCALE FACTOR CHANGES IN POSITION AND VELOCITY. AN ITERA-
R0062 TION TECHNIQUE IS UTILIZED IN THE COMPUTATION.
R0063 IF A NEGATIVE TIME-OF-FLIGHT IS INPUT, THE PROGRAM WILL SOLVE FOR THE STATE WHICH WOULD BE PRODUCED BY
R0065 EXTRAPOLATING THE POSITION BACKWARD IN TIME.
R00651 IF THE ABSOLUTE VALUE OF THE DESIRED TRANSFER TIME EXCEEDS THE ORBITAL PERIOD, THE SUBROUTINE, THROUGH A
R00653 MODULAR TECHNIQUE, WILL COMPUTE THE STATE CORRESPONDING TO THE DESIRED TIME (WHETHER POSITIVE OR NEGATIVE).
R0066

R0067 THE RESTRICTIONS ARE -
R0068 1. (PREVIOUS RESTRICTION ON THE NEGATIVE DESIRED TRANSFER TIME IS NOW DELETED.)
R0071 2. THE PARAMETERS IN THE PROBLEM CANNOT EXCEED THEIR SCALING LIMITS AS SPECIFIED IN THE GSOP. IF
R0073 ANY OF THESE LIMITS ARE EXCEEDED, THE RESULTING SOLUTION WILL BE MEANINGLESS.
R0075

R0076 THE NUMBER OF ITERATIONS AND, THEREFORE, THE COMPUTATION SPEED IS DEPENDENT ON THE ACCURACY OF THE
R0078 GUESS, XKEPNEW. THE AGC COMPUTATION TIME IS APPROXIMATELY .061 SECONDS FOR INITIALIZATION, .065 SECONDS FOR THE
R0080 FINAL COMPUTATIONS, PLUS .083 SECONDS FOR EACH ITERATION.
R0081

R0082 REFERENCES -
R0083 R-479, MISSION PROGRAMMING DEFINITION MEMO NO. 10, LUNAR LANDING MISSION GSOP, SECTION 5.5, SGA
R0085 MEMO 67-4.
R0086

R0087 INPUT - ERASABLE INITIALIZATION REQUIRED

R0088 * SCALE FACTOR *
R0089 VARIABLE*IN POWERS OF 2* DESCRIPTION AND REMARKS
R0090 --------*--------------* ----------
R0091 RRECT * +29 FOR EARTH*OP INITIAL POSITION VECTOR IN METERS
R0092 * +27 FOR MOON *

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R0093   VRECT    * +7 FOR EARTH *DP INITIAL VELOCITY VECTOR IN METERS/CENTISECOND
R0094             * +5 FOR MOON  *
R0095   X1 (38D)* NONE           *INDEX REGISTER SET TO -2D OR -10D ACCORDING TO WHETHER THE EARTH OR MOON,
R0097             *              *RESPECTIVELY, IS THE CENTRAL BODY
R0098   TAU.     * +28            *DESIRED TRANSFER TIME IN CENTISECONDS (DP)
R00987            *              *    MAY BE POS OR NEG AND ABSOLUTE VALUE MAY BE GREATER OR LESS THAN ONE ORBITAL PERIOD.
R0099   XKEPNEW * +17 FOR EARTH*DP GUESS OF ROOT X OF KEPLERS EQN IN SQRT(METERS). SIGN SHOULD AGREE WITH THAT OF TAU.
R0100             * +16 FOR MOON *    AND ABS VALUE SHOULD BE LESS THAN THAT CORRESPONDING TO A PERIOD,VIZ, 2PI SQRT(SEMI-
R0101             *              *    MAJOR AXIS),FOR SPEED OF CONVERGENCE,BUT IF EITHER CONDITION FAILS, XKEPNEW IS RESET
R01017            *              *    BY KEPLER TO A POOR BUT VALID GUESS.
R0102   TC        * +28            *DP PREV. VALUE OF TIME IN CENTISECS.  MUST BE LESS THAN ONE ORBITAL PERIOD.
R0103   XPREV     * +17 FOR EARTH*DP PREV. VALUE OF X IN SQRT(METERS).  MUST BE LESS THAN AN X CORRESPONDING TO ONE
R0105             * +16 FOR MOON *    ORBITAL PERIOD,VIZ,2PI SQRT(SEMI-MAJOR AXIS)
R0106

R0107   SUBROUTINES CALLED -
R0108        DELTIME
R0109

R0110   CALLING SEQUENCE AND NORMAL EXIT MODES -

R0111   KEPRTN-2 GOTO                    MUST BE IN INTERPRETIVE MODE BUT OVFIND ARBITRARY.
R0113   KEPRTN-1        KEPLER          RETURNS WITH XPREV IN MPAC. PL IS AT 0.
R0114   KEPRTN   ...                    CONTINUE

R0115   KEPLER MUST NOT BE CALLED DIRECTLY SINCE AN INTERRUPTION OF IT WOULD DESTROY THE ERASABLES IT NEEDS TO COMPLETE
R0117   THE INTERRUPTED JOB.  THEREFORE THE USER MUST CALL CSMCONIC OR LEMCONIC WHICH GUARANTEES NO INTERRUPTS AND WHICH
R0119   ALSO CALLS KEPPREP TO COMPUTE A GUESS OF XKEPNEW.
R0120

R0121   ABORT EXIT MODES -
R0122        NONE
R0123

R0124   OUTPUT -

R0125             * SCALE FACTOR *
R0126   VARIABLE*IN POWERS OF 2*                          DESCRIPTION AND REMARKS
R0127   --------*---------------*                         ----------------------
R0128   RCV       * +29 FOR EARTH*DP TERMINAL POSITION VECTOR IN METERS
R0129             * +27 FOR MOON *
R0130   VCV       * +7 FOR EARTH *DP TERMINAL VELOCITY VECTOR IN METERS/CENTISEC
R0131             * +5 FOR MOON  *
R0132   TC        * +28            *DP TRANSFER TIME IN CENTISECS TO WHICH KEPLER CONVERGED. ALWAYS LESS THAN ONE PERIOD.
R0134   XPREV     * +17 FOR EARTH*DP VALUE OF X IN SQRT(METERS) TO WHCIH KEPLER CONVERGED. ALWAYS LESS THAN THE X
R0136             * +16 FOR MOON *    CORRESPONDING TO ONE PERIOD.
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R0137   FOR OTHER OUTPUT WHICH MAY BE OF USE, SEE DEBRIS.
R0138

R0139   DEBRIS -

R0140         PARAMETERS WHICH MAY BE OF USE -

R0141              * SCALE FACTOR *
R0142   VARIABLE*IN POWERS OF 2*                          DESCRIPTION AND REMARKS
R0143   --------*--------------*                          ----------------------
R0144   URRECT  * +1            *DP UNIT VECTOR OF INITIAL POSITION
R0145   R1       * +29 FOR EARTH*DP MAGNITUDE OF INITIAL POSITION IN METERS
R0146            * +27 FOR MOON *
R0147   ALPHA    * -22 FOR EARTH*DP INVERSE OF SEMIMAJOR AXIS IN 1/METERS
R0148            * -20 FOR MOON *
R01481  TMODULO * +28            *DP INTEGRAL NUMBER OF PERIODS IN  CENTISECS. WHICH WAS SUBTRACTED FROM TAU. TO PRODUCE A
R01483           *               *TAU. OF LESS THAN ONE PERIOD.

R0149         PARAMETERS OF NO USE -
R0150   DP PARAMETERS - EPSILONT, DELX, DELT, RCNORM, XMODULO, PLUS PUSHLIST REGISTERS 0 THROUGH 39D.
R0152
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L CONIC SUBROUTINES USER'S PAGE NO. 5 EO S3

P0153 PROGRAM DESCRIPTION - LAMBERT SUBROUTINE DATE - 1 SEPTEMBER 1967
R0155 MOD NO. - 0 LOG SECTION - CONIC SUBROUTINES
R0157 MOD BY KRAUSE ASSEMBLY - COLOSSUS REVISION 88
R0159

R0160 FUNCTIONAL DESCRIPTION -

R0161 THIS SUBROUTINE CALCULATES THE INITIAL VELOCITY REQUIRED TO TRANSFER A POINT-MASS ALONG A CONIC TRAJECTORY
R0163 FROM AN INITIAL POSITION TO A TERMINAL POSITION IN A PRESCRIBED TIME INTERVAL. THE RESULTING TRAJECTORY MAY BE
R0165 A SECTION OF A CIRCLE, ELLIPSE, PARABOLA, OR HYPERBOLA WITH RESPECT TO THE EARTH OR THE MOON. THE USE OF THE
R0167 SUBROUTINE CAN BE EXTENDED USING OTHER PRIMARY BODIES BY SIMPLE ADDITIONS TO THE MUTABLE WITHOUT INTRODUCING ANY
R0169 CODING CHANGES, ACCEPTING THE INHERENT SCALE FACTOR CHANGES IN POSITION AND VELOCITY. AN ITERATION TECHNIQUE IS
R0171 UTILIZED IN THE COMPUTATION.
R0172

R0173 THE RESTRICTIONS ARE -
R0174 1. RECTILINEAR TRAJECTORIES CANNOT BE COMPUTED.
R0175 2. AN ACCURACY DEGRADATION OCCURS AS THE COSINE OF THE TRUE ANOMALY DIFFERENCE APPROACHES +1.0.
R0177 3. THE ANGLE BETWEEN ANY POSITION VECTOR AND ITS VELOCITY VECTOR MUST BE GREATER THAN 1 DEGREE 47.5 MINUTES
R0179 AND LESS THAN 178 DEGREES 12.5 MINUTES.
R0180 4. NEGATIVE TRANSFER TIME IS AMBIGUOUS AND WILL RESULT IN NO SOLUTION.
R0182 5. THE PARAMETERS IN THE PROBLEM MUST NOT EXCEED THEIR SCALING LIMITS SPECIFIED IN THE GSOP. IF THE
R0184 LIMITS ARE EXCEEDED, THE RESULTING SOLUTION WILL BE MEANINGLESS.
R0185 THE NUMBER OF ITERATIONS AND, THEREFORE, THE COMPUTATIONS SPEED IS DEPENDENT ON THE ACCURACY OF THE FIRST
R0187 GUESS OF THE INDEPENDENT VARIABLE, COGA. THE AGC COMPUTATION TIME IS APPROXIMATE-
R0189 LY .105 SECONDS FOR INITIALIZATION, .069 SECONDS FOR FINAL COMPUTATIONS, PLUS .205 SECONDS FOR EACH ITERATION.
R0191

R0192 REFERENCES -
R0193 R-479, MISSION PROGRAMMING DEFINITION MEMO NO. 10, LUNAR LANDING MISSION GSOP-SECTION 5.5, SGA MEMO 67-8,
R0195 SGA MEMO 67-4.
R0196

R0197 INPUT - ERASABLE INITIALIZATION REQUIRED

R0198 * SCALE FACTOR *
R0199 VARIABLE*IN POWERS OF 2* DESCRIPTION AND REMARKS
R0200 --------*-------------* ---------------------
R0201 RIVEC * +29 FOR EARTH*DP INITIAL POSITION VECTOR IN METERS
R0202 * +27 FOR MOON *
R0203 R2VEC * +29 FOR EARTH*DP TARGET OR TERMINAL POSITION VECTOR IN METERS
R0204 * +27 FOR MOON *
R0205 TDESIRED* +28 *DP DESIRED TRANSFER TIME IN CENTISECONDS
R0206 XI (38D)* NONE *INDEX REGISTER SET TO -2D OR -10D ACCORDING TO WHETHER THE EARTH OR MOON,
R0208 * *RESPECTIVELY, IS THE CENTRAL BODY
R0209 GEOMSGN * NONE *SP +.5 IF DESIRED TRANSFER ANGLE IS LESS THAN 180 DEGREES, -.5 IF GREATER THAN 180 DEG.
R0211 GUESSW * NONE *AN INTERPRETER SWITCH TO BE SET IF NO GUESS OF COGA IS AVAILABLE, CLEAR IF A GUESS OF

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R0213           *               *COGA IS TO BE USED BY LAMBERT
R0214   COGA    * +5            *DP GUESS OF COTANGNT OF FLIGHT PATH ANGLE (MEASURED FROM VERTICAL).  THIS WILL BE
R0216                           *IGNORED IF GUESSW IS SET.
R0217   NORMSW  * NONE          *AN INTERPRETER SWITCH TO BE SET IF UN IS TO BE AN INPUT TO THE SUBROUTINE, CLEAR IF
R0219           *               *LAMBERT IS TO COMPUTE ITS OWN NORMAL (UN).
R0220   UN      * +1            *DP UNIT  NORMAL TO THE DESIRED ORBIT PLANE IN THE DIRECTION OF THE RESULTING ANGULAR
R0222           *               *MOMENTUM VECTOR.  THIS WILL BE IGNORED IF NORMSW IS CLEAR.
R0224   VTARGTAG* NONE          *A S.P. TAG TO BE SET TO ZERO IF LAMBERT IS TO COMPUTE THE VELOCITY AT R2VEC AS WELL AS
R0226           *               *AT R1VEC.
R0227


R0228   SUBROUTINES CALLED -
R0229        GEOM, GETX, DELTIME, ITERATOR, LAMENTER (PART OF NEWSTATE)
R0230


R0231   CALLING SEQUENCE AND NORMAL EXIT MODES -

R0232   L       CALL                    MUST BE IN INTERPRETIVE MODE BUT OVFIND ARBITRARY.
R0234   L+1             LAMBERT         RETURNS WITH PL AT 0 AND WITH VVEC IN MPAC IF VTARGTAG WAS NON-ZERO OR VTARGET
R0236                                   IN MPAC IF VTARGTAG WAS ZERO
R0237   L+2     BON                     CONTINUE IF SOLNSW CLEAR SINCE SOLUTION IS ACCEPTABLE
R0239   L+3             SOLNSW
R0240   L+4             LAMABORT
R0241        IF A LAMBERT RESULT IS TO BE A FIRST GUESS FOR THE NEXT LAMBERT CALCULATION, COGA MUST BE PRESERVED AND
R0243   GUESSW MUST BE CLEAR FOR EACH SUCCEEDING LAMBERT CALL.
R0244


R0245   ABORT EXIT MODES -
R0246        IF SOLNSW WAS SET UPON EXITING. EITHER LAMBERT WAS ASKED TO COMPUTE A TRANSFER TOO NEAR 0 OR 360 DEG. OR T
R0248   WAS TOO SMALL TO PRODUCE A REALISTIC TRANSFER BETWEEN R1VEC AND R2VEC.  IN EITHER CASE THE FIX MUST BE MADE
R0250   ACCORDING TO THE NEEDS OF THE PARTICULAR USER.  THE ABORT EXIT MODE MAY BE CODED AS ...
R0252   LAMABORT DLOAD  ABS                     A MEASURE OF PROXIMITY TO 0 OR
R0253                   1-CSTH                  360 DEGREES.
R0254           DSU     BMN
R0255                   ONEBIT
R0256                   CHANGER2                CHANGE R2VEC DIRECTION SLIGHTLY.
R0257           DLOAD   DAD
R0258                   TDESIRED
R0259                   SOMETIME
R0260           STCALL  TDESIRED                INCREASE TDESIRED
R0261                   LAMBERT
R0262


R0263   OUTPUT -
R0264           * SCALE FACTOR *
R0265   VARIABLE*IN POWERS OF 2*                        DESCRIPTION AND REMARKS
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R0266   --------*--------------*                    ----------------------
R0267   VVEC    * +7 FOR EARTH *DP INITIAL VELOCITY VECTOR IN METERS/CENTISECOND REQUIRED TO SATISFY THE BOUNDARY VALUE
R0269           * +5 FOR MOON  *PROBLEM.
R0270   VTARGET * +7 FOR EARTH *DP RESULTANT VELOCITY VECTOR AT R2VEC IN METERS/CENTISECOND.
R0272           * +5 FOR MOON  *
R0273   SOLNSW  * NONE         *INTERPRETER SWITCH WHICH IS SET IF THE SUBROUTINE CANNOT SOLVE THE PROBLEM, CLEAR IF THE
R0275           *              *SOLUTION EXISTS.
R0276   FOR OTHER OUTPUT WHICH MAY BE OF USE, SEE DEBRIS.
R0277


R0278   DEBRIS -
R0279        PARAMETERS WHICH MAY BE OF USE -

R0280           * SCALE FACTOR *
R0281   VARIABLE*IN POWERS OF 2*                    DESCRIPTION AND REMARKS
R0282   --------*--------------*                    ----------------------
R0283   SNTH    * +1           *DP SIN OF ANGLE BETWEEN R1VEC AND R2VEC
R0284   CSTH    * +1           *DP COSINE OF ANGLE
R0285   1-CSTH  * +2           *DP 1-CSTH
R0286   COGA    * +5           *DP COTAN OF INITIAL REQUIRED FLIGHT PATH ANGLE MEASURED FROM VERTICAL
R0289   P       * +4           *DP RATIO  OF SEMILATUS RECTUM TO INITIAL RADIUS
R0290   R1A     * +6           *DP RATIO OF INITIAL RADIUS TO SEMIMAJOR AXIS
R0291   R1 (32D)* +29 FOR EARTH*DP INITIAL RADIUS IN METERS
R0292           * +27 FOR MOON *
R0293   UR1     * +1           *DP UNIT VECTOR OF R1VEC
R0294   U2      * +1           *DP UNIT VECTOR OF R2VEC

R0295        PARAMETERS OF NO USE
R0296   DP PARAMETERS - EPSILONL, CSTH-RHO, TPREV, TERRLAMB, R2, RTNLAMB (SP),  PLUS PUSHLIST REGISTER 0 THROUGH 41D
R0298   ADDITIONAL INTERPRETIVE SWITCHES USED - INFINFLG, 360SW, SLOPESW, ORDERSW
R0300
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L CONIC SUBROUTINES USER'S PAGE NO. 8 EO S3

P0301 PROGRAM DESCRIPTION - TIME-THETA SUBROUTINE
R0303 MOD NO. - 0
R0305 MOD BY KRAUSE
R0307

DATE - 1 SEPTEMBER 1967
LOG SECTION - CONIC SUBROUTINES
ASSEMBLY - COLOSSUS REVISION 88

R0308 FUNCTIONAL DESCRIPTION -

R0309 THIS SUBROUTINE, GIVEN AN INITIAL STATE VECTOR AND A DESIRED TRUE-ANOMALY-DIFFERENCE THROUGH WHICH THE
R0311 STATE IS TO BE UPDATED ALONG A CONIC TRAJECTORY, CALCULATES THE CORRESPONDING TIME-OF-FLIGHT AND, IN ADDITION,
R0313 PROVIDES THE OPTION OF COMPUTING THE NEW UPDATED STATE VECTOR. THE RESULTING TRAJECTORY MAY BE A SECTION OF A
R0315 CIRCLE, ELLIPSE, PARABOLA, OR HYPERBOLA WITH RESPECT TO THE EARTH OR THE MOON. THE USE OF THE SUBROUTINE CAN BE
R0317 EXTENDED USING OTHER PRIMARY BODIES BY SIMPLE ADDITIONS TO THE MUTABLE WITHOUT INTRODUCING ANY CODING CHANGES.
R0319 ACCEPTING THE INHERENT SCALE FACTOR CHANGES IN POSITION AND VELOCITY.
R0320

R0321 THE RESTRICTIONS ARE -
R0322 1. THE ANGLE BETWEEN ANY POSITION VECTOR AND ITS VELOCITY VECTOR MUST BE GREATER THAN 1 DEGREE 47.5 MINUTES
R0324 AND LESS THAN 178 DEGREES 12.5 MINUTES.
R0325 2. THE PARAMETERS IN THE PROBLEM MUST NOT EXCEED THEIR SCALING LIMITS SPECIFIED IN THE GSOP. IF THE LIMITS
R0327 ARE EXCEEDED, THE RESULTING SOLUTION WILL BE MEANINGLESS.

R0328 THE AGC COMPUTATION TIME IS APPROXIMATELY .292 SECONDS.
R0329

R0330 REFERENCES -
R0331 R-479, MISSION PROGRAMMING DEFINITION MEMO NO. 10, LUNAR LANDING MISSION GSOP-SECTION 5.5, SGA MEMO 67-8.
R0333

R0334 INPUT - ERASABLE INITIALIZATION REQUIRED

R0335		* SCALE FACTOR *	
R0336	VARIABLE	*IN POWERS OF 2*	DESCRIPTION AND REMARKS
R0337	--------	*-------------*	----------
R0338	RVEC	* +29 FOR EARTH	*DP INITIAL POSITION VECTOR IN METERS
R0339		* +27 FOR MOON	*
R0340	VVEC	* +7 FOR EARTH	*DP INITIAL VELOCITY VECTOR IN METERS/CENTISECOND
R0341		* +5 FOR MOON	*
R0342	SNTH	* +1	*DP SINE OF TRUE-ANOMALY-DIFFERENCE THROUGH WHICH THE STATE IS TO BE UPDATED
R0344	CSTH	* +1	*DP COSINE OF THE ANGLE
R0345	RVSW	* NONE	*AN INTERPRETIVE SWITCH TO BE SET IF ONLY TIME IS TO BE AN OUTPUT, CLEAR IF THE NEW STATE
R0347		*	*IS TO BE COMPUTED ALSO.
R0348	XI (38D)	*NONE	*INDEX REGISTER TO BE SET TO -2D OR -10D ACCORDING TO WHETHER THE EARTH OR MOON,
R0350		*	*RESPECTIVELY, IS THE CENTRAL BODY.

R0351

R0352 SUBROUTINES CALLED -

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R0353          PARAM, GEOM, GETX, DELTIME, NEWSTATE
R0354
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R0355   CALLING SEQUENCE AND NORMAL EXIT MODES -

R0356       IF ONLY TIME IS DESIRED AS OUTPUT -
R0357   L       SET     CALL            MUST BE IN INTERPRETIVE MODE BUT OVFIND ARBITRARY.
R0359   L+1             RVSW
R0360   L+2             TIMETHET        RETURN WITH PL AT 0 AND T IN MPAC
R0361   L+3     ...                     CONTINUE
R0362

R0363       IF THE UPDATE STATE VECTOR IS DESIRED AS WELL -
R0364   L       CLEAR   CALL            MUST BE IN INTERPRETIVE MODE BUT OVFIND ARBITRARY.
R0366   L+1             RVSW
R0367   L+2             TIMETHET        RETURNS WITH PL AT 6.  THE INITIAL POSITION VECTOR IS IN OD OF THE PUSHLIST AND
R0369                                   THE INITIAL VELOCITY VECTOR IN MPAC.
R0370   L+3     STOVL   NEWVVEC
R0371   L+4     STADR
R0372   L+5     STORE   NEWRVEC                 NEWVVEC AND NEWRVEC ARE SYMBOLIC REPRESENTATIONS OF THE USERS LOCATIONS.
R0374   L+6     ...                             CONTINUE
R0375
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R0376   ABORT EXIT MODES -
R0377           IF COGAFLAG AND/OR INFINFLG IS SET AT THE EXIT TO TIME-THETA, TIME-THETA WILL TRANSFER TO POODOO WITH
R0379           AN ALARM CODE (ORIGINALLY 00607), AND NOT RETURN TO THE CALLING PROGRAM. (PCR 692 AND 721).
R0386


R0387   OUTPUT -
R0388           * SCALE FACTOR *
R0389   VARIABLE*IN POWERS OF 2*                        DESCRIPTION AND REMARKS
R0390   --------*--------------*                        -----------------------
R0391   T (30D) * +28           *DP TRANSFER TIME IN CENTISECONDS
R0392   INFINFLG* NONE          *AN INTERPRETIVE SWITCH WHICH IS SET IF THE TRANSFER ANGLE REQUIRES CLOSURE THROUGH
R0394           *               *INFINITY (NO SOLUTION), CLEAR IF A PHYSICAL SOLUTION IS POSSIBLE.
R0396   COGAFLAG* NONE          *AN INTERPRETIVE SWITCH WHICH IS SET IF RESTRICTION 1 HAS BEEN VIOLATED (NO SOLUTION),
R0398           *               *CLEAR IF NOT.

R0399   IN ADDITION, IF RVSW IS CLEAR, THE FOLLOWING ARE OUTPUT-

R0400   MPAC -  * +7 FOR EARTH *DP TERMINAL VELOCITY VECTOR IN METERS/CENTISEC.
R0401    MPAC +5* +5 FOR MOON  *
R0402   OD - 5D * +29 FOR EARTH*DP TERMINAL POSITION VECTOR IN METERS (PL AT 6D)
R0403           * +27 FOR MOON *

R0404   FOR OTHER OUTPUT WHICH MAY BE OF USE, SEE DEBRIS.
R0405
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R0406   DEBRIS -

R0407         PARAMETERS WHICH MAY BE OF USE -

R0408              * SCALE FACTOR *
R0409   VARIABLE*IN POWERS OF 2*                          DESCRIPTION AND REMARKS
R0410   --------*--------------*                          ----------------------
R0411   R1 (32D)* +29 FOR EARTH*DP MAGNITUDE OF INITIAL POSITION VECTOR, RVEC, IN METERS
R0413            * +27 FOR MOON *
R0414   R1A      * +6            *DP RATIO OF R1 TO SEMIMAJOR AXIS (NEG. FOR HYPERBOLIC TRAJECTORIES)
R0416   P        * +4            *DP RATIO OF SEMILATUS RECTUM TO R1
R0417   COGA     * +5            *DP COTAN OF ANGLE BETWEEN RVEC AND VVEC
R0419   UR1      * +1            *DP UNIT VECTOR OF RVEC
R0420   U2       * +1            *DP UNIT VECTOR OF VVEC
R0421   UN       * +1            *DP UNIT VECTOR OF UR1*U2
R0422

R0423         PARAMETERS OF NO USE -
R0424   SP PARAMETERS - RTNTT, GEOMSGN, RTNPRM, MAGVEC2=R2 (DP), PLUS PUSHLIST LOCATIONS 0-11D, 14D-21D, 24D-39D, 41D
R0426   ADDITIONAL INTERPRETIVE SWITCHES USED - NORMSW, 360SW
R0427
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L CONIC SUBROUTINES USER'S PAGE NO. 11 E0 S3

P0428 PROGRAM DESCRIPTION - TIME-RADIUS SUBROUTINE DATE - 11 OCTOBER 1967
R0430 MOD NO. -1 LOG SECTION - CONIC SUBROUTINES
R0432 MOD BY KRAUSE ASSEMBLY - COLOSSUS REVISION 88
R0434

R0435 FUNCTIONAL DESCRIPTION -

R0436 THIS SUBROUTINE, GIVEN AN INITIAL STATE VECTOR AND A DESIRED RADIUS TO WHICH THE
R0438 STATE IS TO BE UPDATED ALONG A CONIC TRAJECTORY, CALCULATES THE CORRESPONDING TIME-OF-FLIGHT AND, IN ADDITION,
R0440 PROVIDES THE OPTION OF COMPUTING THE NEW UPDATED STATE VECTOR. THE RESULTING TRAJECTORY MAY BE A SECTION OF A
R0442 CIRCLE, ELLIPSE, PARABOLA, OR HYPERBOLA WITH RESPECT TO THE EARTH OR THE MOON. THE USE OF THE SUBROUTINE CAN BE
R0444 EXTENDED USING OTHER PRIMARY BODIES BY SIMPLE ADDITIONS TO THE MUTABLE WITHOUT INTRODUCING ANY CODING CHANGES,
R0446 ACCEPTING THE INHERENT SCALE FACTOR CHANGES IN POSITION AND VELOCITY.
R0447 IF THE DESIRED RADIUS IS BEYOND THE RADIUS OF APOCENTER OF THE CONIC OR BELOW THE RADIUS OF PERICENTER,
R0449 APSESW WILL BE SET AND THE SUBROUTINE WILL RETURN THE APOCENTER OR PERICENTER SOLUTION, RESPECTIVELY.
R0451

R0452 THE RESTRICTIONS ARE -
R0453 1. THE ANGLE BETWEEN ANY POSITION VECTOR AND ITS VELOCITY VECTOR MUST BE GREATER THAN 1 DEGREE 47.5 MINUTES
R0455 AND LESS THAN 178 DEGREES 12.5 MINUTES.
R0456 2. THE PARAMETERS IN THE PROBLEM MUST NOT EXCEED THEIR SCALING LIMITS SPECIFIED IN THE GSOP. IF THE LIMITS
R0458 ARE EXCEEDED, THE RESULTING SOLUTION WILL BE MEANINGLESS.
R04581 3. AN ACCURACY DEGRADATION OCCURS AS THE SENSITIVITIES OF TIME AND UPDATED STATE VECTOR TO CHANGES IN
R04583 RDESIRED INCREASE. THIS WILL OCCUR NEAR EITHER APSIS OF THE CONIC AND WHEN THE CONIC IS NEARLY CIRCULAR. IN
R04585 PARTICULAR, IF THE CONIC IS AN EXACT CIRCLE, THE PROBLEM IS UNDEFINED AND THE SUBROUTINE WILL ABORT.
R04587

R0459 THE AGC COMPUTATION TIME IS APPROXIMATELY .363 SECONDS
R0460

R0461 REFERENCES -
R0462 R-479, MISSION PROGRAMMING DEFINITION MEMO NO. 10, LUNAR LANDING MISSION GSOP-SECTION 5.5, SGA MEMO 67-8.
R0464

R0465 INPUT - ERASABLE INITIALIZATION REQUIRED

R0466 * SCALE FACTOR *
R0467 VARIABLE*IN POWERS OF 2* DESCRIPTION AND REMARKS
R0468 --------*--------------* ----------
R0469 RVEC * +29 FOR EARTH*DP INITIAL POSITION VECTOR IN METERS
R0470 * +27 FOR MOON *
R0471 VVEC * +7 FOR EARTH *DP INITIAL VELOCITY VECTOR IN METERS/CENTISECOND
R0472 * +5 FOR MOON *
R0473 RDESIRED* +29 FOR EARTH*DP TERMINAL RADIAL DISTANCE ON CONIC TRAJECTORY FOR WHICH TRANSFER TIME IS TO BE
R0475 * +27 FOR MOON *COMPUTED.
R0476 SGNRDOT * NONE *SP TAG SET TO +.5 OR -.5 ACCORDING TO WHETHER THE RADIAL VELOCITY AT RDESIRED IS TO BE
R0478 * *POSITIVE OR NEGATIVE, RESPECTIVELY. THIS TAG REDUCES THE DOUBLE-VALUED PROBLEM TO A

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R0480           *               *SINGLE-VALUED PROBLEM.
R0481   X1 (38D)*NONE            *INDEX REGISTER TO BE SET TO -2D OR -10D ACCORDING TO WHETHER THE EARTH OR MOON,
R0483           *               *RESPECTIVELY, IS THE CENTRAL BODY.
R0484   RVSW     * NONE          *AN INTERPRETIVE SWITCH TO BE SET IF ONLY TIME IS TO BE AN OUTPUT, CLEAR IF THE NEW STATE
R0486           *               *IS TO BE COMPUTED ALSO.
R0487


R0488   SUBROUTINES CALLED -
R0489        PARAM, GEOM, GETX, DELTIME, NEWSTATE
R0490


R0491   CALLING SEQUENCE AND NORMAL EXIT MODES -

R0492      IF ONLY TIME IS DESIRED AS OUTPUT -
R0493   L          SET     CALL            MUST BE IN INTERPRETIVE MODE BUT OVFIND ARBITRARY.
R0495   L+1                CALL            RVSW
R0496   L+2                CALL            TIMERAD         RETURN WITH PL AT 0 AND T IN MPAC
R0497   L+3        ...                     CONTINUE
R0498

R0499      IF THE UPDATE STATE VECTOR IS DESIRED AS WELL -
R0500   L          CLEAR   CALL            MUST BE IN INTERPRETIVE MODE BUT OVFIND ARBITRARY.
R0502   L+1                CALL            RVSW
R0503   L+2                CALL            TIMERAD         RETURNS WITH PL AT 6.  THE INITIAL POSITION VECTOR IS IN OD OF THE PUSHLIST AND
R0505                                       THE INITIAL VELOCITY VECTOR IN MPAC.
R0506   L+3        STOVL   NEWVVEC
R0507   L+4        STADR
R0508   L+5        STORE   NEWRVEC                 NEWVVEC AND NEWRVEC ARE SYMBOLIC REPRESENTATIONS OF THE USERS LOCATIONS.
R0510   L+6        ...                             CONTINUE
R0511


R0512   ABORT EXIT MODES -
R0513           IF SOLNSW AND/OR COGAFLAG AND/OR INFINFLG IS SET AT THE EXIT TO TIME-RADIUS, TIME-RADIUS WILL TRANSFER
R0515           TO POODOO WITH AN ALARM CODE (ORIGINALLY 00607), AND NOT RETURN TO THE CALLING PROGRAM. (PCR 692 & 721)
R0522


R0523   OUTPUT -
R0524           * SCALE FACTOR *
R0525   VARIABLE*IN POWERS OF 2*                              DESCRIPTION AND REMARKS
R0526   --------*--------------*                              ----------------------
R0527   T (30D) * +28           *DP TRANSFER TIME IN CENTISECONDS
R0528   INFINFLG* NONE          *AN INTERPRETIVE SWITCH WHICH IS SET IF RDESIRED AND SGNRDOT REQUIRE CLOSURE THROUGH
R0530           *               *INFINITY (NO SOLUTION). CLEAR IF A PHYSICAL SOLUTION IS POSSIBLE.
R0532   COGAFLAG* NONE          *AN INTERPRETIVE SWITCH WHICH IS SET IF RESTRICTION I HAS BEEN VIOLATED (NO SOLUTION),
R0534           *               *CLEAR IF NOT.
R0535   APSESW  * NONE          *AN INTERPRETIVE SWITCH WHICH IS SET IF RDESIRED WAS GREATER THAN RADIUS OF APOCENTER OR
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R0537           *               *LESS THAN RADIUS OF PERICENTER.  THE APOCENTER OR PERICENTER SOLUTION, RESPECTIVELY,
R0539           *               *WILL THEN BE RETURNED.  THE SWITCH IS CLEAR IF RDESIRED WAS BETWEEN PERICENTER AND
R0541           *               *APOCENTER.
R05411  SOLNSW  * NONE          *AN INTERPRETIVE SWITCH WHICH IS SET IF THE CONIC IS SO CLOSE TO A CIRCLE THAT THE TERMIN
R05413                          *POINT IS AMBIGUOUS, VIOLATING RESTRICTION 3.  IF ECCENTRICITY IS GREATER THAN 2-TO-THE-
R05415                          *MINUS-18, THE SWITCH IS CLEAR.
R0542

R0543   IN ADDITION, IF RVSW IS CLEAR, THE FOLLOWING ARE OUTPUT-

R0544   MPAC -  * +7 FOR EARTH *DP TERMINAL VELOCITY VECTOR IN METERS/CENTISEC.
R0545    MPAC +5* +5 FOR MOON  *
R0546   OD - 5D * +29 FOR EARTH*DP TERMINAL POSITION VECTOR IN METERS (PL AT 6D)
R0547           * +27 FOR MOON *

R0548   FOR OTHER OUTPUT WHICH MAY BE OF USE, SEE DEBRIS.
R0549


R0550   DEBRIS -

R0551         PARAMETERS WHICH MAY BE OF USE -

R0552           * SCALE FACTOR *
R0553   VARIABLE*IN POWERS OF 2*                        DESCRIPTION AND REMARKS
R0554   --------*--------------*                        -----------------------
R0555   R1 (320)* +29 FOR EARTH*DP MAGNITUDE OF INITIAL POSITION VECTOR, RVEC, IN METERS
R0557           * +27 FOR MOON *
R0558   R1A     * +6            *DP RATIO OF R1 TO SEMIMAJOR AXIS (NEG. FOR HYPERBOLIC TRAJECTORIES)
R0560   P       * +4            *DP RATIO OF SEMILATUS RECTUM TO R1
R0561   COGA    * +5            *DP COTAN OF ANGLE BETWEEN RVEC AND VVEC
R0563   UR1     * +1            *DP UNIT VECTOR OF RVEC
R0564   U2      * +1            *DP UNIT VECTOR OF VVEC
R0565   UN      * +1            *DP UNIT VECTOR OF UR1*U2
R0566   CSTH    * +1            *DP COSINE OF TRUE ANOMALY DIFFERENCE BETWEEN RVEC AND RDESIRED.
R0568   SNTH    * +1            *DP SINE OF TRUE ANOMALY DIFFERENCE.
R0569

R0570         PARAMETERS OF NO USE -
R0571   SP PARAMETERS -  RTNTT, GEOMSGN, RTNPRM, MAGVEC2=R2 (DP), PLUS PUSHLIST LOCATIONS 0-11D, 14D-21D, 24D-39D, 41D
R0573   ADDITIONAL INTERPRETIVE SWITCHES USED - NORMSW, 360SW
R0574
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L CONIC SUBROUTINES USER'S PAGE NO. 14 E0 S3

P0575 PROGRAM DESCRIPTION - APSIDES SUBROUTINE DATE - 1 SEPTEMBER 1967
R0577 MOD NO. - 0 LOG SECTION - CONIC SUBROUTINES
R0579 MOD BY KRAUSE ASSEMBLY - COLOSSUS REVISION 88
R0581

R0582 FUNCTIONAL DESCRIPTION -

R0583 THIS SUBROUTINE, GIVEN AN INITIAL STATE VECTOR CALCULATES THE RADIUS OF PERICENTER AND OF APOCENTER AND THE
R0585 ECCENTRICITY OF THE RESULTING CONIC TRAJECTORY, WHICH MAY BE A STRAIGHT LINE,
R0587 CIRCLE, ELLIPSE, PARABOLA, OR HYPERBOLA WITH RESPECT TO THE EARTH OR THE MOON. THE USE OF THE SUBROUTINE CAN BE
R0589 EXTENDED USING OTHER PRIMARY BODIES BY SIMPLE ADDITIONS TO THE MUTABLE WITHOUT INTRODUCING ANY CODING CHANGES,
R0591 ACCEPTING THE INHERENT SCALE FACTOR CHANGES IN POSITION AND VELOCITY.
R0592

R0593 THE RESTRICTIONS ARE -
R0594 1. IF APOCENTER IS BEYOND THE SCALING OF POSITION, THE SCALE FACTOR LIMIT (536,870,910 METERS WITH RESPECT
R0596 TO THE EARTH OR 134,217,727.5 METERS WITH RESPECT TO THE MOON) WILL BE RETURNED.
R0598 2. THE PARAMETERS IN THE PROBLEM MUST NOT EXCEED THEIR SCALING LIMITS SPECIFIED IN THE GSOP. IF THE LIMITS
R0600 ARE EXCEEDED, THE RESULTING SOLUTION WILL BE MEANINGLESS.

R0601 THE AGC COMPUTATION TIME IS APPROXIMATELY .103 SECONDS.
R0602

R0603 REFERENCES -
R0604 MISSION PROGRAMMING DEFINITION MEMO NO. 10, LUNAR LANDING MISSION GSOP-SECTION 5.5
R0606

R0607 INPUT - ERASABLE INITIALIZATION REQUIRED

R0608 * SCALE FACTOR *
R0609 VARIABLE*IN POWERS OF 2* DESCRIPTION AND REMARKS
R0610 --------*--------------* ---------------------
R0611 RVEC * +29 FOR EARTH*DP INITIAL POSITION VECTOR IN METERS
R0612 * +27 FOR MOON *
R0613 VVEC * +7 FOR EARTH *DP INITIAL VELOCITY VECTOR IN METERS/CENTISECOND
R0614 * +5 FOR MOON *
R0615 XI (3BD)*NONE *INDEX REGISTER TO BE SET TO -2D OR -1OD ACCORDING TO WHETHER THE EARTH OR MOON,
R0617 * *RESPECTIVELY, IS THE CENTRAL BODY.
R0618

R0619 SUBROUTINES CALLED -
R0620 PARAM, GEOM
R0621

R0622 CALLING SEQUENCE AND NORMAL EXIT MODES -

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R0623       IF ONLY TIME IS DESIRED AS OUTPUT -
R0624  L         CALL                MUST BE IN INTERPRETIVE MODE BUT OVFIND ARBITRARY.
R0626  L+1               APSIDES     RETURNS WITH PL AT 0, RADIUS OF APOCENTER IN MPAC AND RADIUS OF PERICENTER IN OD
R0628  L+2       STODL   APOAPSE
R0629  L+3               OD
R0630  L+4       STORE   PERIAPSE            APOAPSE AND PERIAPSE ARE SYMBOLIC REPRESENTATIONS OF THE USERS LOCATIONS
R0632  L+5       ...                 CONTINUE
R0633

R0634  OUTPUT -
R0635            * SCALE FACTOR *
R0636  VARIABLE*IN POWERS OF 2*                          DESCRIPTION AND REMARKS
R0637  --------*--------------*                          ----------------------
R0638  MPAC      * +29 FOR EARTH*DP RADIUS OF APOCENTER IN METERS
R0639            * +27 FOR MOON *
R0640  OD-10     * +29 FOR EARTH*DP RADIUS OF PERICENTER IN METERS
R0641            * +27 FOR MOON *
R0642  ECC       * +3            *DP ECCENTRICITY OF CONIC TRAJECTORY.

R0643  FOR OTHER OUTPUT WHICH MAY BE OF USE, SEE DEBRIS.
R0644

R0645  DEBRIS -

R0646       PARAMETERS WHICH MAY BE OF USE -

R0647            * SCALE FACTOR *
R0648  VARIABLE*IN POWERS OF 2*                          DESCRIPTION AND REMARKS
R0649  --------*--------------*                          ----------------------
R0650  R1 (32D)* +29 FOR EARTH*DP MAGNITUDE OF INITIAL POSITION VECTOR, RVEC, IN METERS
R0652            * +27 FOR MOON *
R0653  R1A       * +6            *DP RATIO OF R1 TO SEMIMAJOR AXIS (NEG. FOR HYPERBOLIC TRAJECTORIES)
R0655  P         * +4            *DP RATIO OF SEMILATUS RECTUM TO R1
R0656  COGA      * +5            *DP COTAN OF ANGLE BETWEEN RVEC AND VVEC
R0658  UR1       * +1            *DP UNIT VECTOR OF RVEC
R0659  U2        * +1            *DP UNIT VECTOR OF VVEC
R0660  UN        * +1            *DP UNIT VECTOR OF UR1*U2
R0661  MAGVEC2   * +7 FOR EARTH *DP MAGNITUDE OF VVEC
R0662            * +5 FOR MOON  *
R0663

R0664       PARAMETERS OF NO USE -
R0665  SP PARAMETERS - RTNAPSE, GEOMSGN, RTNPRM, PLUS PUSHLIST LOCATIONS 0-5,10D-11D, 14D-21D, 31D-38D.
R0667  ADDITIONAL INTERPRETIVE SWITCHES USED - NORMSW
R0668

 0669  REF   1             12,2000                    SETLOC CONICS
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0670                            12,2042                         BANK

0671    REF   1                                                 COUNT   12/CONIC

0672    REF   2  LAST   96      E5,1723                         EBANK=  UR1
0678                            12,2042   40001 1  KEPLERN      SETPD   BOV
0679                            12,2043   00001 0                       0
0680                            12,2044   24045 0                       +1
0681                            12,2045   77773 1               VLOAD*
0683    REF   5  LAST  558      12,2046   11740 1                       MUTABLE,1
0684                            12,2047   24017 1               STOVL   14D
0685    REF   3  LAST  512      12,2050   01503 0                       RRECT
0686                            12,2051   66256 0               UNIT    SSP
0687    REF   1                 12,2052   00027 1                       ITERCTR
0688                            12,2053   00024 1                       20D
0689    REF   2  LAST   96      12,2054   16647 0               STODL   URRECT
0690                            12,2055   00045 0                       36D
0691    REF   5  LAST  908      12,2056   24041 1               STOVL   R1
0692    REF   4  LAST 1277      12,2057   01503 0                       RRECT
0693                            12,2060   76441 1               DOT     SL1R
0694    REF   2  LAST   85      12,2061   01511 0                       VRECT
0695                            12,2062   76405 1               DMP     SL1R
0696    REF   1                 12,2063   00023 0                       1/ROOTMU        1/ROOTMU (-17 OR -14)
0697    REF   1                 12,2064   24043 0               STOVL   KEPC1           C1=R.V/ROOTMU (+17 OR +16)
0698    REF   3  LAST 1277      12,2065   01511 0                       VRECT
0699                            12,2066   57236 1               VSQ     DMPR
0700    REF   1                 12,2067   00017 1                       1/MU            1/MU (-34 OR -28)
0701                            12,2070   52405 1               DMP     SL3
0702    REF   6  LAST 1277      12,2071   00041 1                       R1
0703                            12,2072   61425 0               DSU     RDUND
0704    REF   1                 12,2073   11610 0                       D1/64
0705    REF   1                 12,2074   00045 0               STORE   KEPC2           C2=RV.V/MU -1 (+6)

0706                            12,2075   74421 0               BDSU    SR1R
0707    REF   2  LAST 1277      12,2076   11610 0                       D1/64
0708                            12,2077   77671 1               DDV
0709    REF   7  LAST 1277      12,2100   00041 1                       R1
0710    REF   1                 12,2101   00011 1               STORE   ALPHA           ALPHA=(1-C2)/R1 (-22 OR -20)


0711                            12,2102   71244 0               BPL     DLOAD           MAXIMUM X DEPENDS ON TYPE OF CONIC
0712    REF   1                 12,2103   24112 0                       1REV
0713    REF   1                 12,2104   11626 0                       -50SC           -50SC (+12)
0714                            12,2105   40071 0               DDV     BOV
0715    REF   2  LAST 1277      12,2106   00011 1                       ALPHA
0716    REF   1                 12,2107   24116 1                       STOREMAX
0717                            12,2110   52166 1               SQRT    GOTO
0718    REF   2  LAST 1277      12,2111   24116 1                       STOREMAX
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0719                                12,2112  55366 1  1REV       SQRT    BDDV
0720  REF   4  LAST  669            12,2113  11630 1                     2PISC          2PISC (+6)
0721                                12,2114  77600 1            BOV
0722  REF   3  LAST 1277            12,2115  24116 1                     STOREMAX
0723  REF   1                       12,2116  00013 0  STOREMAX  STORE   XMAX
0724                                12,2117  65205 0            DMP     PDDL
0725  REF   2  LAST 1277            12,2120  00023 0                     1/ROOTMU
0726  REF   3  LAST 1277            12,2121  00011 1                     ALPHA
0727                                12,2122  65301 0            NORM    PDDL
0728  REF  66  LAST 1261            12,2123  00047 1                     X1
0729                                12,2124  56257 1            SL*     DDV
0730                                12,2125  20173 0                     0 -6,1
0731                                12,2126  50000 1            BOV     BMN
0732  REF   1                       12,2127  24143 1                     MODDONE
0733  REF   2  LAST 1278            12,2130  24143 1                     MODDONE        MPAC=PERIOD
0734                                12,2131  51525 1  PERIODCH  PDDL    ABS            OD=PERIOD
0735  REF   2  LAST   89            12,2132  02312 0                     TAU.
0736                                12,2133  50025 0            DSU     BMN
0737                                12,2134  00001 0                     OD
0738  REF   3  LAST 1278            12,2135  24143 1                     MODDONE
0739                                12,2136  77765 0            SIGN
0740  REF   3  LAST 1278            12,2137  02312 0                     TAU.
0741  REF   4  LAST 1278            12,2140  16312 0            STODL    TAU.
0750                                12,2141  77650 1            GOTO
0751  REF   1                       12,2142  24131 1                     PERIODCH
0752                                12,2143  71201 1  MODDONE   SETPD   DLOAD
0753                                12,2144  00001 0                     0
0754  REF   2  LAST   89            12,2145  02306 0                     XKEPNEW
0755  REF   1                       12,2146  00025 0            STORE    X
07555                               12,2147  53165 0            SIGN     BZE
0756  REF   5  LAST 1278            12,2150  02312 0                     TAU.
07565 REF   1                       12,2151  24320 0                     BADX
0757                                12,2152  51440 0            BMN      ABS
07575 REF   2  LAST 1278            12,2153  24320 0                     BADX
0758                                12,2154  51025 1            DSU      BPL
07585 REF   2  LAST 1278            12,2155  00013 0                     XMAX
0759  REF   3  LAST 1278            12,2156  24320 0                     BADX
07595                               12,2157  51145 0  STORBNDS  DLOAD    BPL
0760  REF   6  LAST 1278            12,2160  02312 0                     TAU.
07605 REF   1                       12,2161  24170 1                     STOREMIN
0761                                12,2162  57545 1            DLOAD    DCOMP
07615 REF   3  LAST 1278            12,2163  00013 0                     XMAX
0762  REF   1                       12,2164  14015 0            STODL    XMIN
07625 REF   1                       12,2165  11566 1                     KEPZERO
0763  REF   4  LAST 1278            12,2166  34013 1            STCALL   XMAX
0764  REF   1                       12,2167  24173 1                     DXCOMP
07645                               12,2170  77745 1  STOREMIN  DLOAD
0765  REF   2  LAST 1278            12,2171  11566 1                     KEPZERO
07655 REF   2  LAST 1278            12,2172  00015 0            STORE    XMIN
0766                                12,2173  57345 1  DXCOMP    DLOAD    DMPR
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0767   REF   7  LAST 1278   12,2174   02312 0                TAU.
0768   REF   1              12,2175   11621 1                BEE22
07685                       12,2176   77646 0          ABS
0769   REF   1              12,2177   15350 0          STODL EPSILONT
0770   REF   1              12,2200   01553 0                XPREV
0779                        12,2201   77621 1  XDIFF   BDSU
0780   REF   2  LAST 1278   12,2202   00025 0                X
0781   REF   2  LAST   96   12,2203   02643 1          STORE DELX

0782                        12,2204   63545 0  KEPLOOP DLOAD  DSQ
0783   REF   3  LAST 1279   12,2205   00025 0                X              X=XKEP
0784                        12,2206   41501 0          NORM  PUSH           OD=XSQ (+34 OR +32 -N1)      PL AT 2
0785   REF  67  LAST 1278   12,2207   00047 1                X1
0786                        12,2210   53605 1          DMP   SRR*
0787   REF   4  LAST 1278   12,2211   00011 1                ALPHA
0788                        12,2212   21573 0                0 -6,1
0789   REF   1              12,2213   34031 1          STCALL XI            XI=ALPHA XSQ (+6)
0790   REF   1              12,2214   24433 0                DELTIME
0791                        12,2215   44200 0          BOV   BDSU
0792   REF   1              12,2216   24326 0                TIMEOVFL       UNLIKELY
0793   REF   8  LAST 1279   12,2217   02312 0                TAU.
0794   REF   2  LAST   96   12,2220   02645 1          STORE DELT           DELT=DELINDEP
0795                        12,2221   44246 1          ABS   BDSU
0796   REF   2  LAST 1279   12,2222   01350 0                EPSILONT
0797                        12,2223   71244 0          BPL   DLOAD
0798   REF   1              12,2224   24346 0                KEPCONVG
0799   REF   9  LAST  910   12,2225   00037 0                T
0800                        12,2226   60225 1          DSU   NORM
0801   REF   2  LAST   85   12,2227   01551 1                TC
0802   REF  68  LAST 1279   12,2230   00047 1                X1
0803                        12,2231   60325 0          PDDL  NORM
0804   REF   3  LAST 1279   12,2232   02643 1                DELX
0805   REF  37  LAST 1258   12,2233   00050 1                X2
0806                        12,2234   41260 0          XSU,1 DMP
0807   REF  38  LAST 1279   12,2235   00047 1                X2
0808   REF   3  LAST 1279   12,2236   02645 1                DELT
0809                        12,2237   56257 1          SLR*  DDV
0810                        12,2240   21202 1                1,1
0811                        12,2241   41542 1          SR1   PUSH           OD=TRIAL DELX                PL AT 2
0812                        12,2242   71244 0          BPL   DLOAD
0813   REF   1              12,2243   24264 1                POSDELX
0814   REF   4  LAST 1279   12,2244   00025 0                X
0815   REF   5  LAST 1278   12,2245   00013 0          STORE XMAX           MOVE MAX BOUND IN
0816                        12,2246   45221 1          BDSU  DSU                                         PL AT 0
0817   REF   3  LAST 1278   12,2247   00015 0                XMIN
0818                        12,2250   51000 0          BOV   BPL
0819   REF   1              12,2251   24256 0                NDXCHNGE
0820   REF   2  LAST 1279   12,2252   24256 0                NDXCHNGE
0821                        12,2253   52145 0          DLOAD GOTO
```

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0822                          12,2254   00001 0                 OD
0823   REF   1                12,2255   24276 1                 NEWDELX

0824                          12,2256   45345 1 NDXCHNGE DLOAD  DSU
0825   REF   4  LAST 1279     12,2257   00015 0                 XMIN
0826   REF   5  LAST 1279     12,2260   00025 0                 X
0827                          12,2261   52075 1         DMPR    GOTO          TO FORCE MPAC +2 TO ZERO
0828   REF   1                12,2262   11624 1                 DP9/10
0829   REF   2  LAST 1280     12,2263   24276 1                 NEWDELX

0830                          12,2264   77745 1 POSDELX DLOAD
0831   REF   6  LAST 1280     12,2265   00025 0                 X
0832   REF   5  LAST 1280     12,2266   00015 0         STORE   XMIN          MOVE MIN BOUND IN
0833                          12,2267   45221 1         BDSU    DSU                                 PL AT 0
0834   REF   6  LAST 1279     12,2270   00013 0                 XMAX
0835                          12,2271   50000 1         BOV     BMN
0836   REF   1                12,2272   24312 1                 PDXCHNGE
0837   REF   2  LAST 1280     12,2273   24312 1                 PDXCHNGE
0838                          12,2274   77745 1         DLOAD
0839                          12,2275   00001 0                 OD
0840   REF   4  LAST 1279     12,2276   02643 1 NEWDELX STORE   DELX
0841                          12,2277   43254 0         BZE     DAD
0842   REF   2  LAST 1279     12,2300   24346 0                 KEPCONVG
0843   REF   7  LAST 1280     12,2301   00025 0                 X
0844   REF   8  LAST 1280     12,2302   14025 0         STODL   X
0845   REF  10  LAST 1279     12,2303   00037 0                 T
0846   REF   3  LAST 1279     12,2304   01551 1         STORE   TC
0847                          12,2305   46034 1 BRNCHCTR RTB    BHIZ
0848   REF   1                12,2306   24656 1                 CHECKCTR
0849   REF   3  LAST 1280     12,2307   24346 0                 KEPCONVG
0850                          12,2310   77650 1         GOTO
0851   REF   1                12,2311   24204 1                 KEPLOOP       ITERATE

0852                          12,2312   45345 1 PDXCHNGE DLOAD  DSU
0853   REF   7  LAST 1280     12,2313   00013 0                 XMAX
0854   REF   9  LAST 1280     12,2314   00025 0                 X
0855                          12,2315   52075 1         DMPR    GOTO          TO FORCE MPAC +2 TO ZERO
0856   REF   2  LAST 1280     12,2316   11624 1                 DP9/10
0857   REF   3  LAST 1280     12,2317   24276 1                 NEWDELX

0858                          12,2320   70545 1 BADX    DLOAD   SR1
0859   REF   8  LAST 1280     12,2321   00013 0                 XMAX
0860                          12,2322   77765 0         SIGN
0861   REF   9  LAST 1279     12,2323   02312 0                 TAU.
0862   REF  10  LAST 1280     12,2324   34025 1         STCALL  X
0864   REF   1                12,2325   24157 1                 STORBNDS
```

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0879                                12,2326  50145 1  TIMEOVFL DLOAD   BMN             X WAS TOO BIG
0880   REF  11  LAST 1280          12,2327  00025 0                   X
08805  REF   1                     12,2330  24344 1                   NEGTOVFL
0881   REF   9  LAST 1280          12,2331  00013 0           STORE   XMAX
0882                                12,2332  70545 1  CMNTOVFL DLOAD   SR1
0883   REF   5  LAST 1280          12,2333  02643 1                   DELX
0884   REF   6  LAST 1281          12,2334  02643 1           STORE   DELX
0885                                12,2335  44254 1           BZE     BDSU
08855  REF   1                     12,2336  02270 0                   KEPRTN
0886   REF  12  LAST 1281          12,2337  00025 0                   X
0887   REF  13  LAST 1281          12,2340  14025 0           STODL   X
0888   REF   4  LAST 1280          12,2341  01551 1                   TC
0889   REF  11  LAST 1280          12,2342  34037 1           STCALL  T
0891   REF   1                     12,2343  24305 1                   BRNCHCTR
08911  REF   6  LAST 1280          12,2344  34015 1  NEGTOVFL STCALL  XMIN
08913  REF   1                     12,2345  24332 0                   CMNTOVFL
0892                                12,2346  44545 0  KEPCONVG DLOAD   SR4R
0893   REF   8  LAST 1277          12,2347  00041 1                   R1
0894                                12,2350  74225 1           DSU     VXSC
0895   REF   1                     12,2351  00035 1                   XSQC(XI)
0896   REF   3  LAST 1277          12,2352  02647 0                   URRECT
0897                                12,2353  65372 1           VSL1    PDDL            OD=(R1-XSQC(XI))URRECT (+33 OR +31)
0898   REF  14  LAST 1281          12,2354  00025 0                   X
0899                                12,2355  60316 0           DSQ     NORM
0900   REF  69  LAST 1279          12,2356  00047 1                   X1
0901                                12,2357  57275 0  DMPR     DMPR
0902   REF   3  LAST 1278          12,2360  00023 0                   1/ROOTMU
0903   REF  15  LAST 1281          12,2361  00025 0                   X
0904                                12,2362  53605 1  DMP      SRR*
0905   REF   1                     12,2363  00033 1                   S(XI)
0906                                12,2364  21572 1                   0 -7,1
0907                                12,2365  77621 1  BDSU
0908   REF  12  LAST 1281          12,2366  00037 0                   T
0909                                12,2367  74352 0  SL1      VXSC
0910   REF   4  LAST 1277          12,2370  01511 0                   VRECT
0911                                12,2371  53372 1  VSL1     VAD                                     PL AT 0
0912                                12,2372  77712 0  VSL4
0913   REF  15  LAST 1259          12,2373  01535 0  STORE    RCV             RCV (+29 OR +27)


0914                                12,2374  60246 1  ABVAL    NORM
0915   REF  39  LAST 1279          12,2375  00050 1                   X2
0916   REF   2  LAST   96          12,2376  16655 0  STODL    RCNORM
0917   REF   2  LAST 1279          12,2377  00031 0                   XI
0918                                12,2400  45275 0  DMPR     DSU
0919   REF   2  LAST 1281          12,2401  00033 1                   S(XI)
0920   REF   1                     12,2402  11606 1                   D1/128
0921                                12,2403  76405 1  DMP      SLIR
0922   REF   1                     12,2404  00021 1                   ROOTMU
0923                                12,2405  53605 1  DMP      SLR*
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0924   REF  16  LAST 1281   12,2406   00025 0            X
0925                        12,2407   56601 0            0 -3,2
0926                        12,2410   74271 0     DDV    VXSC
0927   REF   3  LAST 1281   12,2411   02655 0            RCNORM
0928   REF   4  LAST 1281   12,2412   02647 0            URRECT
0929                        12,2413   65372 1     VSL1   PDDL        OD=URRECT(XI S(XI)-1)X ROOTMU/RCV (+15
0930   REF   2  LAST 1281   12,2414   00035 1            XSQC(XI)    OR +13)                          PL AT 6
0931                        12,2415   56257 1     SLR*   DDV
0932                        12,2416   56602 0            0 -4,2
0933   REF   4  LAST 1282   12,2417   02655 0            RCNORM
0934                        12,2420   74221 0     BDSU   VXSC
0935   REF   1              12,2421   11622 1            D1/256
0936   REF   5  LAST 1281   12,2422   01511 0            VRECT
0937                        12,2423   42455 0     VAD    VSL8                                          PL AT 0
0938                        12,2424   77626 0     STADR
0939   REF  14  LAST 1259   12,2425   62234 0     STODL  VCV         VCV (+7 OR +5)
0940   REF  13  LAST 1281   12,2426   00037 0            T
0943   REF   5  LAST 1281   12,2427   15551 1     STODL  TC
0944   REF  17  LAST 1282   12,2430   00025 0            X
0947   REF   2  LAST 1279   12,2431   35553 1     STCALL XPREV
0949   REF   2  LAST 1281   12,2432   02270 0            KEPRTN
```

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0950                              12,2433   77776 1  DELTIME  EXIT          MPAC=XI (+6), OD=XSQ (+34 OR +32 -N1)
0951   REF   7  LAST 1190        12,2434   0 7171 1           TC      POLY
0952                              12,2435    00010 0         DEC     8
0953                              12,2436    02525 1         2DEC    .083333334
0953                              12,2437    12526 0
0954                              12,2440    67356 0         2DEC    -.266666684
0954                              12,2441    75666 0
0955                              12,2442    15001 1         2DEC    .406349155
0955                              12,2443    23771 1
0956                              12,2444    64342 0         2DEC    -.361198675
0956                              12,2445    43674 0
0957                              12,2446    06563 1         2DEC    .210153242
0957                              12,2447    04645 1
0958                              12,2450    75173 0         2DEC    -.086221951
0958                              12,2451    52672 0
0959                              12,2452    00656 1         2DEC    .026268812
0959                              12,2453    14331 0
0960                              12,2454    77633 1         2DEC    -.006163316
0960                              12,2455    40512 0
0961                              12,2456    00023 0         2DEC    .001177342
0961                              12,2457    11210 1
0962                              12,2460    77774 0         2DEC    -.000199055
0962                              12,2461    67506 0
0963   REF 231  LAST 1258         12,2462   0 6006 1           TC      INTPRET
0964   REF   3  LAST 1281        12,2463    14033 1          STODL   S(XI)
0965   REF   3  LAST 1281        12,2464    00031 0                  XI
0966                              12,2465   77776 1  EXIT
0967   REF   8  LAST 1283        12,2466   0 7171 1           TC      POLY
0968                              12,2467    00010 0         DEC     8
0969                              12,2470    01000 0         2DEC    .031250001
0969                              12,2471    00000 1
0970                              12,2472    72525 0         2DEC    -.166666719
0970                              12,2473    52506 0
0971                              12,2474    13301 1         2DEC    .355555413
0971                              12,2475    15337 1
0972                              12,2476    62776 0         2DEC    -.406347410
0972                              12,2477    54733 1
0973                              12,2500    11176 1         2DEC    .288962094
0973                              12,2501    13267 0
0974                              12,2502    73410 0         2DEC    -.140117894
0974                              12,2503    51674 0
0975                              12,2504    01446 0         2DEC    .049247387
0975                              12,2505    33641 1
0976                              12,2506    77451 1         2DEC    -.013081923
0976                              12,2507    65233 0
0977                              12,2510    00055 1         2DEC    .002806389
0977                              12,2511    37266 1
0978                              12,2512    77767 1         2DEC    -.000529414
0978                              12,2513    52336 0
0979   REF 232  LAST 1283         12,2514   0 6006 1           TC      INTPRET
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0980                          12,2515   53605 1        DMP     SRR*                                          PL AT 0
0981                          12,2516   00001 0                OD
0982                          12,2517   21574 1                0 -5,1
0983  REF   3 LAST 1282      12,2520   00035 1        STORE   XSQC(XI)      XSQC(XI) (+33 OR +31)
0984                          12,2521   72405 0        DMP     SL1
0985  REF   2 LAST 1277      12,2522   00043 0                KEPC1
0986                          12,2523   65234 1        RTB     PDDL          XCH WITH PL. OD=C1 XSQ C(XI) (+49 OR +46
0987  REF  10 LAST 1253      12,2524   45565 0                TPMODE                                        PL AT 0,3
0988                          12,2525   53605 1        DMP     SRR*
0989  REF   4 LAST 1283      12,2526   00033 1                S(XI)
0990                          12,2527   21574 1                0 -5,1
0991                          12,2530   72405 0        DMP     SL1
0992  REF   2 LAST 1277      12,2531   00045 0                KEPC2
0993                          12,2532   65234 1        RTB     PDDL          3D=C2 XSQ S(XI) (+35 OR +33)  PL AT 6
0994  REF  11 LAST 1284      12,2533   45565 0                TPMODE
0995  REF   9 LAST 1281      12,2534   00041 1                R1
0996                          12,2535   76261 0        SR      TAD                                           PL AT 3
0997                          12,2536   20607 1                6
0998                          12,2537   41301 0        NORM    DMP           TO PRESERVE SIGNIF.
0999  REF  70 LAST 1281      12,2540   00047 1                X1
1000  REF  18 LAST 1282      12,2541   00025 0                X
1001                          12,2542   76257 0        SR*     TAD           X(C2 XSQ S(XI) +R1) (+49 OR +46) PL AT 0
1002                          12,2543   20576 1                0 -3,1
1003                          12,2544   57232 0        SL4R    DMPR
1004  REF   4 LAST 1281      12,2545   00023 0                1/ROOTMU
1005  REF  14 LAST 1282      12,2546   00037 0        STORE   T
1006                          12,2547   77616 0        RVQ
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1007                          12,2550  71214 0  ITERATOR BONCLR  DLOAD
1008  REF   1                 12,2551  00614 1                   SLOPESW
1009  REF   1                 12,2552  24620 0                   FIRSTIME
1010  REF   1                 12,2553  00037 0                   DEP
1011                          12,2554  60225 1           DSU     NORM
1012  REF   2  LAST   96       12,2555  02764 0                   DEPREV
1013  REF  71  LAST 1284       12,2556  00047 1                   X1
1014                          12,2557  60325 0           PDDL    NORM
1015  REF   1                 12,2560  00015 0                   DELINDEP
1016  REF  40  LAST 1281       12,2561  00050 1                   X2
1017                          12,2562  41260 0           XSU,1   DMP
1018  REF  41  LAST 1285       12,2563  00047 1                   X2
1019  REF   3  LAST   96       12,2564  02762 0                   DELDEP
1020                          12,2565  56257 1           SLR*    DDV                                    PL UP 2
1021                          12,2566  21202 1                   1,1
1022                          12,2567  43142 1           SR1     BOFF
1023  REF   1                 12,2570  04351 1                   ORDERSW
1024  REF   1                 12,2571  24574 1                   SGNCHECK
1025                          12,2572  75246 0           ABS     SIGN      IN CASE 2ND DERIV. CHANGED SIGN, MUST
1026  REF   4  LAST 1285       12,2573  02762 0                   DELDEP    DISREGARD IT TO FIND MIN.

1027                          12,2574  51006 0  SGNCHECK PUSH    BPL       TRIAL DELINDEP                 PL DOWN 2
1028  REF   1                 12,2575  24632 0                   POSDEL
1029                          12,2576  43145 0           DLOAD   BON
1030  REF   1                 12,2577  03775 1                   INDEP
1031  REF   2  LAST 1285       12,2600  04311 0                   ORDERSW
1032  REF   1                 12,2601  24603 1                   MINCHECK
1033  REF   1                 12,2602  00017 1           STORE   MAX       IF NOT 2ND ORDER, CAN MOVE MAX BOUND IN.

1034                          12,2603  45221 1  MINCHECK BDSU    DSU
1035  REF   1                 12,2604  00011 1                   MIN
1036                          12,2605  51000 0           BOV     BPL
1037  REF   1                 12,2606  24612 1                   MODNGDEL
1038  REF   2  LAST 1285       12,2607  24612 1                   MODNGDEL
1039                          12,2610  77650 1           GOTO
1040  REF   1                 12,2611  24644 1                   DELOK

1041                          12,2612  45345 1  MODNGDEL DLOAD    DSU       TRIAL DELINDEP WOULD EXCEED MIN BOUND
1042  REF   2  LAST 1285       12,2613  00011 1                   MIN
1043  REF   2  LAST 1285       12,2614  03775 1                   INDEP
1044                          12,2615  52005 0           DMP     GOTO
1045  REF   3  LAST 1280       12,2616  11624 1                   DP9/ID
1046  REF   1                 12,2617  24646 0                   NEWDEL

1047                          12,2620  41345 0  FIRSTIME DLOAD    DMP
1048  REF   3  LAST 1285       12,2621  00011 1                   MIN
1049  REF   1                 12,2622  00051 0                   TWEEKIT   DLOAD TWEEKIT(400) SENSITIVE TO CHANGE.
1050                          12,2623  41325 0           PDDL    DMP       S2(41D) SHOULDNT CONTAIN HI ORDER ONES
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1051  REF   2  LAST 1285   12,2624   00017 1                    MAX
1052  REF   2  LAST 1285   12,2625   00051 0                    TWEEKIT
1053                        12,2626   77625 0          DSU
1054                        12,2627   52165 1          SIGN      GOTO
1055  REF   5  LAST 1285   12,2630   02762 0                    DELDEP
1056  REF   2  LAST 1285   12,2631   24574 1                    SGNCHECK

1057                        12,2632   43145 0  POSDEL  DLOAD     BON
1058  REF   3  LAST 1285   12,2633   03775 1                    INDEP
1059  REF   3  LAST 1285   12,2634   04311 0                    ORDERSW
1060  REF   1               12,2635   24637 0                    MAXCHECK
1061  REF   4  LAST 1285   12,2636   00011 1          STORE     MIN       IF NOT 2ND ORDER, CAN MOVE MIN BOUND IN.

1062                        12,2637   45221 1  MAXCHECK BDSU     DSU
1063  REF   3  LAST 1286   12,2640   00017 1                    MAX
1064                        12,2641   50000 1          BOV       BMN
1065  REF   1               12,2642   24650 1                    MODPSDEL
1066  REF   2  LAST 1286   12,2643   24650 1                    MODPSDEL
1067                        12,2644   77745 1  DELOK   DLOAD
1068                        12,2645   00001 0                    OD
1069  REF   2  LAST 1285   12,2646   00015 0  NEWDEL  STORE     DELINDEP
1070                        12,2647   77616 0          RVQ

1071                        12,2650   45345 1  MODPSDEL DLOAD    DSU
1072  REF   4  LAST 1286   12,2651   00017 1                    MAX
1073  REF   4  LAST 1286   12,2652   03775 1                    INDEP
1074                        12,2653   52005 0          DMP       GOTO
1075  REF   4  LAST 1285   12,2654   11624 1                    DP9/10
1076  REF   2  LAST 1285   12,2655   24646 0                    NEWDEL

1077  REF 155  LAST 1230   12,2656   4 5017 0 CHECKCTR CS       ONE
1078  REF  36  LAST 1213   12,2657   50 120 1           INDEX   FIXLOC
1079  REF   2  LAST 1277   12,2660   6 0026 0           AD      ITERCTR
1080  REF  37  LAST 1286   12,2661   50 120 1           INDEX   FIXLOC
1081  REF   3  LAST 1286   12,2662   54 026 1           TS      ITERCTR
1082  REF 649  LAST 1254   12,2663   54 154 0           TS      MPAC
1083  REF  62  LAST 1199   12,2664   0 6030 1           TC      DANZIG
```

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1084                          12,2665   44545 0 NEWSTATE DLOAD   SR4R
1085  REF  10  LAST 1284     12,2666   00041 1                  R1
1089                          12,2667   74225 1          DSU     VXSC
1090  REF   4  LAST 1284     12,2670   00035 1                  XSQC(XI)
1091  REF   3  LAST 1277     12,2671   02724 1                  UR1
1092                          12,2672   65372 1          VSL1    PDDL          OD=(R1-XSQC(XI))UR1 (+33 OR 31) PL AT 6
1093  REF  19  LAST 1284     12,2673   00025 0                  X
1094                          12,2674   60316 0          DSQ     NORM
1095  REF  72  LAST 1285     12,2675   00047 1                  X1
1096                          12,2676   57275 0          DMPR    DMPR
1097  REF   5  LAST 1284     12,2677   00023 0                  1/RODTMU
1098  REF  20  LAST 1287     12,2700   00025 0                  X
1099                          12,2701   53605 1          DMP     SRR*
1100  REF   5  LAST 1284     12,2702   00033 1                  S(XI)
1101                          12,2703   21572 1                  0 -7,1
1102                          12,2704   77621 1          BDSU
1103  REF  15  LAST 1284     12,2705   00037 0                  T
1104                          12,2706   74352 0          SL1     VXSC
1105  REF  17  LAST  910     12,2707   02746 0                  VVEC
1106                          12,2710   53372 1          VSL1    VAD                                   PL AT 0
1107                          12,2711   41512 1          VSL4    PUSH
1108                          12,2712   77646 0          ABVAL
1109                          12,2713   77701 1 LAMENTER NORM
1110  REF  73  LAST 1287     12,2714   00047 1                  X1
1111  REF   1                 12,2715   16722 1          STODL   R2
1112  REF   4  LAST 1283     12,2716   00031 0                  XI
1113                          12,2717   45205 1          DMP     DSU
1114  REF   6  LAST 1287     12,2720   00033 1                  S(XI)
1115  REF   2  LAST 1281     12,2721   11606 1                  D1/128
1116                          12,2722   76405 1          DMP     SLIR
1117  REF   2  LAST 1281     12,2723   00021 1                  RODTMU
1118                          12,2724   53605 1          DMP     SLR*
1119  REF  21  LAST 1287     12,2725   00025 0                  X
1120                          12,2726   21176 1                  0 -3,1
1121                          12,2727   74271 0          DDV     VXSC
1122  REF   2  LAST 1287     12,2730   02722 1                  R2
1123  REF   4  LAST 1287     12,2731   02724 1                  UR1
1124                          12,2732   65372 1          VSL1    PDDL          60=V2VEC PART (+15 OR 13)       PL AT 12
1125  REF   5  LAST 1287     12,2733   00035 1                  XSQC(XI)
1126                          12,2734   56257 1          SLR*    DDV
1127                          12,2735   21175 1                  0 -4,1
1128  REF   3  LAST 1287     12,2736   02722 1                  R2
1129                          12,2737   77621 1          BDSU
1130  REF   2  LAST 1282     12,2740   11622 1                  D1/256
1131                          12,2741   53361 0          VXSC    VAD                                   PL AT 6
1132  REF  18  LAST 1287     12,2742   02746 0                  VVEC
1133                          12,2743   43412 1          VSL8    RVQ
R1134
```

L CONIC SUBROUTINES

```
1135   REF   1                04,2000                    SETLOC CONICS1
1136                          04,3602                    BANK

1137   REF   1                                           COUNT  04/CONIC
R1138  DO NOT DISTURB THE ORDER OF THESE CDS, OVERLAYS HAVE BEEN MADE.
1139                          04,3602   00000 1  BEE17   DEC    0              KEEP WITH D1/8 2DEC 1.0B-17 (0000004000)
1140                          04,3603   04000 0  D1/8     2DEC   1.0 B-3
1140                          04,3604   00000 1
1141                          04,3605   00200 0  D1/128   2DEC   1.0 B-7
1141                          04,3606   00000 1
1142                          04,3607   00400 0  D1/64    2DEC   1.0 B-6
1142                          04,3610   00000 1
1143                          04,3611   10000 0  D1/4     2DEC   1.0 B-2
1143                          04,3612   00000 1
1144                          04,3613   02000 0  D1/16    2DEC   1.0 B-4
1144                          04,3614   00000 1
1145                          04,3615   01000 0  D1/32    2DEC   1.0 B-5
1145                          04,3616   00000 1
1146                          04,3617   00020 0  D1/1024  2DEC   1.0 B-10
1146                          04,3620   00000 1
1147                          04,3621   00100 0  D1/256   2DEC   1.0 B-8
1147                          04,3622   00000 1
1148                          04,3623   34631 1  DP9/10   2DEC   .9
1148                          04,3624   23146 0
1149   REF   5  LAST  725     04,3565              KEPZERO  EQUALS L06ZEROS
1150                          04,3625   77467 1  -50SC    2DEC   -50.0 B-12
1150                          04,3626   77777 0
1151                          04,3627   03110 1  2PISC    2DEC   6.28318530 B-6
1151                          04,3630   17665 1
1152   REF   2  LAST  559     04,3614              BEE19    EQUALS D1/32 -1        2DEC 1.0 B-19 (00000 01000)
1153   REF   3  LAST 1287     04,3620              BEE22    EQUALS D1/256 -1       2DEC 1.0 B-22 (00000 00100)
1154                          04,3631   00000 1  ONEBIT   2DEC   1.0 B-28
1154                          04,3632   00001 0
1155                          04,3633   37767 0  COGUPLIM 2DEC   .999511597
1155                          04,3634   37737 0
1156                          04,3635   40010 1  COGLOLIM 2DEC   -.999511597
1156                          04,3636   40040 1
R1157
```

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1158  REF   2 LAST 1276   12,2000                    SETLOC CONICS
1159                      12,2744                    BANK

1160  REF   2 LAST 1277 TO 1288:   450   450*        COUNT  12/CONIC

1161                      12,2744   40220 0 TIMETHET STQ    SETPD                                    PL AT 0
1162  REF   1             12,2745   02712 1                 RTNTT
1163                      12,2746   00001 0                 0
11635                     12,2747   77600 1           BOV
11636                     12,2750   24751 1                 +1
1164                      12,2751   63375 0           VLOAD PDVL          SETUP FOR PARAM CALL         PL AT 6
1165  REF  13  LAST  910  12,2752   02657 1                 RVEC
1166  REF  19  LAST 1287  12,2753   02746 0                 VVEC
1167                      12,2754   77624 1           CALL
1168  REF   2  LAST  908  12,2755   11637 0                 PARAM
1169                      12,2756   45000 0           BOV   CALL                                     PL AT 0
1170  REF   1             12,2757   24776 1                 COGAOVFL
1171  REF   1             12,2760   25001 1                 GETX
1172                      12,2761   43145 0 COMMNOUT DLOAD  BON
1173  REF   5 LAST 1287   12,2762   00031 0                 XI
1174  REF   1             12,2763   04310 1                 INFINFLG
1175  REF   1             12,2764   25751 0                 ABTCONIC
1176                      12,2765   45014 0           CLEAR CALL
1177  REF   1             12,2766   04273 0                 COGAFLAG
1178  REF   2 LAST 1279   12,2767   24433 0                 DELTIME
1179                      12,2770   45014 0           BON   CALL
1180  REF  10  LAST  910  12,2771   03706 0                 RVSW
1181  REF   2 LAST 1289   12,2772   02712 1                 RTNTT
1182  REF   1             12,2773   24665 1                 NEWSTATE
1183                      12,2774   77650 1           GOTO
1184  REF   3 LAST 1289   12,2775   02712 1                 RTNTT


1185                      12,2776   77614 1 COGAOVFL SETGO
1186  REF   2 LAST 1289   12,2777   04033 0                 COGAFLAG
1187  REF   2 LAST 1289   12,3000   25751 0                 ABTCONIC
11872                     04,3637                    BANK   4
11874 REF   2 LAST 1288   04,2000                    SETLOC CONICS1
11876                     04,3637                    BANK
11878 REF   2 LAST 1288 TO 1289:    29    29*        COUNT* $$/CONIC
1188                      04,3637   43020 1 PARAM    STQ    CLEAR         MPAC=V1VEC, OD=R1VEC         PL AT 6
1189  REF   2  LAST   96  04,3640   02755 1                 RTNPRM
1190  REF   7  LAST  898  04,3641   03665 1                 NORMSW
11901                     04,3642   77614 1           CLEAR
11902 REF   3  LAST 1289  04,3643   04273 0                 COGAFLAG
1191                      04,3644   45131 0           SSP   CALL
1192  REF   3  LAST  489  04,3645   02675 1                 GEOMSGN
1193                      04,3646   27777 0                 37777         GAMMA ALWAYS LESS THAN 180DEG
1194  REF   1             04,3647   11702 1                 GEOM          MPAC=SNGA (+1), OD=CSGA (+1) PL AT 2
1195                      04,3650   14045 0           STODL 36D           36D=SIN GAMMA (+1)           PL AT 0
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1196                                04,3651  56261 1        SR      DDV
1197                                04,3652  20606 0                5

1198                                04,3653  00045 0                36D
1199  REF   4  LAST  908            04,3654  33775 1        STOVL*  COGA
1200  REF   6  LAST 1277            04,3655  11740 1                MUTABLE,1
1201  REF   2  LAST 1277            04,3656  14017 1        STODL   1/MU
1202  REF   3  LAST   96            04,3657  02722 1                MAGVEC2
1203                                04,3660  60316 0        DSQ     NORM
1204  REF  74  LAST 1287            04,3661  00047 1                X1
1205                                04,3662  41275 1        DMPR    DMP
1206  REF   3  LAST 1290            04,3663  00017 1                1/MU
1207  REF  11  LAST 1287            04,3664  00041 1                R1
1208                                04,3665  77657 0        SRR*
1209                                04,3666  21576 0                0 -3,1
1210                                04,3667  44206 0        PUSH    BDSU            OD=R1 VISQ/MU (+6)          PL AT 2
1211  REF   3  LAST 1288            04,3670  11616 0                D1/32
1212  REF   4  LAST  908            04,3671  16744 1        STODL   R1A             R1A (+6)                    PL AT 0

1213                                04,3672  60205 0        DMP     NORM
1214                                04,3673  00045 0                36D
1215  REF  75  LAST 1290            04,3674  00047 1                X1
1216                                04,3675  53605 1        DMP     SR*
1217                                04,3676  00045 0                36D
1218                                04,3677  20575 1                0 -4,1
1219  REF   5  LAST  908            04,3700  36742 0        STCALL  P                       P (+4)
1221  REF   3  LAST 1289            04,3701  02755 1                RTNPRM
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1225                          04,3702  77656 1  GEOM      UNIT                MPAC=V2VEC, OD=R1VEC                PL AT 6
1226  REF   2  LAST   96      04,3703  16714 1            STODL   U2          U2 (+1)
1227                          04,3704  00045 0                    36D
1228  REF   4  LAST 1290      04,3705  26722 1            STOVL   MAGVEC2                                         PL AT 0
1229                          04,3706  77656 1            UNIT
1230  REF   5  LAST 1287      04,3707  02724 1            STORE   UR1         UR1 (+1)
1231                          04,3710  72441 0            DOT     SL1
1232  REF   3  LAST 1291      04,3711  02714 1                    U2
1233                          04,3712  77725 1            PDDL                OD=CSTH (+1)                        PL AT 2
1234                          04,3713  00045 0                    36D
1235  REF  12  LAST 1290      04,3714  24041 1            STOVL   R1          R1 (+29 OR +27)
1236  REF   6  LAST 1291      04,3715  02724 1                    UR1
1237                          04,3716  76435 1            VXV     VSL1
1238  REF   4  LAST 1291      04,3717  02714 1                    U2
1239                          04,3720  75214 1            BON     SIGN
1240  REF   8  LAST 1289      04,3721  03705 0                    NORMSW
1241  REF   1                  04,3722  11734 1                    HAVENORM
1242  REF   4  LAST 1289      04,3723  02675 1                    GEOMSGN
1243                          04,3724  40056 0            UNIT    BOV
1244  REF   1                  04,3725  11732 1                    COLINEAR
1245  REF   4  LAST  488      04,3726  16676 1  UNITNORM  STODL   UN          UN (+1)
1246                          04,3727  00045 0                    36D
1247                          04,3730  43565 0            SIGN    RVQ         MPAC=SNTH (+1), 34D=SNTH.SNTH (+2)
1248  REF   5  LAST 1291      04,3731  02675 1                    GEOMSGN

1249                          04,3732  52162 0  COLINEAR  VSR1    GOTO
1250  REF   1                  04,3733  11726 1                    UNITNORM

1251                          04,3734  75246 0  HAVENORM  ABVAL   SIGN
1252  REF   6  LAST 1291      04,3735  02675 1                    GEOMSGN
1253                          04,3736  77616 0            RVQ                 MPAC=SNTH (+1), 34D=SNTH.SNTH (+2)
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```
1254                                12,3001                BANK    12
1255  REF   3  LAST 1289           12,2000                SETLOC  CONICS
1256                                12,3001                BANK

12565 REF   3 LAST 1289 TO 1289:    29   479*             COUNT   12/CONIC

1257                                12,3001  56374 1 GETX  AXT,2   S5P          ASSUMES P (+4) IN MPAC
1258                                12,3002  00003 1               3
1259  REF  26  LAST 1258           12,3003  00052 0               S2
1260                                12,3004  00001 0               1
1261                                12,3005  77614 1       CLEAR
1262  REF   1                      12,3006  04276 0               360SW
1263                                12,3007  65366 1       SQRT    PDDL         OD=SQRT(P)                    PL AT 2
1264  REF   9  LAST  897           12,3010  02734 0               CSTH
1265                                12,3011  44342 1       SR1     BDSU
1266  REF   2  LAST   34           12,3012  11612 1               D1/4
1267                                12,3013  54325 1       PDDL    SRR                                        PL AT 4D
1268  REF  11  LAST  897           12,3014  02732 0               SNTH
1269                                12,3015  21607 0               6
1270                                12,3016  77671 1       DDV                                              PL AT 2
1271                                12,3017  77600 1       BDV
1272  REF   1                      12,3020  25134 0               360CHECK
1273                                12,3021  41225 1       DSU     DMP
1274  REF   5  LAST 1290           12,3022  03775 1               COGA                                       PL AT 0
1275                                12,3023  40132 0       SL2R    BDV
1276  REF   2  LAST 1292           12,3024  25134 0               360CHECK
1277                                12,3025  63406 0 WLOOP PUSH    DSQ          OD=W (+5)                     PL AT 2
1278                                12,3026  65351 0       TLOAD   PDDL         2D=WSQ (+10)                  PL AT 5
1279  REF 650  LAST 1286           12,3027  00155 0               MPAC
1280  REF   5  LAST 1290           12,3030  02744 1               RTA
1281                                12,3031  76202 0       SR4     TAD                                        PL AT 2
1282                                12,3032  75440 0       BMN     SQRT
1283  REF   1                      12,3033  25217 1               INFINITY
1284                                12,3034  43306 0       ROUND   DAD                                        PL AT 0D
1285                                12,3035  61000 0       BOV     TIX,2
1286  REF   1                      12,3036  25132 0               RESETX2
1287  REF   1                      12,3037  25025 1               WLOOP


1288                                12,3040  40065 0       BDDV    BOV
1289  REF   3  LAST 1287           12,3041  11606 1               D1/128
1290  REF   2  LAST 1292           12,3042  25217 1               INFINITY
1291                                12,3043  41440 1 POLYCOEF BMN  PUSH         OD=1/W (+2) OR 16/W (+6)      PL AT 2
1292  REF   3  LAST 1292           12,3044  25217 1               INFINITY
1293                                12,3045  77716 1       DSQ
1294                                12,3046  41301 0       NORM    DMP
1295  REF  76  LAST 1290           12,3047  00047 1               X1
1296  REF   6  LAST 1292           12,3050  02744 1               RTA
1297                                12,3051  77457 1       SRR*    EXIT
1298                                12,3052  21567 0               0 -100,1
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1299	REF 9 LAST 1283	12,3053	0 7171 1			TC	POLY	
1300		12,3054	00005 1			DEC	5	
1301		12,3055	20000 0			2DEC	.5	
1301		12,3056	00000 1					
1302		12,3057	72525 0			2DEC	-.166666770	
1302		12,3060	52471 1					
1303		12,3061	03146 1			2DEC	.100000392	
1303		12,3062	15003 0					
1304		12,3063	75556 0			2DEC	-.071401086	
1304		12,3064	45210 0					
1305		12,3065	01615 1			2DEC	.055503292	
1305		12,3066	13553 0					
1306		12,3067	76371 0			2DEC	-.047264098	
1306		12,3070	63777 0					
1307		12,3071	01232 0			2DEC	.040694204	
1307		12,3072	27367 0					
1308	REF 233 LAST 1283	12,3073	0 6006 1			TC	INTPRET	
1309		12,3074	76405 1			DMP	SL1R	PL AT OD
1310		12,3075	43006 0			PUSH	BON	
1311	REF 2 LAST 1292	12,3076	04316 1				360SW	
1312	REF 1	12,3077	25204 0				TRUE360X	
1313		12,3100	60316 0		XCOMMON	DSQ	NORM	
1314	REF 77 LAST 1292	12,3101	00047 1				X1	
1315		12,3102	53605 1			DMP	SRR*	
1316	REF 7 LAST 1292	12,3103	02744 1				R1A	
1317		12,3104	21565 1				0 -120,1	
1318	REF 6 LAST 1289	12,3105	14031 0		STODL	X1		X1 (+6)
1319	REF 13 LAST 1291	12,3106	00041 1				R1	
1320		12,3107	75542 0		SR1	SQRT		
1321		12,3110	41306 1		ROUND	DMP		
1322		12,3111	77632 0		SL4R			PL AT 0
1323	REF 22 LAST 1287	12,3112	00025 0		STORE	X		X (+17 OR +16)
1324		12,3113	60316 0		DSQ	NORM		
1325	REF 78 LAST 1293	12,3114	00047 1				X1	
1326		12,3115	41325 0		PDDL	DMP		OD=XSQ (+34 OR +32 -N1) PL AT 2
1327	REF 6 LAST 1290	12,3116	02742 1				P	
1328	REF 14 LAST 1293	12,3117	00041 1				R1	
1329		12,3120	75452 0		SL3	SQRT		
1330		12,3121	56405 0		DMP	SL3R		
1331	REF 6 LAST 1292	12,3122	03775 1				COGA	
1332	REF 3 LAST 1284	12,3123	14043 0		STODL	KEPC1		
1333	REF 8 LAST 1293	12,3124	02744 1				R1A	
1334		12,3125	43021 0		BOSU	CLEAR		
1335	REF 3 LAST 1277	12,3126	11610 0				DI764	
1336	REF 2 LAST 1289	12,3127	04270 0				INFINFLG	
1337	REF 3 LAST 1284	12,3130	00045 0		STORE	KEPC2		

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1338                        12,3131  77616 0          RVQ

1339                        12,3132  77774 0 RESETX2  AXT,2
1340                        12,3133  00003 1          3

1341                        12,3134  51001 1 360CHECK SETPD  BPL
1342                        12,3135  00001 0                 OD
1343  REF   1               12,3136  25141 1                 INVRSEQN
1344                        12,3137  77614 1          SET
1345  REF   3  LAST 1293    12,3140  04076 1                 360SW

1346                        12,3141  75545 1 INVRSEQN DLOAD  SQRT
1347  REF   7  LAST 1293    12,3142  02742 1                 P
1348                        12,3143  41325 0          PDDL   DMP          OD=SQRT(P)  (+2)          PL AT 2
1349  REF  12  LAST 1292    12,3144  02732 0                 SNTH
1350  REF   7  LAST 1293    12,3145  03775 1                 COGA
1351                        12,3146  65352 0          SL1    PDDL         2D=SNTH COGA (+5)         PL AT 4
1352  REF  10  LAST 1292    12,3147  02734 0                 CSTH
1353                        12,3150  43202 0          SR4    DAD
1354  REF   4  LAST 1290    12,3151  11616 0                 D1/32
1355                        12,3152  41225 1          DSU    DMP                                   PL AT 2,0
1356                        12,3153  55301 0          NORM   BDDV
1357  REF  79  LAST 1293    12,3154  00047 1                 X1
1358  REF  13  LAST 1294    12,3155  02732 0                 SNTH
1359                        12,3156  51457 0          SLR*   ABS          NOTE: NEAR 360 CASE TREATED DIFFERENTLY
1360                        12,3157  21174 0                 0 -5,1
1361                        12,3160  63406 0          PUSH   DSQ          OD=1/W (-1)               PL AT 2
1362                        12,3161  14043 0          STODL  34D
1363  REF   1               12,3162  11614 1                 D1/16
1364                        12,3163  63406 0 1/WLOOP  PUSH   DSQ          2D=G (+4)                    PL AT 4
1365                        12,3164  65234 1          RTB    PDDL                                  PL AT 7
1366  REF  12  LAST 1284    12,3165  45565 0                 TPMODE
1367  REF   9  LAST 1293    12,3166  02744 1                 R1A
1368                        12,3167  40405 1          DMP    SR4
1369                        12,3170  00043 0                 34D
1370                        12,3171  77771 0          TAD                                           PL AT 4
1371                        12,3172  75440 0          BMN    SQRT
1372  REF   4  LAST 1292    12,3173  25217 1                 INFINITY
1373                        12,3174  77615 0          DAD                                           PL AT 2
1374                        12,3175  60304 0          TIX,2  NORM
1375  REF   1               12,3176  25163 1                 1/WLOOP
1376  REF  80  LAST 1294    12,3177  00047 1                 X1
1377                        12,3200  77665 1          BDDV                                          PL AT 0
1378                        12,3201  52057 1          SLR*   GOTO
1379                        12,3202  21172 0                 0 -7,1
1380  REF   1               12,3203  25043 1                 POLYCOEF
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1381                          12,3204  50145 1  TRUE360X DLOAD   BMN
1382  REF  10  LAST 1294     12,3205  02744 1                    R1A
1383  REF   5  LAST 1294     12,3206  25217 1                    INFINITY
1384                          12,3207  60366 1           SQRT     NORM
1385  REF  81  LAST 1294     12,3210  00047 1                    X1
1386                          12,3211  53665 1           BDDV     SL*
1387  REF   5  LAST 1278     12,3212  11630 1                    2PISC
1388                          12,3213  20176 0                    0 -3,1
1389                          12,3214  41425 1           DSU      PUSH          OD=2PI/SQRT(R1A) -X          PL AT 0,2
1390                          12,3215  77650 1           GOTO
1391  REF   1                 12,3216  25100 1                    XCOMMON
1392                          12,3217  40001 1  INFINITY SETPD    BOV           NO SOLUTION EXISTS SINCE CLOSURE THROUGH
1393                          12,3220  00001 0                    0             INFINITY IS REQUIRED
1394  REF   1                 12,3221  25222 1                    OVFLCLR
1395                          12,3222  43414 1  OVFLCLR  SET      RVQ
1396  REF   3  LAST 1293     12,3223  04070 1                    INFINFLG
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1397                                12,3224  40220 0  LAMBERT  STQ     SETPD
1398  REF   5  LAST   96            12,3225  02712 1           RTNLAMB
1399                                12,3226  00001 0           OD
13995                               12,3227  77600 1           BOV
13996                               12,3230  25231 0           +1
1400                                12,3231  76731 0           SSP     VLOAD*
1401  REF   4  LAST 1286            12,3232  00027 1           ITERCTR
1402                                12,3233  00024 1           20D
1403  REF   7  LAST 1290            12,3234  11740 1           MUTABLE,1
1404  REF   4  LAST 1290            12,3235  14017 1           STODL   1/MU
1405  REF   3  LAST  488            12,3236  02673 1           TDESIRED
1406                                12,3237  77675 0           DMPR
1407  REF   1                       12,3240  11615 0           BEE19
1408  REF   1                       12,3241  03777 0           STORE   EPSILONL
1409                                12,3242  77214 0           SET     VLOAD
1410  REF   2  LAST 1285            12,3243  00474 0           SLOPESW
1411  REF   6  LAST  489            12,3244  02657 1           R1VEC
1412                                12,3245  45115 0           PDVL    CALL            OD=R1VEC (+29 OR +27)          PL AT 6
1413  REF  10  LAST  490            12,3246  02665 0           R2VEC   MPAC=R2VEC (+29 OR +27)
1414  REF   2  LAST 1289            12,3247  11702 1           GEOM
1415  REF  14  LAST 1294            12,3250  16732 0           STODL   SNTH            OD=CSTH (+1)                   PL AT 2
1416  REF   5  LAST 1291            12,3251  02722 1           MAGVEC2
1417                                12,3252  65301 0           NORM    PDDL                                           PL AT 4
1418  REF  82  LAST 1295            12,3253  00047 1           X1
1419  REF  15  LAST 1293            12,3254  00041 1           R1
1420                                12,3255  56342 1           SR1     DDV                                            PL AT 2
1421                                12,3256  65257 1           SL*     PDDL            DXCH WITH OD, OD=R1/R2 (+7)    PL AT 0,2
1422                                12,3257  20173 0           0 -6,1
1423                                12,3260  77626 0           STADR
1424  REF  11  LAST 1294            12,3261  75043 1           STORE   CSTH            CSTH (+1)
1425                                12,3262  44342 1           SR1     BDSU
1426  REF   3  LAST 1292            12,3263  11612 1           D1/4
1427  REF   2  LAST   96            12,3264  02736 1           STORE   1-CSTH          1-CSTH (+2)

1428                                12,3265  53106 0           ROUND   BZE
1429  REF   1                       12,3266  25473 0           360LAMB
1430                                12,3267  65301 0           NORM    PDDL                                           PL AT 4
1431  REF  83  LAST 1296            12,3270  00047 1           X1
1432                                12,3271  00001 0           OD
1433                                12,3272  56342 1           SR1     DDV                                            PL AT 2
1434                                12,3273  75457 0           SL*     SQRT
1435                                12,3274  20176 0           0 -3,1
1436                                12,3275  54325 1           PDDL    SR              2D=SQRT(2R1/R2(1-CSTH)) (+5)   PL AT 4
1437  REF  15  LAST 1296            12,3276  02732 0           SNTH
1438                                12,3277  20607 1           6
1439                                12,3300  43271 1           DDV     DAD                                            PL AT 2
1440  REF   3  LAST 1296            12,3301  02736 1           1-CSTH
14401                               12,3302  77626 0           STADR
14402 REF   1                       12,3303  77760 0           STORE   COGAMAX
1441                                12,3304  50000 1           BOV     BMN             IF OVFL, COGAMAX=COGUPLIM
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1442   REF   1                 12,3305   25312 0                    UPLIM     IF NEG, USE EVEN IF LT COGLOLIM, SINCE
14421  REF   1                 12,3306   25315 1                    MAXCOGA     THIS WOULD BE RESET IN LAMBLOOP
14422                          12,3307   50025 0            DSU     BMN       IF COGAMAX GT COGUPLIM, COGAMAX=COGUPLIM
14423  REF   1                 12,3310   11634 0                    COGUPLIM
14424  REF   2  LAST 1297     12,3311   25315 1                    MAXCOGA   OTHERWISE OK, SO GO TO MAXCOGA
14425                          12,3312   77745 1  UPLIM     DLOAD
14426  REF   2  LAST 1297     12,3313   11634 0                    COGUPLIM  COGUPLIM=.999511597 = MAX VALUE OF COGA
14427  REF   2  LAST 1296     12,3314   00017 1            STORE   COGAMAX     NOT CAUSING OVFL IN RIA CALCULATION
1443                           12,3315   77745 1  MAXCOGA   DLOAD
1444   REF  12  LAST 1296     12,3316   02734 0                    CSTH
1445                           12,3317   45261 0            SR      DSU                                    PL AT 0
1446                           12,3320   20607 1                    6
1447                           12,3321   77626 0            STADR
1448   REF   2  LAST   96     12,3322   61037 1            STODL   CSTH-RHO
1449   REF   7  LAST 1291     12,3323   02675 1                    GEOMSGN
1450                           12,3324   71240 1            BMN     DLOAD
1451   REF   1                 12,3325   25512 0                    LOLIM
1452   REF   3  LAST 1297     12,3326   02740 0                    CSTH-RHO
1453                           12,3327   56352 0            SL1     DDV
1454   REF  16  LAST 1296     12,3330   02732 0                    SNTH
1455                           12,3331   77600 1            BOV
1456   REF   2  LAST 1297     12,3332   25512 0                    LOLIM
1457   REF   1                 12,3333   00011 1  MINCOGA   STORE   COGAMIN    COGAMIN (+5)
1458                           12,3334   66214 0            BDN     SSP
1459   REF   4  LAST  723     12,3335   00715 1                    GUESSW
1460   REF   1                 12,3336   25477 1                    NOGUESS
1461   REF   3  LAST 1286     12,3337   00051 0                    TWEEKIT
1462                           12,3340   00001 0                    00001
1463                           12,3341   77745 1            DLOAD
1464   REF   8  LAST 1294     12,3342   03775 1                    COGA


1465                           12,3343   77605 1  LAMBLOOP  DMP
1466   REF  17  LAST 1297     12,3344   02732 0                    SNTH
1467                           12,3345   45342 0            SR1     DSU
1468   REF   4  LAST 1297     12,3346   02740 0                    CSTH-RHO
1469                           12,3347   65301 0            NORM    PDDL      OD=SNTH COGA-(CSTH-RHO) (+7+C(X1)) PL=2
1470   REF  84  LAST 1295     12,3350   00047 1                    X1
1471   REF   4  LAST 1296     12,3351   02736 1                    1-CSTH
1472                           12,3352   56257 1            SL*     DDV       1-CSTH  (+2)                   PL AT 0
1473                           12,3353   20170 0                    0 -9D,1
1474                           12,3354   53040 0            BMN     BZE
1475   REF   1                 12,3355   25431 0                    NEGP
1476   REF   2  LAST 1297     12,3356   25431 0                    NEGP
1477   REF   8  LAST 1294     12,3357   16742 1            STODL   P         P=(1-CSTH)/(SNTH COGA-(CSTH-RHO))  (+4)
1478   REF   9  LAST 1297     12,3360   03775 1                    COGA
1479                           12,3361   43316 1            DSQ     DAD
1480   REF   1                 12,3362   11620 0                    D1/1024
1481                           12,3363   41301 0            NORM    DMP
1482   REF  85  LAST 1297     12,3364   00047 1                    X1
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1483  REF   9  LAST 1297   12,3365  02742 1                 P
1484                       12,3366  44257 1          SR*    BDSU
1485                       12,3367  20571 0                 0 -BD,1
1486  REF   5  LAST 1294   12,3370  11616 0                 D1/32
1487  REF  11  LAST 1295   12,3371  16744 1          STODL  R1A             R1A=2-P(1+COGA COGA) (+6)

1488  REF  10  LAST 1298   12,3372  02742 1                 P
1489                       12,3373  45000 0          BOV    CALL
1490  REF   1              12,3374  25434 0                 HIENERGY
1491  REF   2  LAST 1289   12,3375  25001 1                 GETX
1492                       12,3376  77745 1          DLOAD
1493  REF  16  LAST 1287   12,3377  00037 0                 T
1494  REF   1              12,3400  16764 0          STODL  TPREV
1495  REF   7  LAST 1293   12,3401  00031 0                 XI
1496                       12,3402  45014 0          BON    CALL
1497  REF   4  LAST 1295   12,3403  04310 1                 INFINFLG
1498  REF   3  LAST 1297   12,3404  25431 0                 NEGP           HAVE EXCEEDED THEORETICAL BOUNDS
1499  REF   3  LAST 1289   12,3405  24433 0                 DELTIME
1500                       12,3406  44200 0          BOV    BDSU
1501  REF   1              12,3407  25450 1                 BIGTIME
1502  REF   4  LAST 1296   12,3410  02673 1                 TDESIRED
1503  REF   1              12,3411  02762 0          STORE  TERRLAMB
1504                       12,3412  44246 1          ABS    BDSU
1505  REF   2  LAST 1296   12,3413  03777 0                 EPSILONL
1506                       12,3414  47044 1          BPL    RTB
1507  REF   1              12,3415  25515 1                 INITV
1508  REF   2  LAST 1280   12,3416  24656 1                 CHECKCTR
1509                       12,3417  45030 0          BHIZ   CALL
1510  REF   1              12,3420  25460 1                 SUFFCHEK
1511  REF   1              12,3421  24550 1                 ITERATOR
1512                       12,3422  53145 1          DLOAD  BZE
1513  REF 651  LAST 1292   12,3423  00155 0                 MPAC
1514  REF   2  LAST 1298   12,3424  25460 1                 SUFFCHEK
1515                       12,3425  77615 0          DAD
1516  REF  10  LAST 1297   12,3426  03775 1                 COGA
1517  REF  11  LAST 1298   12,3427  37775 0          STCALL COGA
1519  REF   1              12,3430  25343 1                 LAMBLOOP

1520                       12,3431  51145 0 NEGP     DLOAD  BPL             IMPOSSIBLE TRAJECTORY DUE TO INACCURATE
1521  REF   1              12,3432  00015 0                 DCOGA          BOUND CALCULATION. TRY NEW COGA.
1522  REF   1              12,3433  25453 1                 LOENERGY

1523                       12,3434  71201 1 HIENERGY SETPD  DLOAD          HIGH ENERGY TRAJECTORY RESULTED
1524                       12,3435  00001 0                 0
1525  REF  12  LAST 1298   12,3436  03775 1                 COGA           IN OVFL OF P OR R1A, OR XI EXCEEDING 50.
1526  REF   2  LAST 1297   12,3437  00011 1          STORE  COGAMIN        THIS IS THE NEW BOUND.
1527                       12,3440  70545 1 COMMONLM DLOAD  SR1
1528  REF   2  LAST 1298   12,3441  00015 0                 DCOGA
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1529   REF   3  LAST 1298   12,3442   00015 0          STORE  DCOGA      USE DCOGA/2 AS DECREMENT
1530                        12,3443   44254 1          BZE    BDSU
15301  REF   3  LAST 1298   12,3444   25460 1                 SUFFCHEK
1531   REF  13  LAST 1298   12,3445   03775 1                 COGA
1532   REF  14  LAST 1299   12,3446   37775 0          STCALL COGA
1534   REF   2  LAST 1298   12,3447   25343 1                 LAMBLOOP

1535                        12,3450   77745 1  BIGTIME DLOAD
1536   REF   2  LAST 1298   12,3451   02764 0                 TPREV
1537   REF  17  LAST 1298   12,3452   00037 0          STORE  T

1538                        12,3453   71201 1  LOENERGY SETPD  DLOAD      LOW ENERGY TRAJECTORY RESULTED
1539                        12,3454   00001 0                 0
1540   REF  15  LAST 1299   12,3455   03775 1                 COGA        IN OVERFLOW OF TIME.
1541   REF   3  LAST 1297   12,3456   34017 0          STCALL COGAMAX     THIS IS THE NEW BOUND.
1543   REF   1              12,3457   25440 0                 COMMONLM

1544                        12,3460   51545 1  SUFFCHEK DLOAD  ABS
1545   REF   2  LAST 1298   12,3461   02762 0                 TERRLAMB
1546                        12,3462   41325 0          PDDL   DMP                                  PL AT 2D
1547   REF   5  LAST 1298   12,3463   02673 1                 TDESIRED
1548   REF   4  LAST 1296   12,3464   11612 1                 D174
1549                        12,3465   45215 0          DAD    DSU                                  PL AT OD
1550   REF   1              12,3466   11632 0                 ONEBIT
1551                        12,3467   43044 0          BPL    SETGO
1552   REF   2  LAST 1298   12,3470   25515 1                 INITV
1553   REF   1              12,3471   02434 0                 SOLNSW
1554   REF   6  LAST 1296   12,3472   02712 1                 RTNLAMB

1555                        12,3473   43001 1  360LAMB SETPD  SETGO      LAMBERT CANNOT HANDLE CSTH=1
1556                        12,3474   00001 0                 0
1557   REF   2  LAST 1299   12,3475   02434 0                 SOLNSW
1558   REF   7  LAST 1299   12,3476   02712 1                 RTNLAMB

1559                        12,3477   71331 0  NOGUESS SSP    DLOAD
1560   REF   4  LAST 1297   12,3500   00051 0                 TWEEKIT
1561                        12,3501   10000 0                 20000
1562   REF   3  LAST 1298   12,3502   00011 1                 COGAMIN
1563                        12,3503   65342 1          SR1    PDDL                                 PL AT 2
1564   REF   4  LAST 1299   12,3504   00017 1                 COGAMAX
1565                        12,3505   43342 0          SR1    DAD
1566                        12,3506   77626 0          STADR                                       PL AT 0
1567   REF  16  LAST 1299   12,3507   74002 0          STORE  COGA
1568   REF   4  LAST 1299   12,3510   34015 1          STCALL DCOGA
1570   REF   3  LAST 1299   12,3511   25343 1                 LAMBLOOP
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1574                          12,3512   52145 0  LOLIM    DLOAD   GOTO
1575   REF   1                12,3513   11636 1                   COGLOLIM          COGLOLIM=-.999511597
1576   REF   1                12,3514   25333 0                   MINCOGA


1577                          12,3515   60345 0  INITV    DLOAD   NORM
1578   REF  16  LAST 1296     12,3516   00041 1                   R1
1579   REF  86  LAST 1297     12,3517   00047 1                   X1
1580                          12,3520   70525 1           PDDL    SR1                                        PL AT 2
1581   REF  11  LAST 1298     12,3521   02742 1                   P
1582                          12,3522   77671 1           DDV                                                PL AT 0
1583                          12,3523   75457 0           SL*     SQRT
1584                          12,3524   20175 0                   0 -4,1
1585                          12,3525   72405 0           DMP     SL1
1586   REF   3  LAST 1287     12,3526   00021 1                   ROOTMU
1587                          12,3527   41206 0           PUSH    DMP               OD=VTAN (+7)             PL AT 2
1588   REF  17  LAST 1299     12,3530   03775 1                   COGA
1589                          12,3531   74261 1           SL      VXSC
1590                          12,3532   20206 1                   5
1591   REF   7  LAST 1291     12,3533   02724 1                   UR1
1592                          12,3534   77725 1           PDDL    XCH WITH OD                              PL AT 0,6
1593                          12,3535   76561 1           VXSC    VSL1
1594   REF   5  LAST 1291     12,3536   02676 1                   UN
1595                          12,3537   53235 0           VXV     VAD                                        PL AT 0
1596   REF   8  LAST 1300     12,3540   02724 1                   UR1
1597                          12,3541   43172 1           VSL1    CLEAR
1598   REF   3  LAST 1299     12,3542   02674 0                   SDLNSW
1599   REF  20  LAST 1289     12,3543   02746 0           STORE   VVEC
1600                          12,3544   53135 0           SLOAD   BZE
1601   REF   5  LAST  490     12,3545   02704 0                   VTARGTAG
1602   REF   1                12,3546   25551 1                   TARGETV
1603                          12,3547   77650 1           GOTO
1604   REF   8  LAST 1299     12,3550   02712 1                   RTNLAMB


1605                          12,3551   45145 0  TARGETV  DLOAD   CALL
1606   REF   6  LAST 1296     12,3552   02722 1                   MAGVEC2
1607   REF   1                12,3553   24713 1                   LAMENTER
1608   REF   4  LAST  490     12,3554   36705 0           STCALL  VTARGET
1610   REF   9  LAST 1300     12,3555   02712 1                   RTNLAMB
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1611                          12,3556  40220 0  TIMERAD  STQ     SETPD                                  PL AT 0
1612  REF   1                 12,3557  02712 1                   RTNTR
1613                          12,3560  00001 0                   0
16135                         12,3561  77600 1           BOV
16136                         12,3562  25563 0                   +1
1614                          12,3563  63375 0           VLOAD   PDVL                                   PL AT 6
1615  REF  14  LAST 1289      12,3564  02657 1                   RVEC
1616  REF  21  LAST 1300      12,3565  02746 0                   VVEC
1617                          12,3566  77624 1           CALL
1618  REF   3  LAST 1289      12,3567  11637 0                   PARAM
1619                          12,3570  71200 0           BOV     DLOAD                                  PL AT 0
1620  REF   2  LAST 1289      12,3571  24776 1                   COGAOVFL
1621  REF   6  LAST 1298      12,3572  11616 0                   D1/32
1622                          12,3573  41225 1           DSU     DMP
1623  REF  12  LAST 1298      12,3574  02744 1                   RIA
1624  REF  12  LAST 1300      12,3575  02742 1                   P
1625                          12,3576  41366 1           SQRT    DMP
1626  REF  18  LAST 1300      12,3577  03775 1                   COGA
1627                          12,3600  74212 0           SL4     VXSC
1628  REF   5  LAST 1291      12,3601  02714 1                   U2
1629                          12,3602  45325 1           PDDL    DSU                                    PL AT 6
1630  REF   4  LAST 1293      12,3603  11610 0                   D1/64
1631  REF  13  LAST 1301      12,3604  02744 1                   RIA
1632                          12,3605  52361 1           VXSC    VSU                                    PL AT 0
1633  REF   9  LAST 1300      12,3606  02724 1                   UR1
1634                          12,3607  53512 1           VSL4    UNIT
16345                         12,3610  77600 1           BOV
16346 REF   1                 12,3611  25667 1                   CIRCULAR
1635                          12,3612  60325 0           PDDL    NORM          OD=UNIT(ECC) (+3)                PL AT 6
1636  REF   5  LAST  910      12,3613  02760 1                   RDESIRED      36D=ECC (+3)
1637  REF  87  LAST 1300      12,3614  00047 1                   XI
1638                          12,3615  41325 0           PDDL    DMP                                    PL AT 8
1639  REF  17  LAST 1300      12,3616  00041 1                   RI
1640  REF  13  LAST 1301      12,3617  02742 1                   P
1641                          12,3620  56257 1           SL*     ODV                                    PL AT 6
1642                          12,3621  20201 0                   0.1
1643                          12,3622  56225 1           DSU     DDV
1644  REF   2  LAST 1294      12,3623  11614 1                   D1/16
1645                          12,3624  00045 0                   36D           36D=ECC (+3)
1646  REF   1                 12,3625  00031 0           STORE   COSF
1647                          12,3626  63400 0           BOV     DSQ
1648  REF   1                 12,3627  25673 1                   BADR2
1649                          12,3630  50021 1           BDSU    BMN
1650  REF   5  LAST 1299      12,3631  11612 1                   D1/4
16505 REF   2  LAST 1301      12,3632  25673 1                   BADR2
1651                          12,3633  75366 0           SQRT    SIGN
1652  REF   4  LAST  910      12,3634  02757 0                   SGNRDOT
16525                         12,3635  77614 1           CLEAR
1653  REF   1                 12,3636  04272 1                   APSESW
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1654                              12,3637   76561 1  TERMNVEC VXSC    VSL1
1655   REF   6  LAST 1300        12,3640   02676 1                   UN
1656                              12,3641   63235 0           VXV     PDVL     VXCH WITH OD                    PL AT 0,6
1657                              12,3642   00001 0                   OD
1658                              12,3643   53361 0           VXSC    VAD                                      PL AT 0
1659   REF   2  LAST 1301        12,3644   00031 0                   COSF
1660                              12,3645   41572 1           VSL1    PUSH     OD=U2                           PL AT 6

1661                              12,3646   56241 0           DOT     DDV      LIMITS RESULT TO POSMAX OR NEGMAX
1662   REF  10  LAST 1301        12,3647   02724 1                   UR1
16622  REF   2  LAST  680        12,3650   23756 1                   DP1/4
16624                             12,3651   40142 1           SR1     BOV      SCALE BACK DOWN TO NORMAL
16625                             12,3652   25653 0                   +1       CLEAR OVFIND IF SET
1663   REF  13  LAST 1297        12,3653   26734 0           STOVL   CSTH     CSTH (+1)
1664   REF  11  LAST 1302        12,3654   02724 1                   UR1
1665                              12,3655   76435 1           VXV     VSL1
1666                              12,3656   72441 0           DOT     SL1
1667   REF   7  LAST 1302        12,3657   02676 1                   UN
1668   REF  18  LAST 1297        12,3660   16732 0           STODL   SNTH     SNTH (+1)
1669   REF  14  LAST 1301        12,3661   02742 1                   P
1670                              12,3662   77624 1           CALL
1671   REF   3  LAST 1298        12,3663   25001 1                   GETX
1672                              12,3664   77614 1           CLRGO
16725  REF   4  LAST 1300        12,3665   02634 1                   SOLNSW
1673   REF   1                   12,3666   24761 1                   COMMNOUT

16734                             12,3667   43001 1  CIRCULAR SETPD   SETGO
16735                             12,3670   00001 0                   0
16736  REF   5  LAST 1302        12,3671   02434 0                   SOLNSW
16737  REF   3  LAST 1289        12,3672   25751 0                   ABTCONIC

1674                              12,3673   75345 1  BADR2    DLOAD   SIGN
16741  REF   2  LAST  720        12,3674   11564 0                   LODPHALF
16742  REF   3  LAST 1302        12,3675   00031 0                   COSF
16743  REF   4  LAST 1302        12,3676   14031 0           STODL   COSF
1675   REF   3  LAST 1278        12,3677   11566 1                   KEPZERO
16755                             12,3700   77614 1           SETGO
1676   REF   2  LAST 1301        12,3701   04032 1                   APSESW
1677   REF   1                   12,3702   25637 1                   TERMNVEC
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1678                        12,3703  40220 0  APSIDES  STQ     SETPD                                    PL AT  0
1679  REF   1               12,3704  02712 1                   RTNAPSE
1680                        12,3705  00001 0                   OD
16805                       12,3706  77600 1           BOV
16806                       12,3707  25710 0                   +1
1681                        12,3710  63375 0           VLOAD   PDVL                                     PL AT  6
1682  REF  15  LAST 1301    12,3711  02657 1                   RVEC
1683  REF  22  LAST 1301    12,3712  02746 0                   VVEC
1684                        12,3713  77624 1           CALL
1685  REF   4  LAST 1301    12,3714  11637 0                   PARAM
1686                        12,3715  77600 1           BOV                                              PL AT  0
1687  REF   1               12,3716  25717 1                   GETECC
1688                        12,3717  42405 0  GETECC    DMP     SL4
1689  REF  14  LAST 1301    12,3720  02744 1                   R1A
1690                        12,3721  75421 1           BDSU    SQRT
1691  REF   5  LAST 1301    12,3722  11610 0                   D1/64
1692  REF   3  LAST  666    12,3723  02754 0           STORE   ECC
1693                        12,3724  65215 1           DAD     PDDL                                     PL AT  2
1694  REF   1               12,3725  11604 0                   D1/8
1695  REF  18  LAST 1301    12,3726  00041 1                   R1
1696                        12,3727  72405 0           DMP     SL1
1697  REF  15  LAST 1302    12,3730  02742 1                   P
1698                        12,3731  77671 1           DDV                                              PL AT  0
1699                        12,3732  60325 0           PDDL    NORM        OD=RP (+29 OR +27)           PL AT  2
1700  REF  15  LAST 1303    12,3733  02744 1                   R1A
1701  REF  88  LAST 1301    12,3734  00047 1                   X1
1702                        12,3735  53725 1           PDDL    SL*                                      PL AT  4
1703  REF  19  LAST 1303    12,3736  00041 1                   R1
1704                        12,3737  20174 1                   0 -5,1
1705                        12,3740  45271 1           DDV     DSU                                      PL AT 2,0
1706                        12,3741  50000 1           BOV     BMN
1707  REF   1               12,3742  25746 0                   INFINAPO
1708  REF   2  LAST 1303    12,3743  25746 0                   INFINAPO
1709                        12,3744  77650 1           GOTO
1710  REF   2  LAST 1303    12,3745  02712 1                   RTNAPSE
1711                        12,3746  52145 0  INFINAPO DLOAD   GOTO        RETURNS WITH APOAPSIS IN MPAC,PERIAPSIS
1712  REF   1               12,3747  11577 1                   LDPOSMAX
1713  REF   3  LAST 1303    12,3750  02712 1                   RTNAPSE     THAT PL IS AT 0.
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17136                          12,3751   77776 1  ABTCONIC EXIT
17137  REF   8  LAST 1223      12,3752   0 5721 0           TC      P00D00
17138                          12,3753   00607 0            OCT     00607
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1714   REF   3  LAST 1289   04.2000                  SETLOC CONICS1
1715                        04,3737                  BANK

1716   REF   3 LAST 1289 TO 1292:    64    93*       COUNT  04/CONIC

1717                        04,3737   22437 1  MUTABLE 2DEC*  3.986032 E10 B-36*     MUE
1717                        04,3740   16067 1
1718                        04,3741   15625 1          2DEC*  .25087606 E-10 B+34*  1/MUE
1718                        04,3742   21042 1
1719                        04,3743   30276 1          2DEC*  1.99650495 E5 B-18*   SQRT(MUE)
1719                        04,3744   04773 0
1720                        04,3745   25004 1          2DEC*  .50087529 E-5 B+17*   1/SQRT(MUE)
1720                        04,3746   06702 1

1721                        04,3747   16471 1          2DEC   4.902778 E8 B-30       MUM
1721                        04,3750   01352 1
1722                        04,3751   21412 0          2DEC   .203966 E-8 B+28       1/MUM
1722                        04,3752   20500 0
1723                        04,3753   25477 1          2DEC*  2.21422176 E4 B-15*   SQRT(MUM)
1723                        04,3754   03367 0
1724                        04,3755   27533 1          2DEC*  .45162595 E-4 B+14*   1/SQRT(MUM)
1724                        04,3756   07571 0

1725   REF   1              04,3576                  LDPOSMAX EQUALS LODPMAX        DPPOSMAX IN LOW MEMORY.

R1727  ERASABLE ASSIGNMENTS


R1728  KEPLER SUBROUTINE

R1729      INPUT -
R1730  RRECT     ERASE  +5
R1731  VRECT     ERASE  +5
R1732  TAU.      ERASE  +1
R1733  XKEP      ERASE  +1
R1734  TC        ERASE  +1
R1735  XPREV     ERASE  +1
 1736                        0016             1/MU      EQUALS 14D
 1737                        0020             ROOTMU    EQUALS 16D
 1738                        0022             1/ROOTMU  EQUALS 18D
R1739      OUTPUT -
R1740  RCV       ERASE  +5
R1741  VCV       ERASE  +5
R1742  RC        ERASE  +1
R1743  XPREV     ERASE  +1

R1744  DEBRIS -
 1745                        0010             ALPHA     EQUALS 8D
 1746                        0012             XMAX      EQUALS 10D
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 1747                          0014          XMIN      EQUALS 12D
 1748                          0024          X         EQUALS 20D
 1749                          0030          XI        EQUALS 24D
 1750                          0032          S(XI)     EQUALS 26D
 1751                          0034          XSQC(XI)  EQUALS 28D
 1752                          0036          T         EQUALS 30D
 1753                          0040          R1        EQUALS 32D
 1754                          0042          KEPC1     EQUALS 34D
 1755                          0044          KEPC2     EQUALS 36D
R1756  DELX      ERASE  +1
R1757  DELT      ERASE  +1
R1758  URRECT    ERASE  +5
R1759  RCNORM    ERASE  +1
R1760  XPREV     EQUALS XKEP

R1761  LAMBERT SUBROUTINE

R1762     INPUT-
R1763  R1VEC     ERASE  +5
R1764  R2VEC     ERASE  +5
R1765  TDESIRED  ERASE  +1
R1766  GEOMSGN   ERASE  +0
R1767  GUESSW                  0 IF COGA GUESS AVAILABLE, 1 IF NOT
R1768  COGA      ERASE  +1     INPUT ONLY IF GUESSW IS ZERO.
R1769  NORMSW                  0 IF UN TO BE COMPUTED, 1 IF UN INPUT
R1770  UN        ERASE  +5     ONLY USED IF NORMSW IS 1
R1771  VTARGTAG  ERASE  +0
R1772  TWEEKIT   EQUALS 40D    ONLY USED IF GUESSW IS 0

R1773     OUTPUT -
R1774  VTARGET   ERASE  +5     AVAILABLE ONLY IF VTARGTAG IS ZERO.
R1775  V1VEC     EQUALS MPAC

R1776     DEBRIS -
R1777  RTNLAMB   ERASE  +0
R1778  U2        ERASE  +5
R1779  MAGVEC2   ERASE  +1
R1780  UR1       ERASE  +5
R1781  R1        EQUALS 31D
R1782  UN        ERASE  +5
R1783  SNTH      ERASE  +1
R1784  CSTH      ERASE  +1
R1785  1-CSTH    ERASE  +1
R1786  CSTH-RHO  ERASE  +1
 1787                          0016          COGAMAX   EQUALS 14D          CLOBBERS 17MU
 1788                          0010          COGAMIN   EQUALS 8D
 1789                          0014          DCOGA     EQUALS 12D
R1790  TWEEKIT   EQUALS 40D
R1791  P         ERASE  +1
```

L CONIC SUBROUTINES

```
R1792   COGA       ERASE  +1
R1793   R1A        ERASE  +1
R1794   X          EQUALS 20D
R1795   XSQ        EQUALS 22D
R1796   XI         EQUALS 24D
R1797   S(XI)      EQUALS 26D
R1798   XSQC(XI)   EQUALS 28D
R1799   T          EQUALS 30D
R1800   KEPC1      EQUALS 34D
R1801   KEPC2      EQUALS 36D
R1802   SLOPESW
R1803   SOLNSW
R1804   OTHERS -

R1805   RVEC       EQUALS R1VEC
R1806   VVEC       ERASE  +5
R1807   COGAFLAG
R1808   RVSW
R1809   INFINFLG
R1810   APSESW
R1811   360SW
R1812   RTNTT      EQUALS RTNLAMB
R1813   ECC        ERASE  +1
R1814   RTNTR      EQUALS RTNLAMB
R1815   RTNAPSE    EQUALS RTNLAMB
R1816   R2         EQUALS MAGVEC2
 1817                          0030          COSF      EQUALS 24D
R1818   RTNPRM     ERASE  +0
R1819   SGNRDOT    ERASE  +0
R1820   RDESIRED   ERASE  +1


R1821   ITERATOR SUBROUTINE

R1822   ORDERSW
 1823                          0016          MAX       EQUALS 14D          CLOBBERS I/MU
 1824                          0010          MIN       EQUALS 8D
R1825   INDEP      ERASE  +1
 1826                          0014          DELINDEP  EQUALS 12D
 1827                          0026          ITERCTR   EQUALS 22D
 1828                          0036          DEP       EQUALS 30D
R1829   DELDEP     ERASE  +1
R1830   DEPREV     ERASE  +1
 1831                          0050          TWEEKIT   EQUALS 40D


R1832   MORE KEPLER

R1833   EPSILONT   ERASE  +1
```

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R1834 MORE LAMBERT

R1835 TERRLAMB EQUALS DELDEP
R1836 TPREV EQUALS DEPREV

R1837 EPSILONL EQUALS EPSILONT +2 DOUBLE PRECISION WORD

```
R0006   1.0 INTRODUCTION
R0007   ----------------
R0008
R0009   FROM A USERS POINT OF VIEW, ORBITAL INTEGRATION IS ESSENTIALLY THE SAME AS THE 278 INTEGRATION
R0011   PROGRAM. THE SAME ENTRANCES TO THE PROGRAM WILL BE MAINTAINED, THE SAME STALLING ROUTINE WILL BE USED AND
R0013   OUTPUT WILL STILL BE VIA THE PUSHLIST. THE PRIMARY DIFFERENCES TO A USER INVOLVE THE ADDED CAPABILITY OF
R0015   TERMINATING INTEGRATION AT A SPECIFIC FINAL RADIUS AND THE DIFFERENCE IN STATE VECTOR SCALING INSIDE AND OUT-
R0017   SIDE THE LUNAR SPHERE OF INFLUENCE.
R0018
R0019   IN ORDER TO MAKE THE CSM(LEM)PREC AND CSM(LEM)CONIC ENTRANCES SIMILAR TO FLIGHT 278, THE INTEGRATION PROGRAM
R0021   WILL ITSELF SET THE FINAL RADIUS (RFINAL) TO 0 SO THAT REACHING THE DESIRED TIME ONLY WILL TERMINATE
R0023   INTEGRATION. THE DP REGISTER RFINAL MUST BE SET BY USERS OF INTEGRVS AND INTEGRV, AND MUST BE DONE AFTER THE
R0025   CALL TO INTSTALL.
R0026
R0027   WHEN THE LM IS ON THE LUNAR SURFACE (INDICATED BY LUNAR SURFACE FLAG SET) CALLS TO LEMCONIC, LEMPREC, AND
R0029   INTEGRV WITH VINFLAG = 0 WILL RESULT IN THE USE OF THE PLANETARY INERTIAL ORIENTATION SUBROUTINES TO PROVIDE
R0031   BOTH THE LMS POSITION AND VELOCITY IN THE REFERENCE COORDINATE  SYSTEM.
R0032   THE PROGRAM WILL PROVIDE OUTPUT AS IF INTEGRATION WAS USED. THAT IS, THE PUSHLIST WILL BE SET AS NOTED BELOW AND
R0034   THE PERMANENT STATE VECTOR UPDATED WHEN SPECIFIED BY AN INTEGRV CALL.
R0035
R0036   USERS OF INTEGRVS DESIRING INTEGRATION (INTYPFLG = 0) SHOULD NOTE THAT THE OBLATENESS PERTURBATION COMPUTATION
R0038   IN LUNAR ORBIT IS TIME DEPENDENT. THEREFORE. THE USER SHOULD SUPPLY AN INITIAL STATE VECTOR VALID AT SOME REAL
R0040   TIME AND THE DESIRED TIME (TDEC1) ALSO AT SOME REAL TIME. FOR CONIC ,,INTEGRATION,, THE USER MAY STILL USE ZERO
R0042   AS THE INITIAL TIME AND DELTA TIME AS THE DESIRED TIME.
R0043
R0044   2.0 GENERAL DESCRIPTION
R0045   ----------------------
R0046
R0047   THE INTEGRATION PROGRAM OPERATES AS A CLOSED INTERPRETIVE SUBROUTINE AND PERFORMS THESE FUNCTIONS---
R0049      1) INTEGRATES (PRECISION OR CONIC) EITHER CSM OR LM STATE VECTOR
R0050      2) INTEGRATES THE W-MATRIX
R0051      3) PERMANENT OR TEMPORARY UPDATE OF THE STATE VECTOR
R0052
R0053   THERE ARE SIX ENTRANCES TO THE INTEGRATION PROGRAM. FOUR OF THESE (CSMPREC. LEMPREC. CSMCONIC. LEMCONIC) SET
R0055   ALL THE FLAGS REQUIRED IN THE INTEGRATION PROGRAM ITSELF TO CAUSE THE PRECISION OR CONIC INTEGRATION (KEPLER) OF
R0057   THE LM OR CSM STATE VECTOR, AS THE NAMES SUGGEST. ONE ENTRANCE (INTEGRVS) PERMITS THE CALLING PROGRAM TO
R0059   PROVIDE A STATE VECTOR TO BE INTEGRATED. THE CALLING PROGRAM MUST SET THE FLAGS INDICATING (1) PRECISION OR
R0061   CONIC INTEGRATION, (2) IN OR OUT OF LUNAR SPHERE, (3) MIDCOURSE OR NOT, AND THE INTEGRATION PROGRAM COMPLETES
R0063   THE FLAG SETTING TO BYPASS W-MATRIX INTEGRATION. THE LAST ENTRANCE (INTEGRV, USED IN GENERAL BY THE
R0065   NAVIGATION PROGRAMS) PERMITS THE CALLER TO SET FIVE FLAGS (NOT MOONFLAG OR MIDFLAG) BUT NOT TO INPUT A STATE
R0067   VECTOR. ANY PROGRAM WHICH CALLS INTEGRVS OR INTEGRV MUST CALL INTSTALL BEFORE IT SETS THE INTEGRATION FLAGS
R0069   AND/OR STATE VECTOR.
R0070
R0071   THREE SETS OF 42 REGISTERS AND 2 FLAGS ARE USED FOR THE STATE VECTORS. TWO SETS, WHICH MAY NOT BE OVERLAYED, ARE
R0073   USED FOR THE PERMANENT STATE VECTORS FOR THE CSM AND LM. THE THIRD SET. WHICH MAY BE OVERLAYED WHEN INTEGRATION
R0075   IS NOT BEING DONE. IS USED IN THE COMPUTATIONS.
R0076
R0077   THE PERMANENT STATE VECTORS WILL BE PERIODICALLY UPDATED SO THAT THE VECTORS WILL NOT BE OLDER THAN 4 TIMESTEPS.
R0079   THE PERMANENT STATE VECTORS WILL ALSO BE UPDATED WHENEVER THE W-MATRIX IS INTEGRATED OR WHEN A CALLER OF INTEGRV
R0081   SETS STATEFLG (THE NAVIGATION PROGRAMS P20, P22.)
```

R0082 APPENDIX B OF THE USERS GUIDE LISTS THE STATE VECTOR QUANTITIES.
R0083
R0084 2.1 RESTARTS
R0085
R0086 PHASE CHANGES WILL BE MADE IN THE INTEGRATION PROGRAM ONLY FOR THE INTEGRV ENTRANCE (I.E.. WHEN THE W-MATRIX IS
R0088 INTEGRATED OR PERMANENT STATE VECTOR IS UPDATED.) THE GROUP NUMBER USED WILL BE THAT FOR THE P20-25 PROGRAMS
R0090 (I.E., GROUP2) SINCE THE INTEGRV ENTRANCE WILL ONLY BE USED BY THESE PROGRAMS. IF A RESTART OCCURS DURING AN
R0092 INTEGRATION OF THE STATE VECTOR ONLY. THE RECOVERY WILL BE TO THE LAST PHASE IN THE CALLING PROGRAM. CALLING
R0094 PROGRAMS WHICH USE THE INTEGRV OR INTEGRVS ENTRANCE OF INTEGRATION SHOULD ENSURE THAT IF PHASE CHANGING IS DONE
R0096 THAT IT IS PRIOR TO SETTING THE INTEGRATION INPUTS IN THE PUSHLIST.
R0097 THIS IS BECAUSE THE PUSHLIST IS LOST DURING A RESTART.
R0098
R0099 2.2 SCALING
R0100
R0101 THE INTEGRATION ROUTINE WILL MAINTAIN THE PERMANENT MEMORY STATE VECTORS IN THE SCALING AND UNITS DEFINED IN
R0103 APPENDIX B OF THE USERS GUIDE. THE SCALING OF THE OUTPUT POSITION VECTORDEPENDS ON THE ORIGIN OF THE COORDINATE
R0105 SYSTEM AT THE DESIRED INTEGRATION TIME. THE COORDINATE SYSTEM TRANSFORMATION WILL BE DONE AUTOMATICALLY ON
R0107 MULTIPLE TIMESTEP ENCKE INTEGRATION ONLY. THUS IT IS POSSIBLE TO HAVE OUTPUT FROM SUCCESSIVE INTEGRATIONS IN
R0109 DIFFERENT SCALING.
R0110 HOWEVER, RATT, VATT WILL ALWAYS BE SCALED THE SAME.
R0111
R0112 3.0 INPUT/OUTPUT
R0113 ----------
R0114
R0115 PROGRAM INPUTS ARE THE FLAGS DESCRIBED IN APPENDIX A AND THE PERMANENT STATE VECTOR QUANTITIES DESCRIBED IN AP-
R0117 PENDIX B OF THE USERS GUIDE, PLUS THE DESIRED TIME TO INTEGRATE TO IN TDEC1 (A PUSH LIST LOCATION).
R0119 FOR INTEGRVS, THE RCV,VCV, TET OF THE TEMPORARY STATE VECTOR MUST BE SET. PLUS MOONFLAG AND MIDFLAG
R0121
R0122 FOR SIMULATION THE FOLLOWING QUANTITIES MUST BE PRESET ---
R0123
R0124 EARTH MOON
R0125 29 27
R0126 RRECTCSM(LEM) - RECTIFIED POSITION VECTOR METERS 2 2
R0127
R0128 7 5
R0129 VRECTCSM(LEM) - RECTIFIED VELOCITY VECTOR M/CSEC 2 2
R0130
R0131 28 28
R0132 TETCSM(LEM) - TIME STATE VECTOR IS VALID CSEC 2 2
R0133 CUSTOMARILY 0, BUT NOTE LUNAR
R0134 ORBIT DEPENDENCE ON REAL TIME.
R0135
R0136 22 18
R0137 DELTAVCSM(LEM) - POSITION DEVIATION METERS 2 2
R0138 0 IF TCCSM(LEM) = 0
R0139
R0140 3 -1
R0141 NUVCSM(LEM) - VELOCITY DEVIATION M/CSEC 2 2
R0142 0 IF TCCSM(LEM) = 0
R0143

					29	27
	RCVCSM(LEM)	- CONIC POSITION		METERS	2	2
		EQUALS RRECTCSM(LEM) IF				
		TCCSM(LEM) = 0				
					7	5
	VCVCSM(LEM)	- CONIC VELOCITY		M/CSEC	2	2
		EQUALS VRECTCSM(LEM) IF				
		TCCSM(LEM) = 0				
					28	28
	TCCSM(LEM)	- TIME SINCE RECTIFICATION		CSECS	2	2
		CUSTOMARILY 0				
				1/2	17	16
	XKEPCSM(LEM)	- ROOT OF KEPLERS EQUATION		M	2	2
		0 IF TCCSM(LEM) = 0				
	CMOONFLG	- PERMANENT FLAGS CORRESPONDING			0	0
	CMIDFLAG	TO MOONFLAG AND MIDFLAG			0,1	0,1
	LMOONFLG	C = CSM, L = LM			0	0
	LMIDFLG				0,1	0,1
	SURFFLAG	- LUNAR SURFACE FLAG			0,1	0,1

IN ADDITION, IF (L)CMIDFLAG IS SET, THE INITIAL INPUT VALUES FOR LUNAR SOLAR EPHEMERIDES SUBROUTINE AND PLANETARY INERTIAL ORIENTATION SUB-ROUTINE MUST BE PRESET.

OUTPUT

AFTER EVERY CALL TO INTEGRATION

					EARTH	MOON
					29	29
	0D	RATT	POSITION	METERS	2	2
					7	7
	6D	VATT	VELOCITY	M/CSEC	2	2
					28	28
	12D	TAT	TIME		2	2
					29	27
	14D	RATTI	POSITION	METERS	2	2
					7	5
	20D	VATTI	VELOCITY	M/CSEC	2	2
				3 2	36	30
	26D	MU(P)	MU	M /CS	2	2
	X1		MUTABLE ENTRY		-2	-100
	X2		COORDINT			
	X2		COORDINATE SYSTEM ORIGEN		0	2
			(THIS, NOT MOONFLAG, SHOULD BE			

```
R0194                   USED TO DETERMINE ORIGIN.)
R0195
R0196   IN ADDITION TO THE ABOVE, THE PERMANENT STATE VECTOR IS UPDATED WHENEVER
R0197   STATEFLG WAS SET AND WHENEVER A W-MATRIX IS TO BE INTEGRATED. THE PUSH
R0198   COUNTER IS SET TO 0 AND OVERFLOW IS CLEARED BEFORE RETURNING TO THE
R0199   CALLING PROGRAM.
R0200
R0201   4.0 CALLING SEQUENCES AND SAMPLE CODE
R0202   ------------------------------------
R0203
R0204      A) PRECISION ORBITAL INTEGRATION. CSMPREC,LEMPREC ENTRANCES
R0205            L-X     STORE TIME TO 95T5791T5 T  95 PUS  L9ST (T4531)
R0206            L       CALL
R0207            L+1             CSMPREC (OR LEMPREC)
R0208            L+2     RETURN
R0209         INPUT                                                    28
R0210            TDEC1 (PD 32D) TIME TO INTEGRATE TO...CENTISECONDS SCALED 2
R0211         OUTPUT
R0212            THE DATA LISTED IN SECTION 3.0 PLUS
R0213            RQVV   POSITION VECTOR OF VEHICLE WITH RESPECT TO SECONDARY
R0214            BODY... METERS B-29 ONLY IF MIDFLAG = DIMOFLAG = 1
R0215      B) CONIC INTEGRATION. CSMCONIC, LEMCONIC ENTRANCES
R0216            L-X     STORE TIME IN PUSH LIST (TDEC1)
R0217            L       CALL
R0218              L+1           CSMCONIC (OR LEMCONIC)
R0219         INPUT/OUTPUT
R0220            SAME AS PRECISION INTEGRATION, EXCEPT RQVV NOT SET
R0221      C) INTEGRATE GIVEN STATE VECTOR. INTEGRVS ENTRANCE
R0222                     CALL
R0223                           INITSTALL
R0224                     VLOAD
R0225                           POSITION VECTOR
R0226                     STOVL  RCV
R0227                           VELOCITY VECTOR
R0228                     STODL  VCV
R0229                           TIME STATE VECTOR VALID
R0230                     STODL  TET
R0231                           FINAL RADIUS
R0232                     STORE  RFINAL
R0233                     SET(CLEAR)  SET(CLEAR)
R0234                                 INTYPFLAG
R0235                                 MOONFLAG
R0236                     SET(CLEAR)  DLOAD
R0237                                 DESIRED TIME
R0238                     STCALL      TDEC1
R0239                                 INTEGRVS
R0240         INPUT
R0241            RCV    POSITION VECTOR                    METERS
R0242            VCV    VELOCITY VECTOR                    M/CSEC
R0243            TET    TIME OF STATE VECTOR(MAY = 0)      CSEC B-28
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R0244          TDEC1  TIME TO INTEGRATE TO                CSEC B-28 (PD 32D)
R0245                 (MAY BE INCREMENT IF TET=0)
R0246       OUTPUT
R0247          SAME AS FOR PRECISION OR CONIC INTEGRATION,
R0248          DEPENDING ON INTYPFLG.
R0249    D) INTEGRATE STATE VECTOR.INTGRV ENTRANCE
R0250          L-X    STORE TIME IN PUSH LIST (TDEC1)(MAY BE DONE AFTER CALL TO INTSTALL)
R0252          L-8    CALL
R0253          L-7
R0254          L-6    SET(CLEAR) SET(CLEAR)
R0255          L-5               VINTFLAG   1=CSM, 0=LM
R0256          L-4               INTYPFLAG  1=CONIC, 0=PRECISION
R0257          L-3    SET(CLEAR) SET(CLEAR)
R0258          L-2               DIMOFLAG   1=W-MATRIX, 0=NO W-MATRIX
R0259          L-1               D6OR9FLG   1=9X9, 0=6X6
R0260          L      SET        DLOAD
R0261          L+1               STATEFLG   DESIRE PERMANENT UPDATE
R0262          L+2               FINAL RAD. OF STATE VECTOR
R0263          L+3    STCALL     RFINAL
R0264          L+4               INTEGRV
R0265          L      CALL                  NORMAL USE-- WILL UPDATE STATE
R0266          L+1               INTEGRV    VECTOR IF DIMOFLAG=1.(STATEFLG IS
R0267          L+2    RETURN                ALWAYS RESET IN INTEGRATION AFTER
R0268                                       IT IS USED.)
R0269       INPUT
R0270          TDEC1 (PD 32D) TIME TO INTEGRATE TO    CSEC B-28
R0271       OUTPUT
R0272          SAME AS FOR PRECISION OR CONIC INTEGRATION
R0273       THE PROGRAM WILL SET MOONFLAG, MIDFLAG DEPENDING ON
R0274       THE PERMANENT STATE VECTOR REPRESENTATION.

 02741                          11,2363                        BANK   11
 02742  REF   2  LAST  209     13,2000                        SETLOC INTINIT
 02743                          13,2627                        BANK
 02744  REF   5  LAST  213     E3,1554                        EBANK= RRECTCSM
 02745  REF   2 LAST  209 TO  212:    30    30*               COUNT  13/INTIN

 0275   REF  94  LAST 1256     13,2627  0 5412 0  STATEINT TC     PHASCHNG
 0276                          13,2630   00052 0             OCT    00052
 0277   REF   7  LAST  568     13,2631  3 5061 0             CAF    PRIO5
 0278   REF  29  LAST  825     13,2632  0 5147 0             TC     FINDVAC
 0279   REF   6  LAST 1313     E3,1554                       EBANK= RRECTCSM
 0280   REF   2  LAST  213     13,2633   02636 0             2CADR  STATINT1
 0280                          13,2634   26063 0
 0281   REF  62  LAST 1235     13,2635  0 5324 1             TC     TASKOVER
 0282   REF 234  LAST 1293     13,2636  0 6006 1  STATINT1   TC     INTPRET
 0283                          13,2637   47014 1             BON    RTB
 02831  REF   2  LAST  266     13,2640   04712 1                    QUITFLAG
 02832  REF   1                13,2641   26677 0                    NOINT          NO STATEINT IF V96
 0284   REF  25  LAST  934     13,2642   45510 1                    LOADTIME
```

```
0286   REF  48  LAST  934   13,2643   00041 1            STORE   TDEC1
0323                        13,2644   45014 0            CLEAR   CALL
03235  REF   2  LAST  266   13,2645   04274 1                    V96ONFLG
0324   REF  23  LAST 1256   13,2646   27442 0                    INTSTALL
0325                        13,2647   45014 0            SET     CALL
03251  REF   2  LAST  210   13,2650   01076 1                    NODOFLAG
0326   REF   2  LAST  210   13,2651   26670 1                    SETIFLGS
0327                        13,2652   77650 1            GOTO
0328   REF   1              13,2653   26000 0                    STATEUP
0356                        13,2654   00003 1  600SECS   2DEC    60000
0356                        13,2655   25140 0
0404                        13,2656   77414 0  ENDINT    CLEAR   EXIT
0405   REF   3  LAST  610   13,2657   01672 0                    STATEFLG
0408   REF  95  LAST 1313   13,2660   0 5412 0           TC      PHASCHNG
0409                        13,2661    20032 1           OCT     20032
0411                        13,2662   0 0006 1           EXTEND
0412   REF   2  LAST  213   13,2663   3 2655 0           DCA     600SECS
0413   REF   3  LAST  686   13,2664   0 5342 1           TC      LONGCALL
0414   REF   6  LAST  265   E3,1554                      EBANK=  RRECTHIS
0415   REF   3  LAST  213   13,2665    02627 0           2CADR   STATEINT
0415                        13,2666    26063 0
0416   REF 102  LAST 1038   13,2667   0 5217 0           TC      ENDOFJOB
0426                        13,2670    43014 0  SETIFLGS  SET     CLEAR
0427   REF   4  LAST 1314   13,2671    01472 1                    STATEFLG
0428   REF  15  LAST  915   13,2672    01673 1                    INTYPFLG
0429                        13,2673    43014 0           CLEAR   CLEAR
0430   REF  13  LAST  623   13,2674    01676 1                    DIMOFLAG
04301  REF   5  LAST  610   13,2675    01675 1                    D60R9FLG
04302                       13,2676    77616 0           RVQ
04303                       13,2677    77776 1  NOINT     EXIT
04304  REF  96  LAST 1314   13,2700   0 5412 0           TC      PHASCHNG
04305                       13,2701    00002 0           OCT     2

04306  REF  59  LAST 1066   13,2702   0 5560 1           TC      DOWNFLAG
04307  REF   3  LAST 1313   13,2703    00221 0           ADRES   QUITFLAG

04308  REF 103  LAST 1314   13,2704   0 5217 0           TC      ENDOFJOB

R0431  ATOPCSM TRANSFERS RRECT TO RRECT +41 TO RRECTCSM TO RRECTCSM +41

R0432  CALLING SEQUENCE
R0433     L   CALL
R0434     L+1       ATOPCSM

R0435  NORMAL EXIT AT L+2

0436                        13,2705    47020 0  ATOPCSM   STQ     RTB
0437   REF  27  LAST 1292   13,2706    00051 0                    S2
0438   REF   3  LAST 1260   13,2707    26720 0                    MOVEACSM
0439                        13,2710    45014 0           SET     CALL
```

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0440   REF  22  LAST  667   13,2711   04063 0                    CMOONFLG
0441   REF   3  LAST 1260   13,2712   20237 0                    SVDWN1
0442                        13,2713   43014 0          BON       CLRGD
0443   REF  14  LAST  916   13,2714   00303 1                    MOONFLAG
0444   REF  28  LAST 1314   13,2715   00051 0                    S2
0445   REF  23  LAST 1315   13,2716   04223 0                    CMOONFLG
0446   REF  29  LAST 1315   13,2717   00051 0                    S2
0447   REF   1               13,2720   0 3064 0 MOVEACSM  TC     SETBANK
0448   REF   2  LAST   85    13,2721   55'500 1          TS      DIFEQCNT      INITIALIZE INDEX
0449   REF   3  LAST 1315   13,2722   51'500 0          INDEX   DIFEQCNT
0450   REF   5  LAST 1277   13,2723   3 1502 1          CA      RRECT
0451   REF   4  LAST 1315   13,2724   51'500 0          INDEX   DIFEQCNT
0452   REF   7  LAST 1313   13,2725   55'554 0          TS      RRECTCSM
0453   REF   5  LAST 1315   13,2726   11'500 1          CCS     DIFEQCNT      IS TRANSFER COMPLETE
0454   REF   4  LAST 1314   13,2727   1 2721 0          TCF     MOVEACSM +1   NO-LOOP
0455   REF  63  LAST 1286   13,2730   0 6030 1          TC      DANZIG        COMPLETE- RETURN

R0456  PTOACSM TRANSFERS RRECTCSM TO RRECTCSM +41 TO RRECT TO RRECT +41

R0457  CALLING SEQUENCE
R0458     L   CALL
R0459             PTOACSM

R0460  NORMAL EXIT AT L+2
0461                        13,2731   43034 1 PTOACSM  RTB     BON
0462   REF   2  LAST 1260   13,2732   26747 1                    MOVEPCSM
0463   REF  24  LAST 1315   13,2733   04303 0                    CMOONFLG
0464   REF   1               13,2734   26742 1                    SETMOON
0465                        13,2735   66214 0 CLRMOON  CLEAR   SSP
0466   REF  15  LAST 1315   13,2736   00263 0                    MOONFLAG
0467   REF   4  LAST 1259   13,2737   02151 0                    PBODY
0468                        13,2740   00000 1                    0
0469                        13,2741   77616 0          RVQ
0470                        13,2742   66214 0 SETMOON  SET     SSP
0471   REF  16  LAST 1315   13,2743   00063 1                    MOONFLAG
0472   REF   5  LAST 1315   13,2744   02151 0                    PBODY
0473                        13,2745   00002 0                    2
0474                        13,2746   77616 0          RVQ
0475   REF   2  LAST 1315   13,2747   0 3064 0 MOVEPCSM  TC     SETBANK
0476   REF   6  LAST 1315   13,2750   55'500 1          TS      DIFEQCNT
0477   REF   7  LAST 1315   13,2751   51'500 0          INDEX   DIFEQCNT
0478   REF   8  LAST 1315   13,2752   3 1554 1          CA      RRECTCSM
0479   REF   8  LAST 1315   13,2753   51'500 0          INDEX   DIFEQCNT
0480   REF   6  LAST 1315   13,2754   55'502 0          TS      RRECT
0481   REF   9  LAST 1315   13,2755   11'500 1          CCS     DIFEQCNT
0482   REF   3  LAST 1315   13,2756   1 2750 0          TCF     MOVEPCSM +1
0483   REF  64  LAST 1315   13,2757   0 6030 1          TC      DANZIG
```

R0484 ATOPLEM TRANSFERS RRECT TO RRECT +41 TO RRECTLEM TO RRECTLEM +41

```
0485                                13,2760   47020 0  ATOPLEM  STQ    RTB
0486  REF  30  LAST 1315           13,2761   00051 0                   S2
0487  REF   2  LAST 1259           13,2762   26773 0                   MOVEALEM
0488                                13,2763   45014 0           SET     CALL
0489  REF   3  LAST  588           13,2764   04064 1                   LMOONFLG
0490  REF   3  LAST 1259           13,2765   20263 1                   SVDWN2
0491                                13,2766   43014 0           BON     CLRGO
0492  REF  17  LAST 1315           13,2767   00303 1                   MOONFLAG
0493  REF  31  LAST 1316           13,2770   00051 0                   S2
0494  REF   4  LAST 1316           13,2771   04224 1                   LMOONFLG
0495  REF  32  LAST 1316           13,2772   00051 0                   S2
0496  REF   3  LAST 1315           13,2773   0 3064 0  MOVEALEM TC     SETBANK
0497  REF  10  LAST 1315           13,2774   55'500 1          TS      DIFEQCNT
0498  REF  11  LAST 1316           13,2775   51'500 0          INDEX   DIFEQCNT
0499  REF   7  LAST 1315           13,2776   3 1502 1          CA      RRECT
0500  REF  12  LAST 1316           13,2777   51'500 0          INDEX   DIFEQCNT
0501  REF   2  LAST   86           13,3000   55'626 0          TS      RRECTLEM
0502  REF  13  LAST 1316           13,3001   11'500 1          CCS     DIFEQCNT
0503  REF   3  LAST 1316           13,3002   1 2774 0          TCF     MOVEALEM +1
0504  REF  65  LAST 1315           13,3003   0 6030 1          TC      DANZIG
```

R0505 PTOALEM TRANSFERS RRECTLEM TO RRECTLEM +41 TO RRECT TO RRECT +41

```
0506                                13,3004   47014 1  PTOALEM  BON    RTB
0507  REF   7  LAST  509           13,3005   04307 1                   SURFFLAG
0508  REF   1                       13,3006   27025 0                   USEPIOS
0509  REF   2  LAST 1259           13,3007   27014 1                   MOVEPLEM
0510                                13,3010   52014 0           BON     GOTO
0511  REF   5  LAST 1316           13,3011   04304 1                   LMOONFLG
0512  REF   2  LAST 1315           13,3012   26742 1                   SETMOON
0513  REF   1                       13,3013   26735 1                   CLRMOON
0514  REF   4  LAST 1316           13,3014   0 3064 0  MOVEPLEM TC     SETBANK
0515  REF  14  LAST 1316           13,3015   55'500 1          TS      DIFEQCNT
0516  REF  15  LAST 1316           13,3016   51'500 0          INDEX   DIFEQCNT
0517  REF   3  LAST 1316           13,3017   3 1626 1          CA      RRECTLEM
0518  REF  16  LAST 1316           13,3020   51'500 0          INDEX   DIFEQCNT
0519  REF   8  LAST 1316           13,3021   55'502 0          TS      RRECT
0520  REF  17  LAST 1316           13,3022   11'500 1          CCS     DIFEQCNT
0521  REF   3  LAST 1316           13,3023   1 3015 1          TCF     MOVEPLEM +1
0522  REF  66  LAST 1316           13,3024   0 6030 1          TC      DANZIG


0523                                13,3025   77201 1  USEPIOS  SETPD  VLOAD
0524                                13,3026   00001 0                   0
0525  REF  10  LAST 1242           13,3027   02026 1                   RLS
0526                                13,3030   41525 0           PDDL    PUSH
0527  REF  49  LAST 1314           13,3031   00041 1                   TDEC1
```

```
0528  REF  13  LAST  915   13,3032  15517 0        STODL  TET
0529  REF   1              13,3033  27755 0               5/8
0530                       13,3034  77624 1        CALL
0531  REF   6  LAST 1238   13,3035  55344 1               RP-TO-R
0532  REF  16  LAST 1281   13,3036  25535 0        STOVL  RCV
0533  REF   2  LAST   34   13,3037  11560 1               ZUNIT
0534                       13,3040  14001 0        STODL  OD
0535  REF  14  LAST 1317   13,3041  01517 0               TET
0536                       13,3042  14007 0        STODL  6D
0537  REF   2  LAST 1317   13,3043  27755 0               5/8
0538                       13,3044  45014 0        SET    CALL          NEEDED FOR SETTING X1 ON EXIT
05381 REF  18  LAST 1316   13,3045  00063 1               MOONFLAG
0539  REF   7  LAST 1317   13,3046  55344 1               RP-TO-R
0540                       13,3047  74235 0        VXV    VXSC
0541  REF  17  LAST 1317   13,3050  01535 0               RCV
0542  REF   1              13,3051  27063 1               OMEGMOON
0543  REF  15  LAST 1282   13,3052  25543 1        STOVL  VCV
0544  REF  14  LAST 1238   13,3053  11566 1               ZEROVEC
0545  REF   6  LAST 1259   13,3054  01521 0        STORE  TDELTAV
0546                       13,3055  67174 1        AXT,2  SXA,2
0547                       13,3056  00002 0               2
0548  REF   6  LAST 1315   13,3057  02150 1               PBODY
0549  REF   6  LAST 1259   13,3060  35527 1        STCALL TNUV
0550  REF   1              13,3061  27176 1               A-PCHK
0551                       13,3062   07112 1  OMEGMOON 2DEC*  2.66169947 E-8 B+23*
0551                       13,3063   06620 0
0552  REF   1              13,3064  3 3070 0  SETBANK  CAF    INTBANK
0553  REF  30  LAST 1232   13,3065  54 006 0           TS     BBANK
0554  REF   1              13,3066  3 3507 0           CAF    FORTYONE
0555  REF 306  LAST 1234   13,3067  0 0002 0           TC     Q
0556  REF   9  LAST 1315   E3,1554                     EBANK= RRECTCSM
0557  REF  11  LAST  623   13,3070   26063 0  INTBANK  BBCON  INTEGRV


R0558   SPECIAL PURPOSE ENTRIES TO ORBITAL INTEGRATION. THESE ROUTINES PROVIDE ENTRANCES TO INTEGRATION WITH
R0560   APPROPRIATE SWITCHES SET OR CLEARED FOR THE DESIRED INTEGRATION.

R0561   CSMPREC AND LEMPREC PERFORM ORBIT INTEGRATION BY THE ENCKE METHOD TO THE TIME INDICATED IN TDEC1
R0563   ACCELERATIONS DUE TO OBLATENESS ARE INCLUDED. NO W-MATRIX INT. IS DONE.
R0564   THE PERMANENT STATE VECTOR IS NOT UPDATED.
R0565   CSMCONIC AND LEMCONIC PERFORM ORBIT INTEG. BY KEPLERS METHOD TO THE TIME INDICATED IN TDEC1
R0567   NO DISTURBING ACCELERATIONS ARE INCLUDED. IN THE PROGRAM FLOW THE GIVEN
R0568   STATE VECTOR IS RECTIFIED BEFORE SOLUTION OF KEPLERS EQUATION

R0569   THE ROUTINES ASSUME THAT THE CSM (LEM) STATE VECTOR IN P-MEM IS VALID.
R0570   SWITCHES SET PRIOR TO ENTRY TO THE MAIN INTEG. PROG ARE AS FOLLOWS
R0571                  CSMPREC  CSMCONIC   LEMPREC  LEMCONIC
R0572   VINTFLAG       SET      SET        CLEAR    CLEAR
R0573   INTYPFLG       CLEAR    SET        CLEAR    SET
R0574   DIMOFLAG       CLEAR    CLEAR      CLEAR    CLEAR
```

L INTEGRATION INITIALIZATION USER'S PAGE NO. 10 E3 S3

```
R0575   CALLING SEQUENCE
R0576     L-X  STORE TDEC1
R0577     L    CALL       (STCALL TDEC1)
R0578     L+1             CSMPREC (CSMCONIC, LEMPREC, LEMCONIC)

R0579    NORMAL EXIT TO L+2


R0580   SUBROUTINES CALLED
R0581     INTEGRV1
R0582     PRECOUT FOR CSMPREC AND LEMPREC
R0583     CONICOUT  FOR CSMCONIC AND LEMCONIC


R0584   OUTPUT - SEE PAGE 2 OF THIS LOG SECTION
R0585   INPUT
R0586    TDEC1   TIME TO INTEGRATE TO . CSECS B-28
 0587                          13,3071   45020 1  CSMPREC  STQ     CALL
 0588   REF  89  LAST 1303     13,3072   00046 0                   X1
 0589   REF  24  LAST 1314     13,3073   27442 0                   INTSTALL
 0590                          13,3074   43130 1           SXA,1   SET
 0591   REF   2  LAST   89     13,3075   02214 1                   IRETURN
 0592   REF  12  LAST  610     13,3076   01474 1                   VINTFLAG
 0593                          13,3077   43014 0  IFLAGP   SET     CLEAR
 0594   REF   3  LAST  210     13,3100   01467 0                   PRECIFLG
 0595   REF  14  LAST 1314     13,3101   01676 1                   DIMOFLAG
 0596                          13,3102   77614 1           CLRGO
 05961  REF  16  LAST 1314     13,3103   01633 0                   INTYPFLG
 05962  REF   1                13,3104   27164 1                   INTEGRV1
 0597                          13,3105   45020 1  LEMPREC  STQ     CALL
 0598   REF  90  LAST 1318     13,3106   00046 0                   X1
 0599   REF  25  LAST 1318     13,3107   27442 0                   INTSTALL
 0600                          13,3110   43130 1           SXA,1   CLRGO
 0601   REF   3  LAST 1318     13,3111   02214 1                   IRETURN
 0602   REF  13  LAST 1318     13,3112   01634 1                   VINTFLAG
 0603   REF   1                13,3113   27077 1                   IFLAGP

 0604                          13,3114   45020 1  CSMCONIC STQ     CALL
 0605   REF  91  LAST 1318     13,3115   00046 0                   X1
 0606   REF  26  LAST 1318     13,3116   27442 0                   INTSTALL
 0607                          13,3117   43130 1           SXA,1   SET
 0608   REF   4  LAST 1318     13,3120   02214 1                   IRETURN
 0609   REF  14  LAST 1318     13,3121   01474 1                   VINTFLAG
 0610                          13,3122   43014 0  IFLAGC   CLEAR   SETGO
 0611   REF  15  LAST 1318     13,3123   01676 1                   DIMOFLAG
 0612   REF  17  LAST 1318     13,3124   01433 1                   INTYPFLG
 0613   REF   2  LAST 1318     13,3125   27164 1                   INTEGRV1
 0614                          13,3126   45020 1  LEMCONIC STQ     CALL
 0615   REF  92  LAST 1318     13,3127   00046 0                   X1
```

```
0616   REF  27  LAST 1318   13,3130   27442 0                  INTSTALL
0617                        13,3131   43130 1          SXA,1   CLRGO
0618   REF   5  LAST 1318   13,3132   02214 1                  IRETURN
0619   REF  15  LAST 1318   13,3133   01634 1                  VINTFLAG
0620   REF   1              13,3134   27122 0                  IFLAGC

0621                        13,3135   66214 0 INTEGRVS SET     SSP
0622   REF   4  LAST 1318   13,3136   01467 0                  PRECIFLG
0623   REF   7  LAST 1317   13,3137   02151 0                  PBODY
0624                        13,3140   00000 1                  0
0625                        13,3141   66214 0          BOF     SSP
0626   REF  19  LAST 1317   13,3142   00343 0                  MOONFLAG
0627                        13,3143   27146 1                  +3
0628   REF   8  LAST 1319   13,3144   02151 0                  PBODY
06281                       13,3145   00002 0                  2
0629                        13,3146   77220 1          STQ     VLOAD
0630   REF   6  LAST 1319   13,3147   02214 1                  IRETURN
0631   REF  15  LAST 1317   13,3150   11566 1                  ZEROVEC
0632   REF   7  LAST 1317   13,3151   01521 0          STORE   TDELTAV
0633   REF   7  LAST 1317   13,3152   35527 1          STCALL  TNUV
0634   REF   2  LAST 1259   13,3153   23421 1                  RECTIFY
0635                        13,3154   43014 0          CLEAR   SET
0636   REF  16  LAST 1318   13,3155   01676 1                  DIMOFLAG
0637   REF   1              13,3156   04062 1                  NEWIFLG
06371                       13,3157   77614 1                  SETGO
06372  REF   1              13,3160   04020 1                  RPQFLAG
0638   REF   1              13,3161   22363 1                  ALOADED
R0639  INTEGRV IS AN ENTRY TO ORBIT INTEGRATION WHICH PERMITS THE CALLER ,
R0640  NORMALLY THE NAVIGATION PROGRAM ,TO SET THE INTEG. FLAGS. THE ROUTINE
R0641  IS ENTERED AT INTEGRV1 BY CSMPREC ET.AL. AND AT ALOADED BY INTEGRVS.
R0642  THE ROUTINE SETS UP A-MEMORY IF ENTERED AT INTEGRV,1 AND SETS THE INTEG.
R0643  PROGRAM FOR PRECISION OR CONIC

R0644  THE CALLER MUST FIRST CALL INTSTALL TO CHECK IF INTEG. IS IN USE BEFORE
R0645  SETTING ANY FLAGS.
R0646  THE FLAGS WHICH SHOULD BE SET OR CLEARED ARE
R0647    VINTFLAG    (IGNORED WHEN ENTERED FROM INTEGRVS)
R0648    INTYPFLG
R0649    DIMOFLAG
R0650    D6OR9FLG
R0651  CALLING SEQUENCE
R0652    L-X    CALL
R0653    L-Y           INTSTALL
R0654    L-1    SET OR CLEAR ALL FOUR FLAGS. ALSO CAN SET STATEFLG IF DESIRED
R0655           AND DIMOFLAG IS CLEAR.
R0656    L      CALL
R0657    L+1           INTEGRV
R0658  INITIALIZATION
R0659    FLAGS AS ABOVE
R0660    STORE TIME TO INTEGRATE TO IN TDEC1
```

R0661 OUTPUT
R0662 RATT AS
R0663 VATT DEFINED
R0664 TAT BEFORE

```
0665                                13,3162   77620 0  INTEGRV  STQ
0666  REF   7  LAST 1319           13,3163   02214 1                   IRETURN
0667                                13,3164   43014 0  INTEGRV1 SET     SET
0668  REF   2  LAST 1319           13,3165   04060 0                   RPQFLAG
0669  REF   2  LAST 1319           13,3166   04062 1                   NEWIFLG
0670                                13,3167   77731 1  INTEGRV2 SSP
0671  REF  20  LAST 1260           13,3170   00053 1                   QPRET
0672  REF   2  LAST 1319           13,3171   22363 1                   ALOADED
0673                                13,3172   52014 0           BON     GOTO
0674  REF  16  LAST 1319           13,3173   01714 1                   VINTFLAG
0675  REF   2  LAST  264           13,3174   26731 0                   PTOACSM
0676  REF   1                      13,3175   27004 0                   PTOALEM
06765 REF   1                      11,2000                     SETLOC  INTINIT1
06766                              11,2363                     BANK
0677                               11,2363   77745 1  ALOADED  DLOAD
0678  REF  50  LAST 1316           11,2364   00041 1                   TDEC1
0679  REF   2  LAST   78           11,2365   01101 0           STORE   TDEC
0680                               11,2366   52014 0           BOFF    GOTO
0681  REF  18  LAST 1318           11,2367   01753 1                   INTYPFLG
0682  REF   1                      11,2370   27305 1                   TESTLOOP
0683  REF   1                      11,2371   27271 0                   RVCON
06835 REF   3  LAST 1313           13,2000                     SETLOC  INTINIT
06836                              13,3176                     BANK
0684                               13,3176   45014 0  A-PCHK   BOF     CALL
0685  REF   1                      13,3177   00342 1                   MIDFLAG
0686  REF   1                      13,3200   27205 0                   ANDOUT          DONT MAKE ORIGIN CHANGE CHECK
0687  REF   1                      13,3201   23320 1                   CHKSWTCH
0688                               13,3202   45044 0           BPL     CALL
0689  REF   2  LAST 1320           13,3203   27205 0                   ANDOUT          NO ORIGIN CHANGE
0690  REF   1                      13,3204   23361 1                   ORIGCHNG        MAKE THE SWITCH
0691                               13,3205   77414 0  ANDOUT   BOFCLR  EXIT
0692  REF   5  LAST 1314           13,3206   01652 1                   STATEFLG
0693  REF   1                      13,3207   27226 1                   RECTOUT
0694  REF  97  LAST 1314           13,3210  0 5412 0           TC      PHASCHNG
0695                               13,3211    04022 0          OCT     04022
0696  REF  52  LAST 1257           13,3212  0 5546 0           TC      UPFLAG          PHASE CHANGE HAS OCCURRED BETWEEN
0697  REF   3  LAST 1257           13,3213    00236 0          ADRES   REINTFLG        INTSTALL AND INTWAKE
0698  REF 235  LAST 1313           13,3214  0 6006 1           TC      INTPRET
0699                               13,3215    77731 1          SSP
0700  REF  21  LAST 1320           13,3216    00053 1                 QPRET
0701  REF   1                      13,3217    27224 0                 PHEXIT
0702                               13,3220    52014 0          BON     GOTO
0703  REF  17  LAST 1320           13,3221    01714 1                 VINTFLAG
0704  REF   2  LAST   34           13,3222    26705 1                 ATOPCSM
```

```
0705   REF   2 LAST   34   13,3223   26760 1                    ATOPLEM
0706                       13,3224   77624 1  PHEXIT   CALL
0707   REF  24 LAST 1260   13,3225   56750 0                    GRP2PC
0708                       13,3226   45001 1  RECTOUT  SETPD    CALL
0709                       13,3227   00001 0                    0
0710   REF   3 LAST 1319   13,3230   23421 1                    RECTIFY
0711                       13,3231   53775 1           VLOAD    VSL*
0712   REF   9 LAST 1316   13,3232   01503 0                    RRECT
0713                       13,3233   57576 1                    0,2
0714                       13,3234   53715 1           PDVL     VSL*          RATT TO PDO
0715   REF   6 LAST 1282   13,3235   01511 0                    VRECT
0716                       13,3236   57576 1                    0,2
0717                       13,3237   63325 0           PDDL     PDVL          VATT TO PD6    TAT TO PD12
0718   REF  15 LAST 1317   13,3240   01517 0                    TET
0719   REF  10 LAST 1321   13,3241   01503 0                    RRECT
0720                       13,3242   64715 0           PDVL     PDDL*
0721   REF   7 LAST 1321   13,3243   01511 0                    VRECT
0722   REF   2 LAST  488   13,3244   50042 1                    MUEARTH,2
0723                       13,3245   76006 0           PUSH     AXT,1
0724                       13,3246   77765 0           DEC      -10
0725                       13,3247   76014 0           BON      AXT,1
0726   REF  20 LAST 1319   13,3250   00303 1                    MOONFLAG
0727                       13,3251   27253 0                    +2
0728                       13,3252   77775 1           DEC      -2
0729                       13,3253   40001 1  INTEXIT  SETPD    BOV
0730                       13,3254   00001 0                    0
0731                       13,3255   27256 0                    +1
07311                      13,3256   77614 1           CLEAR
07312  REF   1             13,3257   04675 1                    MIDAVFLG
0732                       13,3260   43014 0           CLEAR    CLEAR
0733   REF   2 LAST  289   13,3261   04676 1                    AVEMIDSW      ALLOW UPDATE OF DOWNLINK STATE VECTOR
0734   REF   5 LAST 1319   13,3262   01667 1                    PRECIFLG
0735                       13,3263   77535 1           SLOAD    EXIT
0736   REF   8 LAST 1320   13,3264   02215 0                    IRETURN
0737   REF 652 LAST 1298   13,3265  3 0154 1           CA       MPAC
0738   REF  38 LAST 1286   13,3266  50 120 1           INDEX    FIXLOC
0739   REF  22 LAST 1320   13,3267  54 052 1           TS       QPRET
0740   REF   4 LAST 1260   13,3270   0 3457 1           TC       INTWAKE
R0741  RVCON SETS UP ORBIT INTEGRATION TO DO A CONIC SOLUTION FOR POSITION AND
R0742  VELOCITY FOR THE INTERVAL (TET-TDEC)

0743                       13,3271   45345 1  RVCON    DLOAD    DSU
0744   REF   3 LAST 1320   13,3272   01101 0                    TDEC
0745   REF  16 LAST 1321   13,3273   01517 0                    TET
0746   REF  10 LAST 1280   13,3274   36312 1           STCALL   TAU.
0747   REF   4 LAST 1321   13,3275   23421 1                    RECTIFY
0748                       13,3276   77624 1           CALL
0749   REF   1             13,3277   22372 1                    KEPPREP
0750                       13,3300   43345 1           DLOAD    DAD
0751   REF   6 LAST 1282   13,3301   01551 1                    TC
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L INTEGRATION INITIALIZATION

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0752   REF  17  LAST 1321   13,3302   01517 0          TET
0753   REF  18  LAST 1322   13,3303   35517 1    STCALL TET
0754   REF   2  LAST 1320   13,3304   27226 1           RECTOUT
```

```
P0755                    TESTLOOP

0756                                 13,3305   43014 0  TESTLOOP BOF     CLRGO
0757   REF    4  LAST 1314           13,3306   04752 0                   QUITFLAG
0758                                 13,3307   27312 1                   +3
0759   REF    6  LAST 1320           13,3310   01632 1                   STATEFLG
0760   REF    1                     13,3311   27253 0                   INTEXIT          STOP INTEGRATION
0761                                 13,3312   73001 1  +3       SETPD   LXA,2
0762                                 13,3313   00013 0                   10D
0763   REF    9  LAST 1319           13,3314   02150 1                   PBODY
0764                                 13,3315   51575 1           VLOAD   ABVAL
0765   REF   18  LAST 1317           13,3316   01535 0                   RCV
0766                                 13,3317   43006 0           PUSH    CLEAR            RC TO 10D
0767   REF    2  LAST 1320           13,3320   00262 1                   MIDFLAG
0768                                 13,3321   50023 0           DSU*    BMN              MIDFLAG=0 IF R G.T. RMP
0769   REF    1                     13,3322   67212 1                   RME,2
0770                                 13,3323   27326 0                   +3
0771                                 13,3324   77614 1           SET
0772   REF    3  LAST 1323           13,3325   00062 0                   MIDFLAG
0773                                 13,3326   41345 0  NORFINAL DLOAD   DMP
0774                                 13,3327   00013 0                   10D
0775                                 13,3330   00043 0                   34D
0776                                 13,3331   55762 1           SRIR    DDV*
0777   REF    3  LAST 1321           13,3332   50042 1                   MUEARTH,2
0778                                 13,3333   41366 1           SQRT    DMP
0779   REF    1                     13,3334   23752 0                   .3D
0780                                 13,3335   40442 1           SR3     SR4              DT   IS TRUNCATED TO A MULTIPLE
0781                                 13,3336   54345 1           DLOAD   SL
0782   REF  653  LAST 1321           13,3337   00155 0                   MPAC
0783                                 13,3340   20220 0                   15D                   OF 128 CSECS.
0784                                 13,3341   40006 0           PUSH    BOV
0785   REF    1                     13,3342   27367 0                   MAXDT
0786                                 13,3343   50021 1           BDSU    BMN
0787   REF    1                     13,3344   27441 0                   DT/2MAX
0788   REF    2  LAST 1323           13,3345   27367 0                   MAXDT
0789                                 13,3346   45345 1  DT/2COMP DLOAD   DSU
0790   REF    4  LAST 1321           13,3347   01101 0                   TDEC
0791   REF   19  LAST 1322           13,3350   01517 0                   TET
0792                                 13,3351   54234 0           RTB     SL
0793   REF    4  LAST  760           13,3352   45544 0                   SGNAGREE
0794                                 13,3353   20211 1                   8D
0795   REF    2  LAST   90           13,3354   02314 0           STORE   DT/2            B-19
0796                                 13,3355   51400 1           BOV     ABS
0797   REF    1                     13,3356   27373 0                   GETMAXDT
0798                                 13,3357   50025 0           DSU     BMN              IS TIME TO INTEG. TO GR THAN MAXTIME
0799                                 13,3360   00015 0                   12D
0800   REF    1                     13,3361   27377 1                   POOHCHK
0801                                 13,3362   75345 1  USEMAXDT DLOAD   SIGN
0802                                 13,3363   00015 0                   12D
0803   REF    3  LAST 1323           13,3364   02314 0                   DT/2
```

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0804   REF   4  LAST 1323   13,3365   36314 1                STCALL DT/2
0805   REF   2  LAST 1323   13,3366   27377 1                       POOHCHK
0806                        13,3367   65345 0  MAXDT         DLOAD  PDDL          EXCHANGE DT/2MAX WITH COMPUTED MAX.
0807   REF   2  LAST 1323   13,3370   27441 0                       DT/2MAX
0808                        13,3371   77650 1                GOTO
0809   REF   1              13,3372   27346 0                       DT/2COMP
0810                        13,3373   77634 0  GETMAXDT      RTB
0811   REF  15  LAST  872   13,3374   45712 1                       SIGNMPAC
0812   REF   5  LAST 1324   13,3375   36314 1                STCALL DT/2
0813   REF   1              13,3376   27362 0                       USEMAXDT
0814                        13,3377   51545 1  POOHCHK       DLOAD  ABS
0815   REF   6  LAST 1324   13,3400   02314 0                       DT/2
0816                        13,3401   50025 0                DSU    BMN
0817   REF   1              13,3402   27437 1                       DT/2MIN
0818   REF   2  LAST 1317   13,3403   27176 1                       A-PCHK
0819                        13,3404   46135 1                SLOAD  BHIZ
0820   REF  14  LAST  757   13,3405   01012 0                       MODREG
0821                        13,3406   27411 0                       +3
0822                        13,3407   77650 1                GOTO
0823   REF   1              13,3410   23240 0                       TIMESTEP
0824                        13,3411   77614 1                BON                  WAS THIS CALL VIA CSM(LEM)PREC
0825   REF   6  LAST 1321   13,3412   01707 0                       PRECIFLG
0826   REF   2  LAST 1324   13,3413   23240 0                       TIMESTEP       YES
0827                        13,3414   45345 1                DLOAD  DSU
0828   REF   7  LAST 1324   13,3415   02314 0                       DT/2
0829                        13,3416   00015 0                       12D
0830                        13,3417   43040 1                BMN    BOFCLR
0831   REF   3  LAST 1324   13,3420   27176 1                       A-PCHK
0832   REF   3  LAST 1320   13,3421   04242 1                       NEWIFLG
0833   REF   3  LAST 1324   13,3422   23240 0                       TIMESTEP
0834                        13,3423   45345 1                DLOAD  DSU
0835   REF   5  LAST 1323   13,3424   01101 0                       TDEC
0836   REF  20  LAST 1323   13,3425   01517 0                       TET
0837                        13,3426   77640 0                BMN                  NO BACKWARD INTEGRATION
0838   REF   2  LAST 1323   13,3427   27253 0                       INTEXIT
0839                        13,3430   40525 1                PDDL   SR4
0840   REF   8  LAST 1324   13,3431   02314 0                       DT/2           IS 4(DT) LS(TDEC - TET)
0841                        13,3432   44322 1                SR2R   BDSU           NO
0842                        13,3433   52040 1                BMN    GOTO
0843   REF   3  LAST 1324   13,3434   27253 0                       INTEXIT
0844   REF   4  LAST 1324   13,3435   23240 0                       TIMESTEP
0845                        13,3436   00000 1  DT/2MIN       2DEC   3 B-20
0845                        13,3437   01400 1
0846                        13,3440   14152 1  DT/2MAX       2DEC   4000 E2 B-20
0846                        13,3441   00000 1
0847                        13,3442   77776 1  INTSTALL      EXIT
0848   REF 259  LAST 1256   13,3443   3 5021 1                CAF    ZERO
0849   REF 171  LAST 1231   13,3444   54 001 1 ALLSTALL      TS     L
0850   REF   5  LAST  188   13,3445   3 0106 0                CA     RASFLAG
0851   REF 172  LAST 1324   13,3446   50 001 0                INDEX  L
```

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```
0852   REF   1                13,3447  7 3540 1            MASK    INTBITAB        IS THIS STALL AREA FREE
0853                          13,3450  0 0006 1            EXTEND
0854   REF   1                13,3451  1 3516 1            BZF     OKTOGRAB        YES
0855   REF 173  LAST 1324     13,3452  50 001 0            INDEX   L
0856   REF   1                13,3453  3 3535 1            CAF     WAKESTAL
0857   REF   4  LAST  424     13,3454  0 5175 1            TC      JOBSLEEP
0858                          13,3455   77776 1 INTWAKE0    EXIT
0859   REF   2  LAST  513     13,3456  1 3477 1            TCF     INTWAKE1

0860   REF   6  LAST 1324     13,3457  4 0106 1 INTWAKE    CS      RASFLAG         IS THIS INTSTALLED ROUTINE TO BE
0861   REF   1                13,3460  7 5011 0            MASK    REINTBIT            RESTARTED
0862   REF 336  LAST 1229     13,3461  10 000 0            CCS     A
0863   REF   3  LAST 1325     13,3462  0 3477 0            TC      INTWAKE1        NO

0864   REF  39  LAST 1321     13,3463  50 120 1            INDEX   FIXLOC
0865   REF  23  LAST 1321     13,3464  3 0052 0            CA      QPRET
0866   REF   1                13,3465  55'055 1            TS      TBASE2          YES. DONT RESTART WITH SOMEONE ELSES Q

0867   REF  98  LAST 1320     13,3466  0 5412 0            TC      PHASCHNG
0868                          13,3467   04022 0            OCT     04022

0869   REF   2  LAST 1325     13,3470  3 1055 0            CA      TBASE2
0870   REF  40  LAST 1325     13,3471  50 120 1            INDEX   FIXLOC
0871   REF  24  LAST 1325     13,3472  54 052 1            TS      QPRET

0872   REF   2  LAST 1325     13,3473  3 5011 1            CAF     REINTBIT
0873   REF   7  LAST 1325     13,3474  7 0106 1            MASK    RASFLAG
0874                          13,3475  0 0006 1            EXTEND
0875   REF   1                13,3476  1 3521 0            BZF     GOBAC           DONT INTWAKE IF WE CAME HERE VIA RESTART

0876   REF 260  LAST 1324     13,3477  3 5021 1 INTWAKE1   CAF     ZERO
0877   REF   1                13,3500  54 154 0 WAKE       TS      STALTEM         INDEX OF ANY STALL USER
0878   REF   2  LAST 1325     13,3501  50 154 1 WAKE1      INDEX   STALTEM
0879   REF   2  LAST 1325     13,3502  3 3535 1            CAF     WAKESTAL
0880                          13,3503  0 0004 0            INHINT
0881   REF   5  LAST  424     13,3504  0 5201 1            TC      JOBWAKE
0882   REF  22  LAST 1216     13,3505  10 064 1            CCS     LOCCTR
0883   REF   1                13,3506  1 3501 1            TCF     WAKE1           MAY BE MORE TO WAKE UP
0884                          13,3507   00051 0 FORTYONE    DEC     41
0885   REF   3  LAST 1325     13,3510  50 154 1            INDEX   STALTEM
0886   REF   2  LAST 1325     13,3511  4 3540 1            CS      INTBITAB
0887   REF   8  LAST 1325     13,3512  7 0106 1            MASK    RASFLAG
0888   REF   9  LAST 1325     13,3513  54 106 1            TS      RASFLAG         RELEASE STALL AREA
0889                          13,3514  0 0003 1            RELINT
0890   REF   2  LAST 1325     13,3515  1 3521 0            TCF     GOBAC
0891   REF 174  LAST 1325     13,3516  50 001 0 OKTOGRAB   INDEX   L               NO, WAIT UNTIL AVAILABLE
0892   REF   2  LAST  187     13,3517  3 5002 0            CAF     INTFLBIT
0893   REF  10  LAST 1325     13,3520  26 106 1            ADS     RASFLAG
0894   REF 236  LAST 1320     13,3521  0 6006 1 GOBAC      TC      INTPRET
0895                          13,3522   77616 0            RVQ
```

```
0896                                13,3523   77776 1  ERASTAL1 EXIT
0897   REF 156  LAST 1286           13,3524   3 5017 1           CAF    ONE
0898   REF   1                     13,3525   1 3444 1           TCF    ALLSTALL
0899                                13,3526   77776 1  ERASTAL2 EXIT
0900   REF  68  LAST 1234           13,3527   3 5016 0           CAF    TWO
0901   REF   2  LAST 1326           13,3530   1 3444 1           TCF    ALLSTALL
0902   REF 157  LAST 1326           13,3531   3 5017 1  ERASWAK1 CAF    ONE
0903   REF   1                     13,3532   1 3500 0           TCF    WAKE
0904   REF  69  LAST 1326           13,3533   3 5016 0  ERASWAK2 CAF    TWO
0905   REF   2  LAST 1326           13,3534   1 3500 0           TCF    WAKE
0906   REF  28  LAST 1319           13,3535   27443 1   WAKESTAL CADR   INTSTALL +1
0907   REF   1                     13,3536   27524 1            CADR   ERASTAL1 +1
0908   REF   1                     13,3537   27527 1            CADR   ERASTAL2 +1
0909   REF 654  LAST 1323              0154             STALTEM EQUALS MPAC
0910                                13,3540   20100 1  INTBITAB OCT    20100
0911                                13,3541   10040 1           OCT    10040
0912                                13,3542   04020 1           OCT    04020
```

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P0913 AVETOMID

R0914 THIS ROUTINE PERFORMS THE TRANSITION FROM A THRUSTING PHASE TO THE COAST
R0915 PHASE BY INITIALIZING THIS VEHICLES PERMANENT STATE VECTOR WITH THE
R0916 VALUES LEFT BY THE AVERAGEG ROUTINE IN RN,VN,PIPTIME.

R0917 BEFORE THIS IS DONE THE W-MATRIX, IF ITS VALID (ORWFLAG OR RENDWFLG IS
R0918 SET) IS INTEGRATED FORWARD TO PIPTIME WITH THE PRE-THRUST STATE VECTOR.

R0919 IN ADDITION, THE OTHER VEHICLE IS INTEGRATED (PERMANENT) TO PIPTIME.

R0920 FINALLY TRKMKCNT IS ZEROED

```
0921  REF   1                 35,2000                        SETLOC  INTINIT2
0922                          35,3675                        BANK

0923  REF   1                                                COUNT*  $$/INTIN
0924                          35,3675   43020 1  AVETOMID    STQ     BON
0925  REF  14  LAST 1260      35,3676   02317 0              EGRESS
0926  REF  11  LAST  633      35,3677   02716 0              RENDWFLG
0927  REF   1                 35,3700   73753 1              INT/W           W-MATRIX VALID ,GO INTEGRATE IT
0928                          35,3701   77614 1              BON
0929  REF  12  LAST  633      35,3702   01711 1              ORBWFLAG
0930  REF   2  LAST 1327      35,3703   73753 1              INT/W           W-MATRIX VALID ,GO INTEGRATE IT

0946                          35,3704   45174 1  SETCOAST    AXT,2   CALL    NOW MOVE PROPERLY SCALED RN,VN AND
0947                          35,3705   00002 0              2               PIPTIME TO INTEGRATION ERASABLES.
0948  REF  29  LAST 1326      35,3706   27442 0              INTSTALL
0949                          35,3707   77014 1              BON     AXT,2
0950  REF   3  LAST  546      35,3710   00315 0              AMOONFLG
0951                          35,3711   73713 0              +2
0952                          35,3712   00000 1              0
0953                          35,3713   53775 1              VLOAD   VSR*
0954  REF  17  LAST  836      35,3714   01171 1              RN
0955                          35,3715   57176 0              0,2
0956  REF  11  LAST 1321      35,3716   01503 0              STORE   RRECT
0957  REF  19  LAST 1323      35,3717   15535 0              STODL   RCV
0958  REF  16  LAST 1068      35,3720   01205 1              PIPTIME
0959  REF  21  LAST 1324      35,3721   25517 0              STOVL   TET
0960  REF  18  LAST  888      35,3722   01177 1              VN
0961                          35,3723   45057 1              VSR*    CALL
0962                          35,3724   57176 0              0,2
0963  REF   2  LAST  512      35,3725   23435 1              MINIRECT        FINISH SETTING UP STATE VECTOR
0964                          35,3726   66234 1              RTB     SSP
0965  REF   1                 35,3727   26720 0              MOVATHIS        PUT TEMP STATE VECTOR INTO PERMANENT
0966  REF   8  LAST  897      35,3730   01127 1              TRKMKCNT
0967                          35,3731   00000 1              0
0968                          35,3732   43014 0              SET     BON
0969  REF  25  LAST 1315      35,3733   04063 0              CMOONFLG
```

```
0970   REF   4  LAST 1327   35,3734   00315 0                AMOONFLG
0971                        35,3735   73740 0                +3
0972                        35,3736   77614 1          CLEAR
0973   REF  26  LAST 1327   35,3737   04263 1                CMOONFLG

0974                        35,3740   71214 0          BON   DLOAD      NOW DO LM
0975   REF   8  LAST 1316   35,3741   04307 1                SURFFLAG
0976   REF   2  LAST 1260   35,3742   75751 0                FAZAB5     NO COASTING LM
0977   REF  17  LAST 1327   35,3743   01205 1                PIPTIME
0978   REF  51  LAST 1320   35,3744   34041 0          STCALL TOEC1
0979   REF   3  LAST 1314   35,3745   26670 1                SETIFLGS
0980                        35,3746   45014 0          CLEAR CALL
0981   REF  18  LAST 1320   35,3747   01674 0                VINTFLAG
0982   REF  12  LAST 1317   35,3750   27162 1                INTEGRV
0985                        35,3751   77650 1          GOTO
0986   REF  15  LAST 1327   35,3752   02317 0                EGRESS
0987                        35,3753   45145 0  INT/W   DLOAD  CALL
0988   REF  18  LAST 1328   35,3754   01205 1                PIPTIME    INTEGRATE W THRU BURN
0989   REF  30  LAST 1327   35,3755   27442 0                INTSTALL
0990                        35,3756   43014 0          SET   SET
0991   REF  17  LAST 1319   35,3757   01476 0                DIMOFLAG   DO W-MATRIX
0992   REF   3  LAST 1321   35,3760   04476 0                AVEMIDSW   SO WONT CLOBBER RN,VN,PIPTIME
0993                        35,3761   43014 0          CLEAR SET
0994   REF   6  LAST 1314   35,3762   01675 1                D60R9FLG
0995   REF  19  LAST 1328   35,3763   01474 1                VINTFLAG
0996   REF  52  LAST 1328   35,3764   34041 0          STCALL TDEC1
0997   REF  13  LAST 1328   35,3765   27162 1                INTEGRV
0998                        35,3766   77650 1          GOTO
0999   REF   1              35,3767   73704 0                SETCOAST
```

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P1000 MIDTOAV1

R1001 THIS ROUTINE INTEGRATES (PRECISION) TO THE TIME SPECIFIED IN TDEC1.
R1002 IF, AT THE END OF AN INTEGRATION TIME STEP, CURRENT TIME PLUS A DELTA
R1003 TIME (SEE TIMEDELT.....BASED ON THE COMPUTATUON TIME FOR ONE TIME STEP)
R1004 IS GREATER THAN THE DESIRED TIME, ALARM 1703 IS SET AND THE INTEGRATION
R1005 IS DONE AS IT IS FOR MIDTOAV2.
R1006 RETURN IS IN BASIC TO THE RETURN ADDRESS PLUS ONE.

R1007 IF THE INTEGRATION IS FINISHED TO THE DESIRED TIME, RETURN IS IN BASIC
R1008 TO THE RETURN ADDRESS

R1009 IN EITHER CASE , BEFORE RETURNING, THE EXTRAPOLATED STATE VECTOR IS TRAN
R1010 FERRED FROM R,VATT TO R,VN1-PIPTIME1 IS SET TO THE FINISHING INTEGRA-
R1011 TION TIME AND MPAC IS SET TO THE DELTA TIME---
R1012 TAT MINUS CURRENT TIME.

R1013 MIDTOAV2

R1014 THIS ROUTINE INTEGRATES THE CSM STATE VECTOR TO CURRENT TIME PLUS
R1015 INCREMENTS OF TIMEDELT SUCH THAT THE DIFFERENCE BETWEEN CURRENT TIME
R1016 AND THE STATE VECTOR TIME AT THE END OF THE LAST STEP IS AT LEAST 5.6
R1017 SECS.
R1018 NO INPUTS ARE REQUIRED OF THE CALLER. RETURN IS IN BASIC TO THE RETURN
R1019 ADDRESS WITH THE ABOVE TRANSFERS TO R,VN1-PIPTIME1-AND MPAC DONE

```
1020   REF   4  LAST 1320   13,2000                          SETLOC  INTINIT
1021                        13,3543                          BANK
1022   REF   2  LAST   78      1127                          EBANK=  IRETURN1
1023                        13,3543   45020 1  MIDTOAV2 STQ     CALL
1024   REF   3  LAST 1329   13,3544   01127 1                  IRETURN1
1025   REF  31  LAST 1328   13,3545   27442 0                  INTSTALL
1026                        13,3546   43145 0           DLOAD  CLEAR
1027   REF   1              13,3547   27711 0                  TIMEDELT
1028   REF   1              13,3550   04674 0                  MIDIFLAG
1029   REF   1              13,3551   37732 0           STCALL T-TO-ADD
1030   REF   1              13,3552   27567 0                  ENTMID2

1031                        13,3553   45020 1  MIDTOAV1 STQ     CALL
1032   REF   4  LAST 1329   13,3554   01127 1                  IRETURN1
1033   REF  32  LAST 1329   13,3555   27442 0                  INTSTALL
1034                        13,3556   47014 1           SET    RTB
1035   REF   2  LAST 1329   13,3557   04474 1                  MIDIFLAG
1036   REF  26  LAST 1313   13,3560   45510 1                  LOADTIME
1037                        13,3561   44215 1           DAD    BDSU            INITIAL CHECK.IS TDEC1 IN THE FUTURE.
1038   REF   2  LAST 1329   13,3562   27711 0                  TIMEDELT
1039   REF  53  LAST 1328   13,3563   00041 1                  TDEC1
1040                        13,3564   45044 0           BPL    CALL
1041   REF   1              13,3565   27573 0                  ENTMID1
```

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```
1042   REF   1                 13,3566   27674 1                    NOTIME          NO SET ALARM.SWITCH TO MIDTOAV2

1043                           13,3567   43234 0  ENTMID2  RTB      DAD
1044   REF  27  LAST 1329      13,3570   45510 1                    LOADTIME
1045   REF   2  LAST 1329      13,3571   03732 1                    T-TO-ADD
1046   REF  54  LAST 1329      13,3572   00041 1           STORE    TDEC1

1047                           13,3573   45014 0  ENTMID1  CLEAR    CALL
1048   REF  18  LAST 1328      13,3574   01676 1                    DIMOFLAG        NO W-MATRIX
1049   REF   1                 13,3575   26034 1                    THISVINT
1050                           13,3576   43014 0           CLEAR    SET
1051   REF  19  LAST 1320      13,3577   01673 1                    INTYPFLG
1052   REF   2  LAST 1321      13,3600   04475 0                    MIDAVFLG        LET INTEG. KNOW THE CALL IS FOR MIDTOAV.
1053                           13,3601   77624 1           CALL
1054   REF  14  LAST 1328      13,3602   27162 1                    INTEGRV          GO INTEGRATE
10541                          13,3603   66134 1           SXA,2    SXA,1
105415 REF  16  LAST  835      13,3604   03746 1                    RTX2
10542  REF  13  LAST  712      13,3605   03745 1                    RTX1
105425                         13,3606   67214 1           CLEAR    SLOAD
10543  REF   5  LAST 1328      13,3607   00275 1                    AMOONFLG
105435 REF  17  LAST 1330      13,3610   03747 0                    RTX2
10544                          13,3611   43054 1           BZE      SET
105445                         13,3612   27614 1                    +2
10545  REF   6  LAST 1330      13,3613   00075 0                    AMOONFLG
1055                           13,3614   77775 1           VLOAD
1056   REF  37  LAST  934      13,3615   00001 0                    RATT
1057   REF   9  LAST  836      13,3616   25232 0           STOVL    RN1
1058   REF  27  LAST  916      13,3617   00007 0                    VATT
1059   REF   4  LAST  836      13,3620   15240 0           STODL    VN1
1060   REF  11  LAST  934      13,3621   00015 0                    TAT
1061   REF   8  LAST  832      13,3622   01246 0           STORE    PIPTIME1
1071                           13,3623   77776 1           EXIT

1072                           13,3624   0 0004 0          INHINT
1073                           13,3625   0 0006 1          EXTEND
1074   REF  28  LAST 1096      13,3626   4 0025 1          DCS      TIME2
1075   REF 655  LAST 1326      13,3627   20 155 1          DAS      MPAC
1076   REF  10  LAST 1162      13,3630   0 7226 0          TC       TPAGREE

1077   REF   5  LAST 1329      13,3631   3 1127 1          CA       IRETURN1
1078   REF   7  LAST  575      13,3632   0 4704 0          TC       BANKJUMP
1079                           13,3633    47014 1 CKMID2   BOF      RTB
1080   REF   3  LAST 1329      13,3634    04754 0                   MIDIFLAG
1081   REF   1                 13,3635    27652 0                   MID2
1082   REF  28  LAST 1330      13,3636    45510 1                   LOADTIME
1083                           13,3637    44215 1          DAD      BDSU
1084   REF   3  LAST 1329      13,3640    27711 0                   TIMEDELT
1085   REF   6  LAST 1324      13,3641    01101 0                   TDEC
1086                           13,3642    45044 0          BPL      CALL
1087   REF   2  LAST 1320      13,3643    27305 1                   TESTLOOP        YES
```

```
1088   REF   2  LAST 1330   13,3644   27674 1                    NOTIME

1089                        13,3645   43234 0  TIMEINC  RTB     DAD
1090   REF  29  LAST 1330   13,3646   45510 1                    LOADTIME
1091   REF   3  LAST 1330   13,3647   03732 1                    T-TO-ADD
1092   REF   7  LAST 1330   13,3650   35101 1           STCALL   TDEC
1093   REF   3  LAST 1330   13,3651   27305 1                    TESTLOOP

1094                        13,3652   45345 1  MID2     DLOAD    DSU
1095   REF   8  LAST 1331   13,3653   01101 0                    TDEC
1096   REF  22  LAST 1327   13,3654   01517 0                    TET
1097                        13,3655   45246 0           ABS      DSU
1098   REF   1              13,3656   27707 1                    3CSECS
1099                        13,3657   77644 1           BPL
1100   REF   1              13,3660   27645 0                    TIMEINC

1101                        13,3661   44234 1           RTB      BDSU        SEE IF 5.6 SECS. AVAILABLE TO CALLER.
1102   REF  30  LAST 1331   13,3662   45510 1                    LOADTIME
1103   REF  23  LAST 1331   13,3663   01517 0                    TET
1104                        13,3664   51025 1           DSU      BPL
1105   REF   1              13,3665   27713 1                    5.6SECS
1106   REF   4  LAST 1324   13,3666   27176 1                    A-PCHK      YES.GET OUT.

1107                        13,3667   43345 1           DLOAD    DAD         NO,ADD TIMEDELT TO T-TO-ADD AND TRY
1108   REF   4  LAST 1331   13,3670   03732 1                    T-TO-ADD    AGAIN.
1109   REF   4  LAST 1330   13,3671   27711 0                    TIMEDELT
1110   REF   5  LAST 1331   13,3672   37732 0           STCALL   T-TO-ADD
1111   REF   2  LAST 1331   13,3673   27645 0                    TIMEINC
1112                        13,3674   77414 0  NOTIME   CLEAR    EXIT        TOO LATE
1113   REF   4  LAST 1330   13,3675   04674 0                    MIDIFLAG
1114   REF   6  LAST 1330   13,3676   25'127 1          INCR     IRETURN1    SET ERROR EXIT  (CALLOC +2)
1115   REF  35  LAST 1191   13,3677   0 5650 1          TC       ALARM       INSUFFICIENT TIME FOR INTEGRATION --
1116                        13,3700    01703 1          OCT      1703           TIG WILL BE SLIPPED...
1117   REF 237  LAST 1325   13,3701   0 6006 1          TC       INTPRET
1118                        13,3702    77745 1          DLOAD
1119   REF   5  LAST 1331   13,3703   27711 0                    TIMEDELT
1120   REF   6  LAST 1331   13,3704   03732 1           STORE    T-TO-ADD
1121                        13,3705   77616 0           RVQ

1122                        13,3706   00000 1  3CSECS   2DEC     3
1122                        13,3707   00003 1
1123                        13,3710   00000 1  TIMEDELT 2DEC     1250
1123                        13,3711   02342 0
1124                        13,3712   00000 1  5.6SECS  2DEC     560
1124                        13,3713   01060 0
1125                        27,2671                    BANK     27
1126   REF   1              27,2000                    SETLOC   UPDATE2
1127                        27,2671                    BANK
1128   REF   1                 0330                    EBANK=   INTWAKUQ
```

```
1129   REF   1                                          COUNT* $$/INTIN

1130   REF   1                  0330          INTWAKUQ =      INTWAK1Q        TEMPORARY UNTIL NAME OF INTWAK1Q IS CHNG

1131                      27,2671  0 0003 1  INTWAKEU RELINT
1132                      27,2672  0 0006 1           EXTEND
1133   REF   2  LAST 1331 27,2673  22 330 1           QXCH    INTWAKUQ        SAVE Q FOR RETURN

1134   REF 238  LAST 1331 27,2674  0 6006 1           TC      INTPRET

1135                      27,2675   53135 0           SLOAD   BZE             IS THIS A CSM/LEM STATE VECTOR UPDATE
1136   REF   3  LAST  193 27,2676   01502 1                   UPSVFLAG        REQUEST. IF NOT GO TO INTWAKUP.
1137   REF   1            27,2677   56736 0                   INTWAKUP

1138                      27,2700   77775 1           VLOAD                   MOVE RRECT(6) AND VRECT(6) INTO
1139   REF  12  LAST 1327 27,2701   01503 0                   RRECT                RCV(6)   AND VCV(6)   RESPECTIVELY.
1140   REF  20  LAST 1327 27,2702   25535 0           STOVL   RCV
1141   REF   8  LAST 1321 27,2703   01511 0                   VRECT           NOW GO TO 'RECTIFY +13D' TO
1142                      27,2704   77624 1           CALL                    STORE VRECT INTO VCV  AND ZERO OUT
1143   REF   5  LAST 1321 27,2705   23436 1                   RECTIFY +13D    TDELTAV(6),TNUV(6),TC(2) AND XKEP(2)
1144                      27,2706   51535 0           SLOAD   ABS             COMPARE ABSOLUTE VALUE OF 'UPSVFLAG'
1145   REF   4  LAST 1332 27,2707   01502 1                   UPSVFLAG        TO 'UPDATE MOON STATE VECTOR CODE'
1146                      27,2710   53025 0           DSU     BZE             TO DETERMINE WHETHER THE STATE VECTOR TO
1147   REF   1            27,2711   16747 1                   UPMNSVCD        BE UPDATED IS IN THE EARTH OR LUNAR
1148   REF   1            27,2712   56717 0                   INTWAKEM        SPHERE OF INFLUENCE.........
1149                      27,2713   43174 1             AXT,2 CLRGO           EARTH SPHERE OF INFLUENCE.
1150                      27,2714   00000 1             DEC   0
1151   REF  21  LAST 1321 27,2715   00223 1                   MOONFLAG
1152   REF   1            27,2716   56722 0                   INTWAKEC
1153                      27,2717   43174 1  INTWAKEM AXT,2   SET             LUNAR SPHERE OF INFLUENCE.
1154                      27,2720   00002 0             DEC   2
1155   REF  22  LAST 1332 27,2721   00063 1                   MOONFLAG
1156                      27,2722   50135 0  INTWAKEC SLOAD   BMN             COMMON CODING AFTER X2 INITIALIZED AND
A1157                                                                        MOONFLAG SET(OR CLEARED).
1158   REF   5  LAST 1332 27,2723   01502 1                   UPSVFLAG        IS THIS A REQUEST FOR A LEM OR CSM
1159   REF   1            27,2724   56732 1                   INTWAKLM         STATE VECTOR UPDATE......
1160                      27,2725   77624 1             CALL                  UPDATE CSM STATE VECTOR
1161   REF   3  LAST 1320 27,2726   26705 1                   ATOPCSM

1162                      27,2727   52014 0             CLEAR GOTO
1163   REF  13  LAST 1327 27,2730   01671 0                   ORBWFLAG
1164   REF   1            27,2731   56734 1                   INTWAKEX

1165                      27,2732   77624 1  INTWAKLM CALL                  UPDATE  LM STATE VECTOR
1166   REF   3  LAST 1321 27,2733   26760 1                   ATOPLEM

1167                      27,2734   77614 1  INTWAKEX CLEAR
1168   REF  12  LAST 1327 27,2735   02676 1                   RENDWFLG

1169                      27,2736   45131 0  INTWAKUP SSP     CALL            REMOVE :UPDATE STATE VECTOR INDICATOR:
```

```
1170  REF   6  LAST 1332   27,2737   01502 1                    UPSVFLAG
1171                       27,2740   00000 1                    0
1172  REF   2  LAST  644   27,2741   27455 0                    INTWAKEO        RELEASE :GRAB: OF ORBIT INTEG
1173                       27,2742   77776 1          EXIT

1174  REF  99  LAST 1325   27,2743   0 5412 0         TC        PHASCHNG
1175                       27,2744    04026 1         OCT       04026
1176  REF   3  LAST 1332   27,2745   0 0330 1         TC        INTWAKUQ

1177                       27,2746    00002 0  UPMNSVCD OCT      2
1178                       27,2747    00000 1          OCT       0


1179                       27,2750    77420 1  GRP2PC  STQ       EXIT
1180  REF   3  LAST  122   27,2751    03536 1                    GRP2SVQ
1181  REF 100  LAST 1333   27,2752   0 5412 0         TC        PHASCHNG
1182                       27,2753    04022 0         OCT       04022
1183  REF 239  LAST 1332   27,2754   0 6006 1         TC        INTPRET
1184                       27,2755    77650 1         GOTO
1185  REF   4  LAST 1333   27,2756    03536 1                    GRP2SVQ
```

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```
R0001                DELETE
 0002                          13,3714                    BANK    13
 0003  REF   1                 11,2000                    SETLOC  ORBITAL
 0004                          11,2372                    BANK
 0005  REF   1                                            COUNT   11/ORBIT
R0006                DELETE
 0007                          11,2372   40354 1  KEPPREP LXA,2   SETPD
 0008  REF  10  LAST 1323     11,2373   02150 1           PBODY
 0009                          11,2374   00001 0           0
 0010                          11,2375   75543 1  DLOAD*  SQRT          SQRT(MU) (+18 OR +15)  0D        PL  2D
 0011  REF   4  LAST 1323     11,2376   50042 1           MUEARTH,2
 0012                          11,2377   53515 0  PDVL    UNIT                                           PL  8D
 0013  REF  21  LAST 1332     11,2400   01535 0           RCV
 0014                          11,2401   60325 0  PDDL    NORM          NORM R (+29 OR +27 - N1) 2D      PL  4D
 0015                          11,2402   00045 0           36D
 0016  REF  93  LAST 1318     11,2403   00047 1           X1
 0017                          11,2404   77715 1  PDVL
 0018                          11,2405   65241 0  DOT     PDDL          F*SQRT(MU)(+7 OR+5) 4D           PL  6D
 0019  REF  16  LAST 1317     11,2406   01543 1           VCV
 0020  REF  11  LAST 1321     11,2407   02312 0           TAU.          (+28)
 0021                          11,2410   60225 1  DSU     NORM
 0022  REF   7  LAST 1321     11,2411   01551 1           TC
 0023  REF  43  LAST 1258     11,2412   00051 0           S1
 0024                          11,2413   77742 0  SR1
 0025                          11,2414   65271 0  DDV     PDDL
 0026                          11,2415   00003 1           2D
 0027                          11,2416   41405 0  DMP     PUSH          FS(+6 +N1-N2) 6D                 PL  8D
 0028                          11,2417   00005 1           4D
 0029                          11,2420   65316 0  DSQ     PDDL          (FS)SQ(+12 +2(N1-N2)) 8D         PL 10D
 0030                          11,2421   00005 1           4D
 0031                          11,2422   64716 0  DSQ     PDDL*         SSQ/MU(-20R +2(N1-N2)) 10D         PL 12D
 0032  REF   5  LAST 1334     11,2423   50042 1           MUEARTH,2
 0033                          11,2424   40442 1  SR3     SR4
 0034                          11,2425   47515 0  PDVL    VSQ           PREALIGN MU (+43 OR +37) 12D     PL 14D
 0035  REF  17  LAST 1334     11,2426   01543 1           VCV
 0036                          11,2427   44205 0  DMP     BDSU                                           PL 12D
 0037                          11,2430   00045 0           36D
 0038                          11,2431   41271 0  DDV     DMP                                            PL 10D
 0039                          11,2432   00003 1           2D            -(1/R-ALPHA)(+12 +3N1-2N2)
 0040                          11,2433   53605 1  DMP     SL*
 0041  REF   1                 11,2434   23774 1           DP2/3
 0042                          11,2435   20176 0           0 -3,1        10L(1/R-ALPHA)(+13 +2(N1-N2))
 0043                          11,2436   43260 1  XSU,1   DAD           2(FS)SQ - ETCETRA          PL 8D
 0044  REF  44  LAST 1334     11,2437   00050 1           S1            X1 = N2-N1
 0045                          11,2440   45257 0  SL*     DSU           -FS+2(FS)SQ ETC (+6 +N1-N2)      PL  6D
 0046                          11,2441   20211 1           8D,1
 0047                          11,2442   41205 0  DMP     DMP
 0048                          11,2443   00001 0           0D
 0049                          11,2444   00005 1           4D
 0050                          11,2445   53657 0  SL*     SL*
```

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```
0051                                11,2446  20211 1          BD,1
0052                                11,2447  20201 0          0,1          S(-FS(1-2FS)-1/6...)(+17 OR +16)
0053                                11,2450  65215 1  DAD     PDOL                                      PL  6D
0054  REF   2  LAST   96            11,2451  01553 0          XKEP
0055                                11,2452  53605 1  DMP     SL*          S(+17 OR +16)
0056                                11,2453  00001 0          0D
0057                                11,2454  20202 0          1,1
0058                                11,2455  43204 0  BOVB    DAD
0059  REF  10  LAST 1259            11,2456  57352 1          TCDANZIG
0060                                11,2457  77626 0  STADR
0061  REF   3  LAST 1278            11,2460  75471 1  STORE   XKEPNEW
0062                                11,2461  74020 0  STQ     AXC,1
0063  REF   3  LAST 1282            11,2462  02270 0          KEPRTN
0064                                11,2463  00012 1  DEC     10
0065                                11,2464  74014 1  BON     AXC,1
0066  REF  23  LAST 1332            11,2465  00303 1          MOONFLAG
0067  REF   1                       11,2466  24042 1          KEPLERN
0068                                11,2467  00002 0  DEC     2
0069                                11,2470  77650 1  GOTO
0070  REF   2  LAST 1335            11,2471  24042 1          KEPLERN
```

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0071                                 11,2472   66350 1  FBR3     LXA,1   SSP
0072  REF  18  LAST 1316            11,2473   01500 0                   DIFEQCNT
0073  REF  45  LAST 1334            11,2474   00051 0                   S1
0074                                 11,2475   77762 1           DEC     -13
0075                                 11,2476   54345 1           DLOAD   SR
0076  REF   9  LAST 1324            11,2477   02314 0                   DT/2
0077                                 11,2500   20612 0                   9D
0078                                 11,2501   61500 0           TIX,1   ROUND
0079                                 11,2502   22503 1                   +1
0080                                 11,2503   43206 1           PUSH    DAD
0081  REF   8  LAST 1334            11,2504   01551 1                   TC
0082  REF  12  LAST 1334            11,2505   16312 0           STODL   TAU.
0083                                 11,2506   77615 0           DAD
0084  REF  24  LAST 1331            11,2507   01517 0                   TET
0085  REF  25  LAST 1336            11,2510   35517 1           STCALL  TET
0086  REF   2  LAST 1321            11,2511   22372 1                   KEPPREP
```

P0087 AGC ROUTINE TO COMPUTE ACCELERATION COMPONENTS.

```
0088                                11,2512  73150 1  ACCOMP   LXA,1   LXA,2
0089  REF  11  LAST 1334           11,2513  02150 1           PBODY
0090  REF  12  LAST 1337           11,2514  02150 1           PBODY
0091                                11,2515  77775 1           VLOAD
0092  REF  16  LAST 1319           11,2516  11566 1                   ZEROVEC
0093  REF   2  LAST   89           11,2517  26202 0           STOVL   FV
0094  REF  30  LAST 1239           11,2520  02152 0                   ALPHAV
0095                                11,2521  53257 1           VSL*    VAD
0096                                11,2522  57605 0                   0 -7,2
0097  REF  22  LAST 1334           11,2523  01535 0                   RCV
0098  REF   2  LAST   89           11,2524  02160 1           STORE   BETAV
0099                                11,2525  65014 1           BOF     XCHX,2
0100  REF  19  LAST 1330           11,2526  01756 1                   DIMOFLAG
0101                                11,2527  22534 0                   +5
0102  REF  19  LAST 1336           11,2530  01500 0                   DIFEQCNT
0103  REF   7  LAST   89           11,2531  12217 0           STORE   VECTAB,2
0104                                11,2532  77724 0           XCHX,2
0105  REF  20  LAST 1337           11,2533  01500 0                   DIFEQCNT
0106                                11,2534  53575 0           VLOAD   UNIT
0107  REF  31  LAST 1337           11,2535  02152 0                   ALPHAV
0108  REF  32  LAST 1337           11,2536  16152 0           STODL   ALPHAV
0109                                11,2537  00045 0                   36D
0110  REF   4  LAST 1237           11,2540  02310 1           STORE   ALPHAM
0111                                11,2541  77624 1           CALL
0112  REF   1                       11,2542  22636 1                   GAMCOMP
0113                                11,2543  66175 1           VLOAD   SXA,1
0114  REF   3  LAST 1337           11,2544  02160 1                   BETAV
0115  REF  33  LAST 1316           11,2545  00051 0                   S2
0116  REF  33  LAST 1337           11,2546  16152 0           STODL   ALPHAV
0117  REF   2  LAST   89           11,2547  02210 0                   BETAM
0118  REF   5  LAST 1337           11,2550  02310 1           STORE   ALPHAM
0119                                11,2551  71214 0           BOF     DLOAD
0120  REF   4  LAST 1323           11,2552  00342 1                   MIDFLAG
0121  REF   1                       11,2553  23010 1                   OBLATE
0122  REF  26  LAST 1336           11,2554  01517 0                   TET
0123                                11,2555  77624 1           CALL
0124  REF   2  LAST  749           11,2556  54110 0                   LSPOS
0125                                11,2557  72174 0           AXT,2   LXA,1
0126                                11,2560  00002 0                   2
0127  REF  34  LAST 1337           11,2561  00051 0                   S2
0128                                11,2562  77614 1           BOF
0129  REF  24  LAST 1335           11,2563  00343 0                   MOONFLAG
0130                                11,2564  22567 0                   +3
0131                                11,2565  77076 0           VCOMP   AXT,2
0132                                11,2566  00000 1                   0
0133  REF   4  LAST 1337           11,2567  02160 1           STORE   BETAV
0134  REF   3  LAST   89           11,2570  26263 1           STOVL   RPQV
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0135                                11,2571  00003 1                 2D
0136  REF   2 LAST   89            11,2572  02300 0          STORE  RPSV
0140                                11,2573  77214 0          BOF    VLOAD
0141  REF  20 LAST 1337            11,2574  01756 1                 DIMOFLAG
0142  REF   1                      11,2575  22610 0                 GETRPSV
0143  REF  34 LAST 1337            11,2576  02152 0                 ALPHAV
0144                                11,2577  53761 1          VXSC   VSR*
0145  REF   6 LAST 1337            11,2600  02310 1                 ALPHAM
0146                                11,2601  57175 0                 1,2
0147                                11,2602  65051 0          VSU    XCHX,2
0148  REF   5 LAST 1337            11,2603  02160 1                 BETAV
0149  REF  21 LAST 1337            11,2604  01500 0                 DIFEQCNT
0150  REF   8 LAST 1337            11,2605  12225 1          STORE  VECTAB +6,2
0155                                11,2606  77724 0          XCHX,2
0156  REF  22 LAST 1338            11,2607  01500 0                 DIFEQCNT
0157                                11,2610  62175 0 GETRPSV  VLOAD  INCR,1
0158  REF   4 LAST 1337            11,2611  02263 1                 RPQV
0159                                11,2612  00004 0                 4
0160                                11,2613  43014 0          CLEAR  BOF
0161  REF   3 LAST 1320            11,2614  04260 1                 RPQFLAG
0162  REF  25 LAST 1337            11,2615  00343 0                 MOONFLAG
0163                                11,2616  22623 0                 +5
0164                                11,2617  53261 1          VSR    VAD
0165                                11,2620  20612 0                 9D
0166  REF   3 LAST 1338            11,2621  02300 0                 RPSV
0167  REF   4 LAST 1338            11,2622  02300 0          STORE  RPSV
0168                                11,2623  77624 1          CALL
0169  REF   2 LAST 1337            11,2624  22636 1                 GAMCOMP
0170                                11,2625  62174 1          AXT,2  INCR,1
0171                                11,2626  00004 0                 4
0172                                11,2627  00004 0                 4
0173                                11,2630  77775 1          VLOAD
0174  REF   5 LAST 1338            11,2631  02300 0                 RPSV
0175  REF   6 LAST 1338            11,2632  36160 0          STCALL BETAV
0176  REF   3 LAST 1338            11,2633  22636 1                 GAMCOMP
0177                                11,2634  77650 1          GOTO
0178  REF   2 LAST 1337            11,2635  23010 1                 OBLATE
0179                                11,2636  74575 0 GAMCOMP  VLOAD  VSR1
0180  REF   7 LAST 1338            11,2637  02160 1                 BETAV
0181                                11,2640  40236 1          VSQ    SETPD
0182                                11,2641  00001 0                 0
0183                                11,2642  61501 1          NORM   ROUND
0184                                11,2643  00040 0                 31D
0185                                11,2644  60325 0          PDDL   NORM           NORMED B SQUARED TO PD LIST
0186  REF   7 LAST 1338            11,2645  02310 1                 ALPHAM         NORMALIZE (LESS ONE) LENGTH OF ALPHA
0187                                11,2646  00041 1                 32D            SAVING NORM SCALE FACTOR IN X1
0188                                11,2647  63342 1          SR1    PDVL
0189  REF   8 LAST 1338            11,2650  02160 1                 BETAV          C(PDL+2) = ALMOST NORMED ALPHA
0190                                11,2651  77656 1          UNIT
0191  REF   9 LAST 1338            11,2652  16160 1          STODL  BETAV
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0192                                11,2653  00045 0            36D
0193  REF  3  LAST 1337            11,2654  02210 0     STORE  BETAM
0194                                11,2655  55301 0     NORM   BDDV          FORM NORMALIZED QUOTIENT ALPHAM/BETAM
0195                                11,2656  00042 1            33D
0196                                11,2657  41562 0     SR1R   PUSH          C(PDL+2) = ALMOST NORMALIZED RHO.
0197                                11,2660  77743 1     DLOAD*
0198  REF  1                        11,2661  27727 0            ASCALE,1
0199  REF 46  LAST 1336             11,2662  00051 0     STORE  S1
0200                                11,2663  57124 1     XCHX,2 XAD,2
0201  REF 47  LAST 1339             11,2664  00050 1            S1
0202                                11,2665  00040 0            32D
0203                                11,2666  71264 1     XSU,2  DLOAD
0204                                11,2667  00041 1            33D
0205                                11,2670  00003 1            2D
0206                                11,2671  65057 0     SR*    XCHX,2
0207                                11,2672  57177 1            0 -1,2
0208  REF 48  LAST 1339             11,2673  00050 1            S1
0209                                11,2674  74406 0     PUSH   SR1R          RHO/4 TO 4D
0210                                11,2675  50315 0     PDVL   DOT
0211  REF 35  LAST 1338             11,2676  02152 0            ALPHAV
0212  REF 10  LAST 1338             11,2677  02160 1            BETAV
0213                                11,2700  44372 1     SL1R   BDSU          (RHO/4) - 2(ALPHAV/2.BETAV/2)
0214                                11,2701  57206 1     PUSH   DMPR          TO PDL+6
0215                                11,2702  00005 1            4
02155                               11,2703  77752 1     SL1
0216                                11,2704  43206 1     PUSH   DAD
0217  REF  1                        11,2705  23756 1            DQUARTER
0218                                11,2706  75406 1     PUSH   SQRT
0219                                11,2707  41475 1     DMPR   PUSH
0220                                11,2710  00013 0            10D
0221                                11,2711  43352 1     SL1    DAD
0222  REF  2  LAST 1339             11,2712  23756 1            DQUARTER
0223                                11,2713  43325 1     PDDL   DAD           (1/4)+2((Q+1)/4)    TO PD+14D
0224                                11,2714  00013 0            10D
0225  REF  1                        11,2715  11564 0            HALFDP
0226                                11,2716  72475 1     DMPR   SL1
0227                                11,2717  00011 1            8D
0228                                11,2720  56215 1     DAD    DDV
0229  REF  1                        11,2721  23750 1            THREE/8
0230                                11,2722  00017 1            14D
0231                                11,2723  74275 1     DMPR   VXSC
0232                                11,2724  00007 0            6
0233  REF 11  LAST 1339             11,2725  02160 1            BETAV             -
0234                                11,2726  64515 1     PDVL   VSR3          (G/2)(C(PD+4))B/2 TO PD+16D
0235  REF 36  LAST 1339             11,2727  02152 0            ALPHAV
0236                                11,2730  41455 0     VAD    PUSH          A12 + C(PD+16D) TO PD+16D
0237                                11,2731  41345 0     DLOAD  DMP
0238                                11,2732  00001 0            0
0239                                11,2733  00015 0            12D           -
0240                                11,2734  61501 1     NORM   ROUND
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0241                                11,2735   00037 0                 30D
0242                                11,2736   40665 0           BDDV  DMP*
0243                                11,2737   00003 1                 2
0244   REF   6  LAST 1334          11,2740   50042 1                 MUEARTH,2
0245                                11,2741   74276 1           DCOMP VXSC
0246                                11,2742   57124 1           XCHX,2 XAD,2
0247   REF  49  LAST 1339          11,2743   00050 1                 S1
0248   REF  35  LAST 1337          11,2744   00051 0                 S2
0249                                11,2745   55064 0           XSU,2 XSU,2
0250                                11,2746   00036 1                 30D
0251                                11,2747   00037 0                 31D
02513                               11,2750   77600 1           BOV                   CLEAR OVIND
02516                               11,2751   22752 1                 +1
0252                                11,2752   65057 0           VSR*  XCHX,2
0253                                11,2753   57177 1                 0 -1,2
0254   REF  50  LAST 1340          11,2754   00050 1                 S1
0255                                11,2755   77655 1           VAD
0256   REF   3  LAST 1337          11,2756   02202 0                 FV
0257   REF   4  LAST 1340          11,2757   02202 0           STORE FV
025805                              11,2760   43400 1           BOV   RVQ             RETURN IF NO OVERFLOW
02581                               11,2761   22762 1                 +1
025815                              11,2762   51575 1 GOBAQUE   VLOAD ABVAL
025816 REF   8  LAST 1319          11,2763   01521 0                 TDELTAV
025817                              11,2764   77654 0           BZE
025818 REF   1                      11,2765   23005 0                 INT-ABRT
025819                              11,2766   54345 1           DLOAD SR
02582  REF   2  LAST   89          11,2767   02212 1                 H
025825                              11,2770   20612 0                 9D
02583                               11,2771   44206 0           PUSH  BDSU
025835 REF   9  LAST 1336          11,2772   01551 1                 TC
02584  REF  13  LAST 1336          11,2773   16312 0           STODL TAU.
025845 REF  27  LAST 1337          11,2774   01517 0                 TET
02585                               11,2775   45425 0           DSU   STADR
025855 REF  28  LAST 1340          11,2776   42260 0           STCALL TET
02586  REF   3  LAST 1336          11,2777   22372 1                 KEPPREP
025865                              11,3000   77624 1           CALL
02587  REF   6  LAST 1332          11,3001   23421 1                 RECTIFY
025875                              11,3002   77614 1           SETGO
02588  REF   4  LAST 1338          11,3003   04020 1                 RPQFLAG
025885 REF   4  LAST 1331          11,3004   27305 1                 TESTLOOP

025886                              11,3005   77776 1 INT-ABRT  EXIT
025887 REF   9  LAST 1304          11,3006 0 5721 0          TC    POODOO
025888                              11,3007   00430 0         OCT   00430
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P0259   THE OBLATE ROUTINE COMPUTES THE ACCELERATION DUE TO OBLATENESS. IT USES THE UNIT OF THE VEHICLE
R0261   POSITION VECTOR FOUND IN ALPHAV AND THE DISTANCE TO THE CENTER IN ALPHAM. THIS IS ADDED TO THE SUM OF THE
R0263   DISTURBING ACCELERATIONS IN FV AND THE PROPER DIFEQ STAGE IS CALLED VIA X1.
 0265                              11,3010  71354 0  OBLATE   LXA,2   DLOAD
 0266   REF  13  LAST 1337        11,3011  02150 1            PBODY
 0267   REF   8  LAST 1338        11,3012  02310 1            ALPHAM
 0268                              11,3013  44601 0           SETPD   DSU*
 0269                              11,3014  00001 0                   0
 0270   REF   1                   11,3015  50010 0                   RDE,2
 0271                              11,3016  43044 0           BPL     BOF                GET URPV
 0272   REF   1                   11,3017  23220 0                   NBRANCH
 0273   REF  26  LAST 1338        11,3020  00343 0                   MOONFLAG
 0274   REF   1                   11,3021  23227 1                   COSPHIE
 0275                              11,3022  65375 0           VLOAD   PDDL
 0276   REF  37  LAST 1339        11,3023  02152 0                   ALPHAV
 0277   REF  29  LAST 1340        11,3024  01517 0                   TET
 0278                              11,3025  45125 0           PDDL    CALL
 0279   REF   1                   11,3026  23746 0                   3/5
 0280   REF   4  LAST 1236        11,3027  55371 1                   R-TO-RP
 0284   REF   1                   11,3030  00017 1           STORE   URPV
 0285                              11,3031  47375 0           VLOAD   VXV
 0286   REF   3  LAST 1245        11,3032  02012 0                   504LM
 0287   REF   3  LAST 1317        11,3033  11560 1                   ZUNIT
 0288                              11,3034  61255 1           VAD     VXM
 0289   REF   4  LAST 1341        11,3035  11560 1                   ZUNIT
 0290   REF   8  LAST 1248        11,3036  00025 0                   MMATRIX
 0291                              11,3037  77656 1           UNIT                       POSSIBLY UNNECESSARY
 0292   REF   1                   11,3040  00025 0  COMTERM  STORE   UZ
 0293                              11,3041  57345 1           DLOAD   DMPR
 0294   REF   1                   11,3042  00023 0                   COSPHI/2
 0295   REF   1                   11,3043  23760 1                   3/32
 0296                              11,3044  63525 0           PDDL    DSQ                P2/64 TO PD0
 0297   REF   2  LAST 1341        11,3045  00023 0                   COSPHI/2
 0298                              11,3046  45275 0           DMPR    DSU
 0299   REF   1                   11,3047  23762 0                   15/16
 0300   REF   1                   11,3050  23754 0                   3/64
 0301                              11,3051  57206 1           PUSH    DMPR               P3/32 TO PD2
 0302   REF   3  LAST 1341        11,3052  00023 0                   COSPHI/2
 0303                              11,3053  76405 1           DMP     SLIR
 0304   REF   1                   11,3054  23766 1                   7/12
 0305                              11,3055  57325 1           PDDL    DMPR
 0306                              11,3056  00001 0                   0
 0307   REF   1                   11,3057  23774 1                   2/3
 0308                              11,3060  41421 0           BDSU    PUSH               P4/128 TO PD4
 0309                              11,3061  57275 0           DMPR    DMPR
 0310   REF   4  LAST 1341        11,3062  00023 0                   COSPHI/2           BEGIN COMPUTING P5/1024
 0311   REF   1                   11,3063  23770 0                   9/16
 0312                              11,3064  57325 1           PDDL    DMPR
 0313                              11,3065  00003 1                   2
 0314   REF   1                   11,3066  23772 1                   5/128
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0315                                11,3067  77621 1          BDSU
0316                                11,3070  77603 1          DMP*
0317  REF   1                      11,3071  50036 1                   J4REQ/J3,2
0318                                11,3072  43271 1          DDV      DAD                          -3
0319  REF   9  LAST 1341           11,3073  02310 1                   ALPHAM       (((P5/256)B 2 /R+P4/32)  /R+P3/8)ALPHAV
0320                                11,3074  00005 1                   4                  4                3
0321                                11,3075  56273 1          DMPR*    DDV
0322  REF   1                      11,3076  50032 0                   2J3RE/J2,2
0323  REF  10  LAST 1342           11,3077  02310 1                   ALPHAM
0324                                11,3100  74215 1          DAD      VXSC
0325                                11,3101  00003 1                   2
0326  REF  38  LAST 1341           11,3102  02152 0                   ALPHAV
0327  REF   1                      11,3103  14033 1          STODL    TVEC
0328                                11,3104  70403 1          DMP*     SR1
0329  REF   2  LAST 1342           11,3105  50036 1                   J4REQ/J3,2
0330                                11,3106  43271 1          DDV      DAD
0331  REF  11  LAST 1342           11,3107  02310 1                   ALPHAM                       -3
0332                                11,3110  50473 1          DMPR*    SR3
0333  REF   2  LAST 1342           11,3111  50032 0                   2J3RE/J2,2         3             4
0334                                11,3112  43271 1          DDV      DAD
0335  REF  12  LAST 1342           11,3113  02310 1                   ALPHAM
0336                                11,3114  76561 1          VXSC     VSL1
0337  REF   2  LAST 1341           11,3115  00025 0                   UZ
0338                                11,3116  77645 0          BVSU
0339  REF   2  LAST 1342           11,3117  00033 1                   TVEC
0340  REF   3  LAST 1342           11,3120  14033 1          STODL    TVEC
0341  REF  13  LAST 1342           11,3121  02310 1                   ALPHAM
0342                                11,3122  63501 0          NORM     DSQ
0343  REF  94  LAST 1334           11,3123  00047 1                   X1
0344                                11,3124  60316 0          DSQ      NORM
0345  REF  51  LAST 1340           11,3125  00051 0                   S1                           4
0346                                11,3126  54606 0          PUSH     BDDV*        NORMED R  TO OD
0347  REF   1                      11,3127  50026 0                   J2REQSQ,2
0348                                11,3130  40161 0          VXSC     BOV
0349  REF   4  LAST 1342           11,3131  00033 1                   TVEC
0350                                11,3132  23133 1                   +1           (RESET OVERFLOW INDICATOR)
0351                                11,3133  56070 0          XAD,1    XAD,1
0352  REF  95  LAST 1342           11,3134  00046 0                   X1
0353  REF  96  LAST 1342           11,3135  00046 0                   X1
0354                                11,3136  53670 0          XAD,1    VSL*
0355  REF  52  LAST 1342           11,3137  00050 1                   S1
0356                                11,3140  20153 1                   0 -22D,1
0357                                11,3141  40055 0          VAD      BOV
0358  REF   5  LAST 1340           11,3142  02202 0                   FV
0359  REF   1                      11,3143  22762 1                   GOBAQUE
0360  REF   6  LAST 1342           11,3144  36202 1          STCALL   FV
0361  REF   1                      11,3145  27770 1                   QUALITY1
0362                                11,3146  77716 1  QUALITY3 DSQ                  J22 TERM X R**4 IN 2D. SCALED B61
A0353                                                                 AS VECTOR.
0364                                11,3147  41206 0          PUSH     DMP          STORE COSPHI**2 SCALED B2 IN 8D
```

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 0365   REF   3  LAST 1317   11,3150   27755 0          5/8      5 SCALED B3
 0366                        11,3151   60525 0   PDDL   SR2      PUT 5 COSPHI**2, D5, IN 8D, GET
A0367                                                            COSPHI**2 D2 FROM 8D
 0368                        11,3152   44215 1   DAD    BDSU     END UP WITH (1-7 COSPHI**2), B5
 0369                        11,3153   00011 1          8D       ADDING COSPHI**2 B4 SAME AS COSPHI**2
A0370                                                            X 2 D5
 0371   REF   7  LAST 1301   11,3154   11616 0          D1/32    1 SCALED B5
 0372                        11,3155   41205 0   DMP    DMP
 0373   REF   2  LAST 1341   11,3156   00017 1          URPV     X COMPONENT
 0374   REF   4  LAST 1343   11,3157   27755 0          5/8      5 SCALED B3
 0375                        11,3160   56561 0   VXSC   VSL5     AFTER SHIFT, SCALED B5
 0376   REF   3  LAST 1343   11,3161   00017 1          URPV     VECTOR, B1.
 0377                        11,3162   77725 1   PDDL             VECTOR INTO 8D, 10D, 12D, SCALED B5.
A0378                                                            GET 5 COSPHI**2 OUT OF 8D
 0379                        11,3163   43225 0   DSU    DAD
 0380   REF   8  LAST 1343   11,3164   11616 0          D1/32    1 B5
 0381                        11,3165   00011 1          8D       X COMPONENT (SAME AS MULTIPLYING
A0382                                                            BY UNITX)
 0383                        11,3166   14011 1   STODL  8D
 0384   REF   4  LAST 1343   11,3167   00017 1          URPV     X COMPONENT
 0385                        11,3170   41205 0   DMP    DMP
 0386   REF   5  LAST 1343   11,3171   00023 0          URPV +4  Z COMPONENT
 0387   REF   5  LAST 1343   11,3172   27755 0          5/8      5 B3 ANSWER B5
 0388                        11,3173   43352 1   SL1    DAD      FROM 12D FOR Z COMPONENT (SL1 GIVES 10
A0389                                                            INSTEAD OF 5 FOR COEFFICIENT)
 0390                        11,3174   60325 0   PDDL   NORM     BACK INTO 12D FOR Z COMPONENT.
 0391   REF  14  LAST 1342   11,3175   02310 1          ALPHAM   SCALED B27 FOR MOON
 0392   REF  42  LAST 1285   11,3176   00050 1          X2
 0393                        11,3177   67206 1   PUSH   SLOAD    STORE IN 14D, DESTROYING URPV
A0394                                                            X COMPONENT
 0395   REF   2  LAST   87   11,3200   02000 0          E32C31RM
 0396                        11,3201   74271 0   DDV    VXSC     IF X2 = 0, DIVISION GIVES B53, VXSC
A0397                                                            OUT OF 8D B5 GIVES B58
 0398                        11,3202   53257 1   VSL*   VAD      SHIFT MAKES B61, FOR ADDITION OF
A0399                                                            VECTOR IN 2D
 0400                        11,3203   57601 1          0 -3,2
 0401                        11,3204   70257 0   VSL*   V/SC     OPERAND FROM OD, B108 FOR X1 = 0
 0402                        11,3205   20146 0          0 -270,1 FOR X1 = 0, MAKES B88, GIVING B-20
A0403                                                            FOR RESULT.
 0404                        11,3206   65325 0   PDDL   PDDL
 0405   REF  30  LAST 1341   11,3207   01517 0          TET
 0406   REF   6  LAST 1343   11,3210   27755 0          578      ANY NON-ZERO CONSTANT
 0407                        11,3211   45154 0   LXA,2  CALL     POSITION IN OD, TIME IN 6D. X2 LEFT
A0408                                                            ALONE.
 0409   REF  14  LAST 1341   11,3212   02150 1          PBODY
 0410   REF   8  LAST 1317   11,3213   55344 1          RP-TO-R
 0411                        11,3214   40055 0   VAD    BOV      OVERFLOW INDICATOR RESET IN "RP-TO-R"
 0412   REF   7  LAST 1342   11,3215   02202 0          FV
 0413   REF   2  LAST 1342   11,3216   22762 1          GOBAQUE
 0414   REF   8  LAST 1343   11,3217   02202 0   STORE  FV
```

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0415                                  11,3220  72135 0  NBRANCH  SLOAD  LXA,1
0416  REF  23  LAST 1338             11,3221  01501 1                   DIFEQCNT
0417  REF 656  LAST 1330             11,3222  00154 1                   MPAC
0418                                  11,3223  73205 1           DMP     CGOTO
0419  REF   1                        11,3224  27757 1                   -1/12
0420  REF 657  LAST 1344             11,3225  00155 0                   MPAC
0421  REF   1                        11,3226  23235 1                   DIFEQTAB
0422                                  11,3227  77745 1  COSPHIE  DLOAD
0423  REF  39  LAST 1342             11,3230  02156 1                   ALPHAV +4
0424  REF   5  LAST 1341             11,3231  24023 0           STOVL   COSPHI/2
0425  REF   5  LAST 1341             11,3232  11560 1                   ZUNIT
0426                                  11,3233  77650 1           GOTO
0427  REF   1                        11,3234  23040 1                   COMTERM
0428  REF   1                        11,3235  23446 0  DIFEQTAB CADR    DIFEQ+0
0429  REF   1                        11,3236  23452 0           CADR    DIFEQ+1
0430  REF   1                        11,3237  23463 1           CADR    DIFEQ+2

0431                                  11,3240  45014 0  TIMESTEP BOF     CALL
0432  REF   5  LAST 1337             11,3241  00342 1                   MIDFLAG
0433  REF   1                        11,3242  23246 0                   RECTEST        SKIP ORIGIN CHANGE LOGIC
0434  REF   2  LAST 1320             11,3243  23320 1                   CHKSWTCH
0435                                  11,3244  77640 0           BMN
0436  REF   1                        11,3245  23355 0                   DOSWITCH
0437                                  11,3246  51575 1  RECTEST  VLOAD   ABVAL          RECTIFY IF
0438  REF   9  LAST 1340             11,3247  01521 0                   TDELTAV
0439                                  11,3250  77600 1           BOV
0440  REF   1                        11,3251  23274 1                   CALLRECT
0441                                  11,3252  51025 1           DSU     BPL                1) EITHER TDELTAV OR TNUV EQUALS OR
0442  REF   2  LAST   34             11,3253  23764 0                   3/4                   EXCEEDS 3/4 IN MAGNITUDE
0443  REF   2  LAST 1344             11,3254  23274 1                   CALLRECT
0444                                  11,3255  53615 0           DAD     SL*                              OR
0445  REF   3  LAST 1344             11,3256  23764 0                   3/4
0446                                  11,3257  57605 0                   0 -7,2             2) ABVAL(TDELTAV) EQUALS OR EXCEEDS
0447                                  11,3260  45271 1           DDV     DSU                   .01(ABVAL(RCV))
0448                                  11,3261  00013 0                   1OD
0449  REF   1                        11,3262  27761 1                   RECRATIO
0450                                  11,3263  77244 0           BPL     VLOAD
0451  REF   3  LAST 1344             11,3264  23274 1                   CALLRECT
0452  REF   8  LAST 1319             11,3265  01527 0                   TNUV
0453                                  11,3266  45246 0           ABVAL   DSU
0454  REF   4  LAST 1344             11,3267  23764 0                   3/4
0455                                  11,3270  77600 1           BOV
0456  REF   4  LAST 1344             11,3271  23274 1                   CALLRECT
0457                                  11,3272  77640 0           BMN
0458  REF   1                        11,3273  23276 0                   INTGRATE
0459                                  11,3274  77624 1  CALLRECT CALL
0460  REF   7  LAST 1340             11,3275  23421 1                   RECTIFY
0461                                  11,3276  77775 1  INTGRATE VLOAD
0462  REF   9  LAST 1344             11,3277  01527 0                   TNUV
```

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0463  REF   1                 11,3300  25120 0           STOVL   ZV
0464  REF  10  LAST 1344      11,3301  01521 0           STORE   TDELTAV
0465  REF   2  LAST   78      11,3302  01112 1           STORE   YV
0466                          11,3303  77614 1           CLEAR
0467  REF   1                 11,3304  00261 1           STORE   JSWITCH
0468                          11,3305  66375 0  DIFEQO   VLOAD   SSP
0469  REF   3  LAST 1345      11,3306  01112 1           STORE   YV
0470  REF  24  LAST 1344      11,3307  01501 1           STORE   DIFEQCNT
0471                          11,3310  00000 1           STORE   0
0472  REF  40  LAST 1344      11,3311  16152 0           STODL   ALPHAV
0473  REF   3  LAST 1240      11,3312  11566 1           STORE   DPZERO
0474  REF   3  LAST 1340      11,3313  02212 1           STORE   H       START H AT ZERO. GOES O(DELT/2)DELT.
0475                          11,3314  52014 0           BON     GOTO
0476  REF   2  LAST 1345      11,3315  00301 0           STORE   JSWITCH
0477  REF   1                 11,3316  23665 0           STORE   DOW..
0478  REF   1                 11,3317  22512 1           STORE   ACCOMP

0479                          11,3320  43020 1  CHKSWTCH STQ     BOF
0480  REF   3  LAST   89      11,3321  02270 0           STORE   ORIGEX
0481  REF   5  LAST 1340      11,3322  04340 1           STORE   RPQFLAG
0482  REF   1                 11,3323  23333 0           STORE   RPQOK    MOON POSITION IS AVAILABLE
0483                          11,3324  45145 0           DLOAD   CALL
0484  REF  31  LAST 1343      11,3325  01517 0           STORE   TET
0485  REF   3  LAST  934      11,3326  54115 0           STORE   LUNPOS   GET MOON POSITION
0486                          11,3327  57414 1           BOF     VCOMP
0487  REF  27  LAST 1341      11,3330  00343 0           STORE   MOONFLAG
0488                          11,3331  23332 1           STORE   +1
0489  REF   5  LAST 1338      11,3332  02263 1           STORE   RPQV
0490                          11,3333  77354 0  RPQOK    LXA,2   VLOAD   RESTORE X2 AFTER USING LUNPOS
0491  REF  15  LAST 1343      11,3334  02150 1           STORE   PBODY
0492  REF  11  LAST 1345      11,3335  01521 0           STORE   TDELTAV  -
0493                          11,3336  53257 1           VSL*    VAD     |RQC|-RSPHERE WHEN OUTSIDE THE SPHERE.
0494                          11,3337  57605 0           STORE   0 -7,2   -   -           -
0495  REF  23  LAST 1337      11,3340  01535 0           STORE   RCV     R = RDEVIATION + RCONIC
0496                          11,3341  51414 1           BOF     ABVAL
0497  REF  28  LAST 1345      11,3342  00343 0           STORE   MOONFLAG
0498  REF   1                 11,3343  23350 0           STORE   EARSPH
0499                          11,3344  44302 0           SR2     BDSU    INSIDE
0500  REF   1                 11,3345  27763 0           STORE   RSPHERE
0501                          11,3346  77650 1           GOTO
0502  REF   4  LAST 1345      11,3347  02270 0           STORE   ORIGEX
0503                          11,3350  51451 0  EARSPH   VSU     ABVAL   OUTSIDE
0504  REF   6  LAST 1345      11,3351  02263 1           STORE   RPQV
0505                          11,3352  52025 1           DSU     GOTO
0506  REF   2  LAST 1345      11,3353  27763 0           STORE   RSPHERE
0507  REF   5  LAST 1345      11,3354  02270 0           STORE   ORIGEX
0508                          11,3355  77624 1  DOSWITCH CALL
0509  REF   2  LAST 1320      11,3356  23361 1           STORE   ORIGCHNG
0510                          11,3357  77650 1           GOTO
0511  REF   2  LAST 1344      11,3360  23276 0           STORE   INTGRATE
```

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0512                                  11,3361   45020 1  ORIGCHNG STQ     CALL
0513  REF   6  LAST 1345             11,3362   02270 0                   ORIGEX
0514  REF   8  LAST 1344             11,3363   23421 1                   RECTIFY
0515                                  11,3364   53775 1           VLOAD   VSL*
0516  REF  24  LAST 1345             11,3365   01535 0                   RCV
0517                                  11,3366   57576 1                   0,2
0518                                  11,3367   53651 0           VSU     VSL*
0519  REF   7  LAST 1345             11,3370   02263 1                   RPQV
0520                                  11,3371   57574 0                   2,2
0521  REF  13  LAST 1332             11,3372   01503 0           STORE   RRECT
0522  REF  25  LAST 1346             11,3373   15535 0           STODL   RCV
0523  REF  32  LAST 1345             11,3374   01517 0                   TET
0524                                  11,3375   77624 1           CALL
0525  REF   1                        11,3376   54120 0                   LUNVEL
0526                                  11,3377   57414 1           BOF     VCOMP
0527  REF  29  LAST 1345             11,3400   00343 0                   MOONFLAG
0528                                  11,3401   23402 0                   +1
0529                                  11,3402   53715 1           PDVL    VSL*
0530  REF  18  LAST 1334             11,3403   01543 1                   VCV
0531                                  11,3404   57576 1                   0,2
0532                                  11,3405   77651 0           VSU
0533                                  11,3406   77657 0           VSL*
0534                                  11,3407   57574 0                   0 +2,2
0535  REF   9  LAST 1332             11,3410   01511 0           STORE   VRECT
0536  REF  19  LAST 1346             11,3411   01543 1           STORE   VCV
0537                                  11,3412   67154 0           LXA,2   SXA,2
0538  REF   7  LAST 1346             11,3413   02270 0                   ORIGEX
0539  REF  25  LAST 1325             11,3414   00052 0                   QPRET
0540                                  11,3415   52014 0           BON     GOTO
0541  REF  30  LAST 1346             11,3416   00303 1                   MOONFLAG
0542  REF   2  LAST 1316             11,3417   26735 1                   CLRMOON
0543  REF   3  LAST 1316             11,3420   26742 1                   SETMOON
```

P0544 THE RECTIFY SUBROUTINE IS CALLED BY THE INTEGRATION PROGRAM AND OCCASIONALLY BY THE MEASUREMENT INCORPORATION
R0546 ROUTINES TO ESTABLISH A NEW CONIC.

```
0547                                11,3421   77354 0  RECTIFY  LXA,2   VLOAD
0548  REF  16  LAST 1345           11,3422   02150 1                   PBODY
0549  REF  12  LAST 1345           11,3423   01521 0                   TDELTAV
0550                                11,3424   53257 1           VSL*    VAD
0551                                11,3425   57605 0                   0 -7,2
0552  REF  26  LAST 1346           11,3426   01535 0                   RCV
0553  REF  14  LAST 1346           11,3427   01503 0           STORE   RRECT
0554  REF  27  LAST 1347           11,3430   25535 0           STOVL   RCV
0555  REF  10  LAST 1344           11,3431   01527 0                   TNUV
0556                                11,3432   53257 1           VSL*    VAD
0557                                11,3433   57602 1                   0 -4,2
0558  REF  20  LAST 1346           11,3434   01543 1                   VCV
0559  REF  10  LAST 1346           11,3435   01511 0  MINIRECT STORE   VRECT
0560  REF  21  LAST 1347           11,3436   25543 1           STOVL   VCV
0561  REF  17  LAST 1337           11,3437   11566 1                   ZEROVEC
0562  REF  13  LAST 1347           11,3440   01521 0           STORE   TDELTAV
0563  REF  11  LAST 1347           11,3441   15527 0           STODL   TNUV
0564  REF  18  LAST 1347           11,3442   11566 1                   ZEROVEC
0565  REF  10  LAST 1340           11,3443   01551 1           STORE   TC
0566  REF   3  LAST 1335           11,3444   01553 0           STORE   XKEP
0567                                11,3445   77616 0                   RVQ
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P0568 THE THREE DIFEQ ROUTINES - DIFEQ+0, DIFEQ+12, AND DIFEQ+24 - ARE ENTEREDTO PROCESS THE CONTRIBUTIONS AT THE
R0570 BEGINNING, MIDDLE, AND END OF THE TIMESTEP, RESPECTIVELY. THE UPDATING IS DONE BY THE NYSTROM METHOD.

```
0572                                11,3446  64575 1  DIFEQ+0  VLOAD   VSR3
0573  REF   9  LAST 1343           11,3447  02202 0            FV
0574  REF   2  LAST   89           11,3450  36166 0           STCALL   PHIV
0575  REF   1                      11,3451  23626 1                    DIFEQCOM
0576                                11,3452  74575 0  DIFEQ+1  VLOAD   VSR1
0577  REF  10  LAST 1348           11,3453  02202 0            FV
0578                                11,3454  53206 0           PUSH     VAD
0579  REF   3  LAST 1348           11,3455  02166 1                    PHIV
0580  REF   2  LAST   89           11,3456  26174 1           STOVL    PSIV
0581                                11,3457  53362 0           VSR1     VAD
0582  REF   4  LAST 1348           11,3460  02166 1                    PHIV
0583  REF   5  LAST 1348           11,3461  36166 0           STCALL   PHIV
0584  REF   2  LAST 1348           11,3462  23626 1                    DIFEQCOM
0585                                11,3463  57345 1  DIFEQ+2  DLOAD   DMPR
0586  REF   4  LAST 1345           11,3464  02212 1                    H
0587  REF   2  LAST 1334           11,3465  23774 1                    DP2/3
0588                                11,3466  74206 0           PUSH     VXSC
0589  REF   6  LAST 1348           11,3467  02166 1                    PHIV
0590                                11,3470  53372 1           VSL1     VAD
0591  REF   2  LAST 1345           11,3471  01120 0            ZV
0592                                11,3472  53361 0           VXSC     VAD
0593  REF   5  LAST 1348           11,3473  02212 1                    H
0594  REF   4  LAST 1345           11,3474  01112 1                    YV
0595  REF   5  LAST 1348           11,3475  25112 1           STOVL    YV
0596  REF  11  LAST 1348           11,3476  02202 0                    FV
0597                                11,3477  53322 1           VSR3     VAD
0598  REF   3  LAST 1348           11,3500  02174 1                    PSIV
0599                                11,3501  76561 1           VXSC     VSL1
0600                                11,3502  77655 1           VAD
0601  REF   3  LAST 1348           11,3503  01120 0                    ZV
0602  REF   4  LAST 1348           11,3504  01120 0           STORE    ZV
0603                                11,3505  45014 0           BOFF     CALL
0604  REF   3  LAST 1345           11,3506  00341 1                    JSWITCH
0605  REF   1                      11,3507  23557 1                    ENDSTATE
0606  REF  25  LAST 1321           11,3510  56750 0                    GRP2PC
0607                                11,3511  77354 0           LXA,2    VLOAD
0608  REF   2  LAST   78           11,3512  01102 0                    COLREG
0609  REF   5  LAST 1348           11,3513  01120 0                    ZV
0610                                11,3514  77732 1           VSL3                ADJUST W-POSITION FOR STORAGE
0611  REF  70  LAST 1258           11,3515  12467 1           STORE    W +54D,2
0612                                11,3516  77775 1           VLOAD
0613  REF   6  LAST 1348           11,3517  01112 1                    YV
0614                                11,3520  40132 0           VSL3     BOV
0615  REF   1                      11,3521  23651 1                    WMATEND
0616  REF  71  LAST 1348           11,3522  12401 1           STORE    W,2

0617                                11,3523  77624 1           CALL
0618  REF  26  LAST 1348           11,3524  56750 0                    GRP2PC
```

```
0619                                11,3525   66354 0            LXA,2  SSP
0620  REF   3  LAST 1348           11,3526   01102 0                   COLREG
0621  REF  36  LAST 1340           11,3527   00052 0                   S2
0622                                11,3530   00000 1                   0
0623                                11,3531   67114 1            INCR,2 SXA,2
0624                                11,3532   00006 1                   6
0625  REF   7  LAST 1348           11,3533   01111 1                   YV
0626                                11,3534   45104 0            TIX,2  CALL
0627  REF   1                       11,3535   23622 0                   RELOADSV
0628  REF  27  LAST 1348           11,3536   56750 0                   GRP2PC
0629                                11,3537   67154 0            LXA,2  SXA,2
0630  REF   8  LAST 1349           11,3540   01111 1                   YV
0631  REF   4  LAST 1349           11,3541   01102 0                   COLREG

0632                                11,3542   77624 1  NEXTCOL   CALL
0633  REF  28  LAST 1349           11,3543   56750 0                   GRP2PC
0634                                11,3544   76754 0            LXA,2  VLOAD*
0635  REF   5  LAST 1349           11,3545   01102 0                   COLREG
0636  REF  72  LAST 1348           11,3546   75376 1                   W,2
0637                                11,3547   77722 0            VSR3                ADJUST W-POSITION FOR INTEGRATION
0638  REF   9  LAST 1349           11,3550   01112 1            STORE  YV
0639                                11,3551   76173 0            VLOAD* AXT,1
0640  REF  73  LAST 1349           11,3552   75310 1                   W +54D,2
0641                                11,3553   00000 1                   0
0642                                11,3554   77722 0            VSR3                ADJUST W-VELOCITY FOR INTEGRATION
0643  REF   6  LAST 1348           11,3555   35120 1            STCALL ZV
0644  REF   1                       11,3556   23305 0                   DIFEQ0

0645                                11,3557   77200 0  ENDSTATE BOV    VLOAD
0646  REF   3  LAST 1343           11,3560   22762 1                   GOBAQUE
0647  REF   7  LAST 1349           11,3561   01120 0                   ZV
0648  REF  12  LAST 1347           11,3562   25527 0            STOVL  TNUV
0649  REF  10  LAST 1349           11,3563   01112 1                   YV
0650  REF  14  LAST 1347           11,3564   01521 0            STORE  TDELTAV
0651                                11,3565   43014 0            BON    BOFF
0652  REF   3  LAST 1330           11,3566   04715 0                   MIDAVFLG
0653  REF   1                       11,3567   27633 1                   CKMID2              CHECK FOR MID2 BEFORE GOING TO TIMEINC
0654  REF  21  LAST 1338           11,3570   01756 1                   DIMOFLAG
0655  REF   5  LAST 1340           11,3571   27305 1                   TESTLOOP
0656                                11,3572   77776 1            EXIT
0657  REF 101  LAST 1333           11,3573   0 5412 0           TC     PHASCHNG
0658                                11,3574   04022 0            OCT    04022               PHASE 1
0659  REF  53  LAST 1320           11,3575   0 5546 0           TC     UPFLAG              PHASE CHANGE HAS OCCURRED BETWEEN
0660  REF   4  LAST 1320           11,3576   00236 0            ADRES  REINTFLG            INTSTALL AND INTWAKE
0661  REF 240  LAST 1333           11,3577   0 6006 1           TC     INTPRET
0662                                11,3600   77731 1            SSP
0663  REF  26  LAST 1346           11,3601   00053 1                   QPRET
0664  REF   1                       11,3602   23607 1                   AMOVED
0665                                11,3603   52014 0            BON    GOTO
0666  REF  20  LAST 1328           11,3604   01714 1                   VINTFLAG
```

```
0667   REF   4  LAST 1332   11,3605   26705 1                    ATOPCSM
0668   REF   4  LAST 1332   11,3606   26760 1                    ATOPLEM
0669                        11,3607   66214 0  AMOVED    SET     SSP
0670   REF   4  LAST 1348   11,3610   00061 0                    JSWITCH
0671   REF   6  LAST 1349   11,3611   01103 1                    COLREG
0672                        11,3612   77741 0           DEC      -30
0673                        11,3613   66214 0           BOFF     SSP
0674   REF   7  LAST 1328   11,3614   01755 1                    D60R9FLG
0675   REF   1              11,3615   23542 0                    NEXTCOL
0676   REF   7  LAST 1350   11,3616   01103 1                    COLREG
0677                        11,3617   77717 0           DEC      -48
0678                        11,3620   77650 1           GOTO
0679   REF   2  LAST 1350   11,3621   23542 0                    NEXTCOL

0680                        11,3622   77745 1  RELOADSV  DLOAD             RELOAD TEMPORARY STATE VECTOR
0681   REF   9  LAST 1331   11,3623   01101 0                    TDEC     FROM PERMANENT IN CASE OF
0682   REF  55  LAST 1330   11,3624   34041 0           STCALL   TDEC1
0683   REF   1              11,3625   27167 1                    INTEGRV2 BY STARTING AT INTEGRV2.
0684                        11,3626   43345 1  DIFEQCOM  DLOAD    DAD      INCREMENT H AND DIFEQCNT.
0685   REF  10  LAST 1336   11,3627   02314 0                    DT/2
0686   REF   6  LAST 1348   11,3630   02212 1                    H
0687                        11,3631   66110 1           INCR,1   SXA,1
0688                        11,3632   77763 0           DEC      -12
0689   REF  25  LAST 1345   11,3633   01500 0                    DIFEQCNT DIFEQCNT SET FOR NEXT ENTRY.
0690   REF   7  LAST 1350   11,3634   02212 1           STORE    H
0691                        11,3635   74561 0           VXSC     VSR1
0692   REF  12  LAST 1348   11,3636   02202 0                    FV
0693                        11,3637   74255 0           VAD      VXSC
0694   REF   8  LAST 1349   11,3640   01120 0                    ZV
0695   REF   8  LAST 1350   11,3641   02212 1                    H
0696                        11,3642   77655 1           VAD
0697   REF  11  LAST 1349   11,3643   01112 1                    YV
0698   REF  41  LAST 1345   11,3644   02152 0           STORE    ALPHAV
0699                        11,3645   52014 0           BON      GOTO
0700   REF   5  LAST 1350   11,3646   00301 0                    JSWITCH
0701   REF   2  LAST 1345   11,3647   23665 0                    DOW..
0702   REF   1              11,3650   22472 0                    FBR3

0703                        11,3651   43014 0  WMATEND   CLEAR    CLEAR
0704   REF  22  LAST 1349   11,3652   01676 1                    DIMOFLAG DONT INTEGRATE W THIS TIME
0705   REF  14  LAST 1332   11,3653   01671 0                    ORBWFLAG INVALIDATE W
0706                        11,3654   77614 1           CLEAR
0707   REF  13  LAST 1332   11,3655   02676 1                    RENDWFLG
0708                        11,3656   77414 0           SET      EXIT
0709   REF   7  LAST 1323   11,3657   01472 1                    STATEFLG PICK UP STATE VECTOR UPDATE
0710   REF  36  LAST 1331   11,3660 0 5650 1           TC       ALARM
0711                        11,3661   00421 0           OCT      421
0712   REF 241  LAST 1349   11,3662 0 6006 1           TC       INTPRET
```

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0713                        11,3663   77650 1          GOTO
0714   REF   6  LAST 1349   11,3664   27305 1                TESTLOOP      FINISH INTEGRATING STATE VECTOR
```

L ORBITAL INTEGRATION USER'S PAGE NO. 19 E0 S3

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P0715   ORBITAL ROUTINE FOR EXTRAPOLATION OF THE W MATRIX. IT COMPUTES THE SECOND DERIVATIVE OF EACH COLUMN POSITION
R0717   VECTOR OF THE MATRIX AND CALLS THE NYSTROM INTEGRATION ROUTINES TO SOLVETHE DIFFERENTIAL EQUATIONS. THE PROGRAM
R0719   USES A TABLE OF VEHICLE POSITION VECTORS COMPUTED DURING THE INTEGRATION OF THE VEHICLES POSITION AND VELOCITY.
 0721                                  11,3665   70754 0  DOW..    LXA,2   DLOAD*
 0722   REF  17  LAST 1347             11,3666   02150 1           PBODY
 0723   REF   7  LAST 1340             11,3667   50042 1           MUEARTH,2
 0724   REF   4  LAST 1339             11,3670   36210 1           STCALL  BETAM
 0725   REF   1                        11,3671   23713 0           DOW..1
 0726   REF  13  LAST 1350             11,3672   02202 0           STORE   FV
 0727                                  11,3673   62014 0           BOF     INCR,1
 0728   REF   6  LAST 1344             11,3674   00342 1           MIDFLAG
 0729   REF   2  LAST 1341             11,3675   23220 0           NBRANCH
 0730                                  11,3676   77771 0           DEC     -6
 0731                                  11,3677   70744 1           LXC,2   DLOAD*
 0732   REF  18  LAST 1352             11,3700   02150 1           PBODY
 0733   REF   8  LAST 1352             11,3701   50044 1           MUEARTH -2,2
 0734   REF   5  LAST 1352             11,3702   36210 1           STCALL  BETAM
 0735   REF   2  LAST 1352             11,3703   23713 0           DOW..1
 0736                                  11,3704   50414 0           BON     VSR6
 0737   REF  31  LAST 1346             11,3705   00303 1           MOONFLAG
 0738                                  11,3706   23707 0           +1
 0739                                  11,3707   77655 1           VAD
 0740   REF  14  LAST 1352             11,3710   02202 0           FV
 0741   REF  15  LAST 1352             11,3711   36202 1           STCALL  FV
 0742   REF   3  LAST 1352             11,3712   23220 0           NBRANCH
 0743                                  11,3713   60575 0  DOW..1   VLOAD   VSR4
 0744   REF  42  LAST 1350             11,3714   02152 0           ALPHAV
 0745                                  11,3715   53513 0           PDVL*   UNIT
 0746   REF   9  LAST 1338             11,3716   02217 1           VECTAB,1
 0747                                  11,3717   46315 1           PDVL    VPROJ
 0748   REF  43  LAST 1352             11,3720   02152 0           ALPHAV
 0749                                  11,3721   52361 1           VXSC    VSU
 0750   REF   5  LAST 1344             11,3722   23764 0           374
 0751                                  11,3723   60325 0           PDDL    NORM
 0752                                  11,3724   00045 0           36D
 0753   REF  37  LAST 1349             11,3725   00052 0           S2
 0754                                  11,3726   63406 0           PUSH    DSQ
 0755                                  11,3727   77605 1           DMP
 0756                                  11,3730   65301 0           NORM    PDDL
 0757                                  11,3731   00043 0           34D
 0758   REF   6  LAST 1352             11,3732   02210 0           BETAM
 0759                                  11,3733   56342 1           SR1     DDV
 0760                                  11,3734   77761 1           VXSC
 0761                                  11,3735   57154 0           LXA,2   XAD,2
 0762   REF  38  LAST 1352             11,3736   00051 0           S2
 0763   REF  39  LAST 1352             11,3737   00051 0           S2
 0764                                  11,3740   57074 0           XAD,2   XAD,2
 0765   REF  40  LAST 1352             11,3741   00051 0           S2
 0766                                  11,3742   00042 1           34D
 0767                                  11,3743   43457 0           VSL*    RVQ
```

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0768                          11,3744   57606 0                  0 -8D,2
0769   REF   1                11,2000                  SETLOC ORBITAL1
0770                          11,3745                  BANK

0771                          11,3745   04631 1  3/5     2DEC   .6 B-2
0771                          11,3746   23146 0
0772                          11,3747   14000 1  THREE/8 2DEC   .375
0772                          11,3750   00000 1
0773                          11,3751   02314 0  .3D     2DEC   .3 B-2
0773                          11,3752   31463 1
0774                          11,3753   01400 1  3/64    2DEC   3 B-6
0774                          11,3754   00000 1
0775                          11,3755   10000 0  DP1/4    2DEC   .25
0775                          11,3756   00000 1
0776   REF   3  LAST 1302     11,3755            QQUARTER EQUALS DP1/4
0777   REF   4  LAST 1353     11,3755            POS1/4   EQUALS DP1/4
0778                          11,3757   03000 1  3/32    2DEC   3 B-5
0778                          11,3760   00000 1
0779                          11,3761   36000 1  15/16   2DEC   15. B -4
0779                          11,3762   00000 1
0780                          11,3763   30000 1  3/4     2DEC   3.0 B -2
0780                          11,3764   00000 1
0781                          11,3765   22525 0  7/12    2DEC   .5833333333
0781                          11,3766   12525 0
0782                          11,3767   22000 1  9/16    2DEC   9 B -4
0782                          11,3770   00000 1
0783                          11,3771   01200 1  5/128   2DEC   5 B-7
0783                          11,3772   00000 1
0784   REF  19  LAST 1347     04,3565            DPZERO   EQUALS ZEROVEC
0785                          11,3773   25252 0  DP2/3    2DEC   .6666666667
0785                          11,3774   25253 1
0786   REF   3  LAST 1348     11,3773            2/3      EQUALS DP2/3
0787                          11,3775   00027 1  OCT27    OCT    27
R0788  LM504 IS TEMPORARY
0789                          13,3714                  BANK   13
0790   REF   1                13,2000                  SETLOC ORBITAL2
0791                          13,3714                  BANK
R0792  IT IS VITAL THAT THE FOLLOWING CONSTANTS NOT BE SHUFFLED
0793                          13,3714   77764 1        DEC    -11
0794                          13,3715   77775 1        DEC    -2
0795                          13,3716   77766 0        DEC    -9
0796                          13,3717   77771 0        DEC    -6
0797                          13,3720   77775 1        DEC    -2
0798                          13,3721   77775 1        DEC    -2
0799                          13,3722   00000 1        DEC    0
0800                          13,3723   77763 0        DEC    -12
0801                          13,3724   77766 0        DEC    -9
0802                          13,3725   77773 1        DEC    -4
0803                          13,3726   77770 1  ASCALE  DEC    -7
0804                          13,3727   77771 0        DEC    -6
```

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0805                              13,3730   27446 1           2DEC*  1.32715445 E16 B-54*     S
0805                              13,3731   14620 0
0806                              13,3732   16471 1           2DEC*  4.9027780 E8 B-30*       M
0806                              13,3733   01352 1
0807                              13,3734   22437 1  MUEARTH  2DEC*  3.986032 E10 B-36*
0807                              13,3735   16067 1
0808                              13,3736   00000 1           2DEC   0
0808                              13,3737   00000 1
0809                              13,3740   02302 1  J4REQ/J3 2DEC*  .4991607391 E7 B-26*
0809                              13,3741   24736 0
0810  *                           13,3742   77651 0           2DEC   -176236.02 B-25
0810  *                           13,3743   76237 0
0811                              13,3744   77776 1  2J3RE/J2 2DEC*  -.1355426363 E5 B-27*
0811                              13,3745   53032 0
0812                              13,3746   10407 0           2DEC*  .3067493316 E18 B-60*
0812                              13,3747   05344 1
0813                              13,3750   13710 0  J2REQSQ  2DEC*  1.75501139 E21 B-72*
0813                              13,3751   35320 0
0814                              13,3752   12160 0  3J22R2MU 2DEC*  9.20479048 E16 B-58*
0814                              13,3753   12124 0
0815                              13,3754   24000 1  5/8       2DEC   5 B-3
0815                              13,3755   00000 1
0816                              13,3756   74631 0  -1/12     2DEC   -.1
0816                              13,3757   63145 1
0817  REF   9  LAST 1352         13,3732             MUM       =      MUEARTH -2
0818                              13,3760   00243 1  RECRATIO  2DEC   .01
0818                              13,3761   32703 1
0819                              13,3762   03654 0  RSPHERE   2DEC   64373.76 E3 B-29
0819                              13,3763   21000 1
0820                              13,3764   03654 0  RDM       2DEC   16093.44 E3 B-27
0820                              13,3765   21000 1
0821                              13,3766   04627 0  RDE       2DEC   80467.20 E3 B-29
0821                              13,3767   25200 1
0822                                 0000           RATT      EQUALS 0D
0823                                 0006           VATT      EQUALS 6D
0824                                 0014           TAT       EQUALS 12D
0825                                 0016           RATT1     EQUALS 14D
0826                                 0024           VATT1     EQUALS 20D
0827                                 0032           MU(P)     EQUALS 26D
0828                                 0040           TDEC1     EQUALS 32D
0829                                 0016           URPV      EQUALS 14D
0830  *REF   6  LAST 1343           0022           COSPHI/2  EQUALS URPV +4
0831                                 0024           UZ        EQUALS 20D
0832                                 0032           TVEC      EQUALS 26D
```

L INFLIGHT ALIGNMENT ROUTINES

```
0001                          22,3510                    BANK   22
0002  REF   1                 23,2000                    SETLOC INFLIGHT
0003                          23,3205                    BANK

0004  REF  34 LAST  818       E5,1671                    EBANK= XSM


R0005  CALCGTA COMPUTES THE GYRO TORQUE ANGLES REQUIRED TO BRING THE STABLE MEMBER INTO THE DESIRED ORIENTATION.

R0007  THE INPUT IS THE DESIRED STABLE MEMBER COORDINATES REFERRED TO PRESENT STABLE MEMBER COORDINATES. THE THREE
R0009  HALF-UNIT VECTORS ARE STORED AT XDC, YDC, AND ZDC.

R0010  THE OUTPUTS ARE THE THREE GYRO TORQUING ANGLES TO BE APPLIED TO THE Y, Z, AND X GYROS AND ARE STORED DP AT IGC,
R0012  MGC, AND OGC RESPECTIVELY.

0013  REF   1                                            COUNT  23/INFLT

0014                          23,3205    71220 1  CALCGTA ITA    DLOAD          PUSHDOWN  00-03,16D-27D,34D-37D
0015  REF  41 LAST 1352       23,3206    00051 0          S2     XDC = (XD1 XD2 XD3)
0016  REF   6 LAST  769       23,3207    02714 1          XDC    YDC = (YD1 YD2 YD3)
0017                          23,3210    65325 0          PDDL   ZDC = (ZD1 ZD2 ZD3)
0018  REF  30 LAST 1250       23,3211    15335 0          HI6ZEROS
0019  REF   7 LAST 1355       23,3212    02720 0          XDC +4
0020                          23,3213    55476 1          DCOMP  VDEF
0021                          23,3214    77656 1          UNIT
0022  REF   1                 23,3215    14027 1          STODL  ZPRIME          ZP = UNIT(-XD3 0 XD1) = (ZP1 ZP2 ZP3)
0023  REF   2 LAST 1355       23,3216    00027 1          ZPRIME

0024                          23,3217    77742 0          SR1
0025  REF  10 LAST 1240       23,3220    14023 0          STODL  SINTH           SIN(IGC) = ZP1
0026  REF   3 LAST 1355       23,3221    00033 1          ZPRIME +4
0027                          23,3222    77742 0          SR1
0028  REF   9 LAST 1240       23,3223    34021 0          STCALL COSTH           COS(IGC) = ZP3
0029  REF   5 LAST  885       23,3224    47256 0          ARCTRIG

0030  REF   3 LAST  537       23,3225    16762 0          STODL  IGC             Y GYRO TORQUING ANGLE   FRACTION OF REV.
0031  REF   8 LAST 1355       23,3226    02716 0          XDC +2
0032                          23,3227    77742 0          SR1
0033  REF  11 LAST 1355       23,3230    14023 0          STODL  SINTH           SIN(MGC) = XD2
0034  REF   4 LAST 1355       23,3231    00027 1          ZPRIME

0035                          23,3232    65205 0          DMP    PDDL
0036  REF   9 LAST 1355       23,3233    02720 0          XDC +4                 PDOO = (ZPI)(XD3)
0037  REF   5 LAST 1355       23,3234    00033 1          ZPRIME +4

0038                          23,3235    45205 1          DMP    DSU
0039  REF  10 LAST 1355       23,3236    02714 1          XDC                    MPAC = (ZP3)(XD1)
0040                          23,3237    77626 0          STADR
0041  REF  10 LAST 1355       23,3240    43756 1          STCALL COSTH           COS(MGC) = MPAC - PDOO
0042  REF   6 LAST 1355       23,3241    47256 0          ARCTRIG
```

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0043  REF   3  LAST  537   23,3242  26764 0   STOVL  MGC       Z GYRO TORQUING ANGLE   FRACTION OF REV.
0044  REF   6  LAST 1355   23,3243  00027 1          ZPRIME
0045                       23,3244  77641 1   DOT
0046  REF   5  LAST  741   23,3245  02730 1          ZDC
0047  REF  11  LAST 1355   23,3246  24021 1   STOVL  COSTH     COS(OGC) = ZP . ZDC
0048  REF   7  LAST 1356   23,3247  00027 1          ZPRIME
0049                       23,3250  77641 1   DOT
0050  REF   5  LAST  741   23,3251  02722 1          YDC
0051  REF  12  LAST 1355   23,3252  34023 1   STCALL SINTH     SIN(OGC) = ZP . YDC
0052  REF   7  LAST 1355   23,3253  47256 0          ARCTRIG

0053  REF  17  LAST  759   23,3254  36760 0   STCALL OGC       X GYRO TORQUING ANGLE   FRACTION OF REV.
0054  REF  42  LAST 1355   23,3255  00051 0          S2
```

L INFLIGHT ALIGNMENT ROUTINES USER'S PAGE NO. 3 E5 S3

R0055 ARCTRIG COMPUTES AN ANGLE GIVEN THE SINE AND COSINE OF THIS ANGLE.

R0056 THE INPUTS ARE SIN/4 AND COS/4 STORED DP AT SINTH AND COSTH.

R0057 THE OUTPUT IS THE CALCULATED ANGLE BETWEEN +.5 AND -.5 REVOLUTIONS AND STORED AT THETA. THE OUTPUT IS ALSO
R0059 AVAILABLE AT MPAC.

```
0060                          23,3256  51545 1  ARCTRIG  DLOAD   ABS       PUSHDOWN  16D-21D
0061  REF  13  LAST 1356      23,3257  00023 0           SINTH
0062                          23,3260  50025 0           DSU     BMN
0063  REF   1                 23,3261  07474 1                   QTSN45    ABS(SIN/4) - SIN(45)/4
0064  REF   1                 23,3262  47271 0                   TRIG1     IF (-45,45) OR (135,-135)

0065                          23,3263  72545 0           DLOAD   SL1       (45,135) OR (-135,-45)
0066  REF  12  LAST 1356      23,3264  00021 1           COSTH
0067                          23,3265  75326 1           ACOS    SIGN
0068  REF  14  LAST 1357      23,3266  00023 0           SINTH
0069  REF   7  LAST 1240      23,3267  00025 0           STORE   THETA     X = ARCCOS(COS) WITH SIGN(SIN)
0070                          23,3270  77616 0           RVQ

0071                          23,3271  72545 0  TRIG1    DLOAD   SL1       (-45,45) OR (135,-135)
0072  REF  15  LAST 1357      23,3272  00023 0           SINTH
0073                          23,3273  77736 0           ASIN
0074  REF   8  LAST 1357      23,3274  14025 0           STODL   THETA     X = ARCSIN(SIN) WITH SIGN(SIN)
0075  REF  13  LAST 1357      23,3275  00021 1           COSTH
0076                          23,3276  77640 0           BMN
0077  REF   1                 23,3277  47302 0                   TRIG2     IF (135,-135)

0078                          23,3300  43545 1           DLOAD   RVQ
0079  REF   9  LAST 1357      23,3301  00025 0           THETA     X = ARCSIN(SIN)     (-45,45)

0080                          23,3302  75345 1  TRIG2    DLOAD   SIGN      (135,-135)
0081  REF  12  LAST 1249      23,3303  15333 0           HIDPHALF
0082  REF  16  LAST 1357      23,3304  00023 0           SINTH
0083                          23,3305  77625 0           DSU
0084  REF  10  LAST 1357      23,3306  00025 0           THETA
0085  REF  11  LAST 1357      23,3307  00025 0           STORE   THETA     X = .5 WITH SIGN(SIN) - ARCSIN(SIN)
0086                          23,3310  77616 0           RVQ                                 (+) - (+) OR (-) - (-)
```

R0087 SMNB, NBSM, AND AXISROT, WHICH USED TO APPEAR HERE, HAVE BEEN
R0088 COMBINED IN A ROUTINE CALLED AX*SR*T, WHICH APPEARS AMONG THE POWERED
R0089 FLIGHT SUBROUTINES.

L INFLIGHT ALIGNMENT ROUTINES USER'S PAGE NO. 5 E5 S3

R0090 CALCGA COMPUTES THE CDU DRIVING ANGLES REQUIRED TO BRING THE STABLE MEMBER INTO THE DESIRED ORIENTATION.

R0092 THE INPUTS ARE 1) THE NAVIGATION BASE COORDINATES REFERRED TO ANY COORDINATE SYSTEM. THE THREE HALF-UNIT
R0094 VECTORS ARE STORED AT XNB,YNB, AND ZNB. 2) THE DESIRED STABLE MEMBER COORDINATES REFERRED TO THE SAME
R0096 COORDINATE SYSTEM ARE STORED AT XSM, YSM, AND ZSM.

R0097 THE OUTPUTS ARE THE THREE CDU DRIVING ANGLES AND ARE STORED SP AT THETAD, THETAD +1, AND THETAD +2.

```
0099                          23,3311  77601 0  CALCGA  SETPD                PUSHDOWN  00-05, 16D-21D, 34D-37D
0100                          23,3312  00001 0           0
0101                          23,3313  47375 0           VLOAD   VXV
0102  REF  10  LAST  818     23,3314  02714 1           XNB                  XNB = OGA (OUTER GIMBAL AXIS)
0103  REF   5  LAST  818     23,3315  02700 1           YSM                  YSM = IGA (INNER GIMBAL AXIS)
0104                          23,3316  41456 0           UNIT    PUSH         PDO = UNIT(OGA X IGA) = MGA

0105                          23,3317  44041 1           DOT     ITA
0106  REF   7  LAST  818     23,3320  02730 1           ZNB
0107  REF  43  LAST 1356     23,3321  00051 0           S2
0108  REF  14  LAST 1357     23,3322  24021 1           STOVL   COSTH        COS(OG) = MGA . ZNB
0109                          23,3323  00001 0           0
0110                          23,3324  77641 1           DOT
0111  REF   7  LAST  818     23,3325  02722 1           YNB
0112  REF  17  LAST 1357     23,3326  34023 1           STCALL  SINTH        SIN(OG) = MGA . YNB
0113  REF   8  LAST 1356     23,3327  47256 0                   ARCTRIG
0114  REF  18  LAST 1356     23,3330  26760 1           STOVL   OGC
0115                          23,3331  00001 0           0

0116                          23,3332  50235 0           VXV     DOT          PROVISION FOR MG ANGLE OF 90 DEGREES
0117  REF  11  LAST 1359     23,3333  02714 1           XNB
0118  REF   6  LAST 1359     23,3334  02700 1           YSM
0119                          23,3335  77752 1           SL1
0120  REF  15  LAST 1359     23,3336  24021 1           STOVL   COSTH        COS(MG) = IGA . (MGA X OGA)
0121  REF   7  LAST 1359     23,3337  02700 1           YSM
0122                          23,3340  77641 1           DOT
0123  REF  12  LAST 1359     23,3341  02714 1           XNB
0124  REF  18  LAST 1359     23,3342  34023 1           STCALL  SINTH        SIN(MG) = IGA . OGA
0125  REF   9  LAST 1359     23,3343  47256 0                   ARCTRIG
0126  REF   4  LAST 1356     23,3344  02764 0           STORE   MGC

0127                          23,3345  45246 0           ABS     DSU
0128  REF   1                 23,3346  07476 0                   .166...
0129                          23,3347  77644 1           BPL
0130  REF   1                 23,3350  47371 1                   GIMLOCK1     IF ANGLE GREATER THAN 60 DEGREES

0131                          23,3351  50375 0  CALCGA1  VLOAD   DOT
0132  REF   4  LAST  818     23,3352  02706 1           ZSM
0133                          23,3353  00001 0           0
0134  REF  16  LAST 1359     23,3354  24021 1           STOVL   COSTH        COS(IG) = ZSM . MGA
0135  REF  35  LAST 1355     23,3355  02672 0           XSM
```

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0136                              23,3356   45441 1            DOT     STADR
0137   REF  19  LAST 1359        23,3357   43754 0            STCALL  SINTH          SIN(IG) = XSM . MGA
0138   REF  10  LAST 1359        23,3360   47256 0                    ARCTRIG

0139   REF   4  LAST 1355        23,3361   26762 0            STOVL   IGC
0140   REF  19  LAST 1359        23,3362   02760 1                    OGC
0141                              23,3363   43034 1            RTB     BONCLR
01415  REF   5  LAST  544        23,3364   45552 1                    V1STO2S
0142   REF   2  LAST  818        23,3365   00200 0                    CPHIFLAG
01425  REF  44  LAST 1359        23,3366   00051 0                    S2
0143   REF  20  LAST  767        23,3367   35156 0            STCALL  THETAD
0144   REF  45  LAST 1360        23,3370   00051 0                    S2

0145                              23,3371   77776 1  GIMLOCK1  EXIT
0146   REF  37  LAST 1350        23,3372   0 5650 1           TC      ALARM
0147                              23,3373    00401 1           OCT     00401
0148   REF  54  LAST 1349        23,3374   0 5546 0           TC      UPFLAG       GIMBAL LOCK HAS OCCURED
0149   REF   2  LAST  424        23,3375    00056 1           ADRES   GLOKFAIL

0150   REF 242  LAST 1350        23,3376   0 6006 1           TC      INTPRET
0151                              23,3377   77650 1           GOTO
0152   REF   1                   23,3400   47351 0                   CALCGA1
```

L INFLIGHT ALIGNMENT ROUTINES USER'S PAGE NO. 7 E5 S3

R0153 AXISGEN COMPUTES THE COORDINATES OF ONE COORDINATE SYSTEM REFERRED TO ANOTHER COORDINATE SYSTEM.

R0155 THE INPUTS ARE 1) THE STAR1 VECTOR REFERRED TO COORDINATE SYSTEM A STORED AT STARAD. 2) THE STAR2 VECTOR
R0157 REFERRED TO COORDINATE SYSTEM A STORED AT STARAD +6. 3) THE STAR1 VECTOR REFERRED TO COORDINATE SYSTEM B STORED
R0159 AT LOCATION 6 OF THE VAC AREA. 4) THE STAR2 VECTOR REFERRED TO COORDINATE SYSTEM B STORED AT LOCATION 12D OF
R0161 THE VAC AREA.

R0162 THE OUTPUT DEFINES COORDINATE SYSTEM A REFERRED TO COORDINATE SYSTEM B. THE THREE HALF-UNIT VECTORS ARE STORED
R0164 AT LOCATIONS XDC, XDC +6, XDC +12D, AND STARAD, STARAD +6, STARAD +12D.

```
0165                          23,3401  66370 0  AXISGEN  AXT,1  SSP             PUSHDOWN  00-30D,34D-37D
0166  REF  11  LAST  783     23,3402  02743 0                   STARAD +6
0167  REF  53  LAST 1342     23,3403  00051 0                   S1
0168  REF  12  LAST 1361     23,3404  02727 1                   STARAD -6

0169                          23,3405  77601 0           SETPD
0170                          23,3406  00001 0                   0
0171                          23,3407  46773 0  AXISGEN1 VLOAD*  VXV*              06D   UA = S1
0172  REF  13  LAST 1361     23,3410  02752 0                   STARAD +12D,1           STARAD +00D   UB = S1
0173  REF  14  LAST 1361     23,3411  02760 1                   STARAD +18D,1
0174                          23,3412  77656 1           UNIT                    12D   VA = UNIT(S1 X S2)
0175  REF  15  LAST 1361     23,3413  06760 0           STORE   STARAD +18D,1           STARAD +06D   VB = UNIT(S1 X S2)
0176                          23,3414  77773 1           VLOAD*
0177  REF  16  LAST 1361     23,3415  02752 0                   STARAD +12D,1

0178                          23,3416  76433 1           VXV*    VSL1
0179  REF  17  LAST 1361     23,3417  02760 1                   STARAD +18D,1   18D   WA = UA X VA
0180  REF  18  LAST 1361     23,3420  06766 0           STORE   STARAD +24D,1           STARAD +12D   WB = UB X VB

0181                          23,3421  77700 0           TIX,1
0182  REF   1                 23,3422  47407 1                   AXISGEN1

0183                          23,3423  66160 0           AXC,1   SXA,1
0184                          23,3424  00006 1                   6
0185                          23,3425  00036 1                   30D

0186                          23,3426  66370 0           AXT,1   SSP
0187                          23,3427  00022 1                   18D
0188  REF  54  LAST 1361     23,3430  00051 0                   S1
0189                          23,3431  00006 1                   6

0190                          23,3432  66374 1           AXT,2   SSP
0191                          23,3433  00006 1                   6
0192  REF  46  LAST 1360     23,3434  00052 0                   S2
0193                          23,3435  00002 0                   2

0194                          23,3436  76720 0  AXISGEN2 XCHX,1  VLOAD*
0195                          23,3437  00036 1                   30D             X1=-6 X2=+6   X1=-6 X2=+4   X1=-6 X2=+2
0196                          23,3440  00001 0                   0,1
```

L INFLIGHT ALIGNMENT ROUTINES USER'S PAGE NO. 8 E5 S3

```
0197                          23,3441   62757 0          VXSC*  PDVL*          J=(UA)(UB1)   J=(UA)(UB2)   J=(UA)(UB3)
0198  REF  19  LAST 1361      23,3442   75033 0                 STARAD +6,2
0199                          23,3443   00007 0                 6,1
0200                          23,3444   77757 1          VXSC*
0201  REF  20  LAST 1362      23,3445   75025 1                 STARAD +12D,2
0202                          23,3446   30031 0          STOVL* 24D            K=(VA)(VB1)   J=(VA)(VB2)   J=(VA)(VB3)
0203                          23,3447   00015 0                 12D,1

0204                          23,3450   53357 0          VXSC*  VAD
0205  REF  21  LAST 1362      23,3451   75017 0                 STARAD +18D,2 L=(WA)(WB1)   J=(WA)(WB2)   J=(WA)(WB3)
0206                          23,3452   76455 1          VAD    VSL1
0207                          23,3453   00031 0                 24D
0208                          23,3454   53520 0          XCHX,1 UNIT
0209                          23,3455   00036 1                 30D
0210  REF  11  LAST 1355      23,3456   06736 0          STORE  XDC +18D,1     XDC = L+J+K   YDC = L+J+K   ZDC = L+J+K

0211                          23,3457   77700 0          TIX,1
0212  REF   1                 23,3460   47461 1                 AXISGEN3

0213                          23,3461   77704 1  AXISGEN3 TIX,2
0214  REF   1                 23,3462   47436 0                 AXISGEN2

0215                          23,3463   77775 1          VLOAD
0216  REF  12  LAST 1362      23,3464   02714 1                 XDC
0217  REF  22  LAST 1362      23,3465   26736 1          STOVL  STARAD
0218  REF   6  LAST 1356      23,3466   02722 1                 YDC
0219  REF  23  LAST 1362      23,3467   26744 1          STOVL  STARAD +6
0220  REF   6  LAST 1356      23,3470   02730 1                 ZDC
0221  REF  24  LAST 1362      23,3471   02752 0          STORE  STARAD +12D

0222                          23,3472   77616 0          RVQ
```

```
0281                    23,3473   05520 0  QTSN45   2DEC   .1768
0281                    23,3474   26075 1
0282                    23,3475   05252 1  .166...  2DEC   .1666666667
0282                    23,3476   25253 1
```

L POWERED FLIGHT SUBROUTINES USER'S PAGE NO. 1 E0 S3

```
0001                        14,3422                 BANK   14              SAME FBANK AS THE FINDCDUD SUB-PROGRAM
0002   REF   1              23,2000                 SETLOC POWFLITE
0003                        23,3477                 BANK

0004   REF   1                0142                 EBANK= DEXDEX
0005   REF   1                                     COUNT* $$/POWFL

R0006       CDUTRIG, CDUTRIG1, CDUTRIG2, AND CD*TR*GS ALL COMPUTE THE SINES AND
R0007  COSINES OF THREE 2'S COMPLEMENT ANGLES AND PLACE THE RESULT, DOUBLE
R0008  PRECISION, IN THE SAME ORDER AS THE INPUTS, AT SINCDU AND COSCDU.   AN
R0009  ADDITIONAL OUTPUT IS THE 1'S COMPLEMENT ANGLES AT CDUSPOT.   THESE
R0010  ROUTINES GO OUT OF THEIR WAY TO LEAVE THE MPAC AREA AS THEY FIND IT,
R0011  EXCEPT FOR THE GENERALLY UNIMPORTANT MPAC +2.   THEY DIFFER ONLY IN
R0012  WHERE THEY GET THE ANGLES, AND IN METHOD OF CALLING.

R0013       CDUTRIG (AND CDUTRIG1, WHICH CAN BE CALLED IN BASIC) COMPUTE THE
R0014  SINES AND COSINES FROM THE CURRENT CONTENTS OF THE CDU REGISTERS.
R0015  THE CONTENTS OF CDUTEMP, ETC., ARE NOT TOUCHED SO THAT THEY MAY
R0016  CONTINUE TO FORM A CONSISTENT SET WITH THE LATEST PIPA READINGS.

R0017       CDUTRIG1 IS LIKE CDUTRIG EXCEPT THAT IT CAN BE CALLED IN BASIC.

R0018       CD*TR*GS FINDS CDU VALUES IN CDUSPOT RATHER THAN IN CDUTEMP.   THIS
R0019  ALLOWS USERS TO MAKE TRANSFORMATIONS USING ARBITRARY ANGLES, OR REAL
R0020  ANGLES IN AN ORDER OTHER THAN X Y Z.   A CALL TO THIS ROUTINE IS
R0021  NECESSARY IN PREPARATION FOR A CALL TO AX*SR*T IN EITHER OF ITS TWO
R0022  MODES (SMNB OR NBSM).   SINCE AX*SR*T EXPECTS TO FIND THE SINES AND
R0023  COSINES IN THE ORDER Y Z X THE ANGLES MUST HAVE BEEN PLACED IN CDUSPOT
R0024  IN THIS ORDER.   CD*TR*GS NEED NOT BE REPEATED WHEN AX*SR*T IS CALLED
R0025  MORE THAN ONCE, PROVIDED THE ANGLES HAVE NOT CHANGED.   NOTE THAT SINCE
R0026  IT CLOBBERS BUF2 (IN THE SINE AND COSINE ROUTINES) CD*TR*GS CANNOT BE
R0027  CALLED USING BANKCALL.   SORRY.

R0028       CD*TR*G IS LIKE CD*TR*GS EXCEPT THAT IT CAN BE CALLED IN
R0029  INTERPRETIVE.

0030                        23,3477   77776 1  CDUTRIG  EXIT
0031   REF   1              23,3500  0 3507 0           TC     CDUTRIGS
0032   REF 243  LAST 1360   23,3501  0 6006 1           TC     INTPRET
0033                        23,3502   77616 0           RVQ

0034                        23,3503   77776 1  CD*TR*G  EXIT
0035   REF   1              23,3504  0 3515 0           TC     CD*TR*GS
0036   REF 244  LAST 1365   23,3505  0 6006 1           TC     INTPRET
0037                        23,3506   77616 0           RVQ

0038   REF  28  LAST 1063   23,3507  3 0032 0  CDUTRIGS CA     CDUX
0039   REF   6  LAST  544   23,3510  54 772 1           TS     CDUSPOT +4
0040   REF  16  LAST 1063   23,3511  3 0033 1           CA     CDUY
0041   REF   7  LAST 1365   23,3512  54 766 1           TS     CDUSPOT
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0042   REF  22  LAST 1063   23,3513  3 0034 0          CA      CDUZ
0043   REF   8  LAST 1365   23,3514  54 770 0          TS      CDUSPOT +2

0044                        23,3515  0 0006 1  CD*TR*GS EXTEND
0045   REF   4  LAST   71   23,3516  22 142 0          QXCH    TEM2
0046   REF  17  LAST 1182   23,3517  3 5015 0          CAF     FOUR
0047   REF  36  LAST 1152   23,3520  7 6211 1  TR*GL**P MASK    SIX          MAKE IT EVEN AND SMALLER
0048   REF   3  LAST   71   23,3521  54 143 0          TS      TEM3
0049   REF   4  LAST 1366   23,3522  50 143 1          INDEX   TEM3
0050   REF   9  LAST 1366   23,3523  3 0766 0          CA      COUSPOT
0051   REF 658  LAST 1344   23,3524  52 155 1          DXCH    MPAC         STORING 2'S COMP ANGLE, LOADING MPAC
0052   REF  53  LAST 1178   23,3525  52 127 1          DXCH    VBUF +4      STORING MPAC FOR LATER RESTORATION
0053   REF   1               23,3526  0 4757 0          TC      USPRCADR
0054   REF  10  LAST  884   23,3527   45513 1          CADR    CDULOGIC
0055                        23,3530  0 0006 1          EXTEND
0056   REF 659  LAST 1366   23,3531  3 0155 0          DCA     MPAC
0057   REF   5  LAST 1366   23,3532  50 143 1          INDEX   TEM3
0058   REF  10  LAST 1366   23,3533  52 767 0          DXCH    COUSPOT      STORING 1'S COMPLEMENT ANGLE
0059   REF   2  LAST 1366   23,3534  0 4757 0          TC      USPRCADR
0060   REF   2  LAST 1118   23,3535   01516 1          CADR    COSINE
0061   REF 660  LAST 1366   23,3536  52 155 1          DXCH    MPAC
0062   REF   6  LAST 1366   23,3537  50 143 1          INDEX   TEM3
0063   REF   4  LAST   74   23,3540  52 745 0          DXCH    COSCDU       STORING COSINE
0064                        23,3541  0 0006 1          EXTEND
0065   REF   7  LAST 1366   23,3542  5 0143 1          INDEX   TEM3
0066   REF  11  LAST 1366   23,3543  3 0767 1          DCA     COUSPOT      LOADING 1'S COMPLEMENT ANGLE
0067   REF   3  LAST 1366   23,3544  0 4757 0          TC      USPRCADR
0068   REF   2  LAST 1118   23,3545   01530 0          CADR    SINE +1      SINE +1 EXPECTS ARGUMENT IN A AND L
0069   REF  54  LAST 1366   23,3546  52 127 1          DXCH    VBUF +4      BRINGING UP PRIOR MPAC TO BE RESTORED
0070   REF 661  LAST 1366   23,3547  52 155 1          DXCH    MPAC
0071   REF   8  LAST 1366   23,3550  50 143 1          INDEX   TEM3
0072   REF   4  LAST   74   23,3551  52 737 0          DXCH    SINCDU
0073   REF   9  LAST 1366   23,3552  10 143 0          CCS     TEM3
0074   REF   1               23,3553  1 3520 1          TCF     TR*GL**P
0075   REF   5  LAST 1366   23,3554  0 0142 0          TC      TEM2
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P0076  ********************************************************************************************************************

R0078       QUICTRIG, INTENDED FOR GUIDANCE CYCLE USE WHERE TIME IS CRITICAL, IS A MUCH FASTER VERSION OF CD*TR*GS.
R0080  QUICTRIG COMPUTES AND STORES THE SINES AND COSINES OF THE 2'S COMPLEMENT ANGLES AT CDUSPOT, CDUSPOT +2,
R0082  AND CDUSPOT +4.   UNLIKE CD*TR*GS, QUICTRIG DOES NOT LEAVE THE 1'S COMPLEMENT VERSIONS OF THE ANGLES IN
R0084  CDUSPOT.   QUICTRIG'S EXECUTION TIME IS 4.1 MS;   THIS IS 10 TIMES AS FAST AS CD*TR*GS.   QUICTRIG MAY BE
R0086  CALLED FROM INTERPRETIVE AS AN RTB OP-CODE, OR FROM BASIC VIA BANKCALL OR IBNKCALL.

 0090                              23,3555  0 0004 0  QUICTRIG INHINT                  INHINT SINCE DAP USES THE SAME TEMPS
 00901                             23,3556  0 0006 1           EXTEND
 00902  REF  18  LAST  231         23,3557  22 061 0           QXCH    ITEMP1
 0091   REF  18  LAST 1366         23,3560  3 5015 0           CAF     FOUR
 0092   REF  37  LAST 1366         23,3561  7 6211 1     +4    MASK    SIX
 0093   REF  19  LAST  229         23,3562  54 062 1           TS      ITEMP2
 0094   REF  20  LAST 1367         23,3563  50 062 0           INDEX   ITEMP2
 0095   REF  12  LAST 1366         23,3564  3 0766 0           CA      CDUSPOT
 0096   REF   8  LAST 1073         23,3565  0 5075 0           TC      SPSIN
 0097                              23,3566  0 0006 1           EXTEND
 0098   REF  71  LAST 1235         23,3567  7 5002 1           MP      BIT14          SCALE DOWN TO MATCH INTERPRETER OUTPUTS
 0099   REF  21  LAST 1367         23,3570  50 062 0           INDEX   ITEMP2
 0100   REF   5  LAST 1366         23,3571  52 737 0           DXCH    SINCDU
 0101   REF  22  LAST 1367         23,3572  50 062 0           INDEX   ITEMP2
 0102   REF  13  LAST 1367         23,3573  3 0766 0           CA      CDUSPOT
 0103   REF   7  LAST 1073         23,3574  0 5074 1           TC      SPCOS
 0104                              23,3575  0 0006 1           EXTEND
 0105   REF  72  LAST 1367         23,3576  7 5002 1           MP      BIT14
 0106   REF  23  LAST 1367         23,3577  50 062 0           INDEX   ITEMP2
 0107   REF   5  LAST 1366         23,3600  52 745 0           DXCH    COSCDU
 0108   REF  24  LAST 1367         23,3601  10 062 1           CCS     ITEMP2
 0109   REF   2  LAST  705         23,3602  1 3561 1           TCF     QUICTRIG +4
 01091  REF  19  LAST 1367         23,3603  3 0061 0           CA      ITEMP1
 0110                              23,3604  0 0003 1           RELINT
 01101  REF 337  LAST 1325         23,3605  0 0000 1           TC      A
```

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R0111   ********************************************************************************************************************

R0113        THESE INTERFACE ROUTINES MAKE IT POSSIBLE TO CALL AX*SR*T, ETC., IN
R0114   INTERPRETIVE.   LATER, WHERE POSSIBLE, THEY WILL BE ELIMINATED.

R0115        NBSM WILL BE THE FIRST TO GO.   IT SHOULD NOT BE USED.

 0116                              23,3606   77620 0  NBSM      STQ
 0117   REF  43  LAST 1343        23,3607   00047 1                X2
 0118                              23,3610   76740 0           LXC,1  VLOAD*
 0119   REF  55  LAST 1361        23,3611   00050 1                S1          BASE ADDRESS OF THE CDU ANGLES IS IN S1
 0120                              23,3612   00001 0                0,1
 0121   REF  14  LAST 1367        23,3613   24767 1           STOVL  CDUSPOT
 0122                              23,3614   00041 1                32D         VECTOR TO BE TRANSFORMED IS IN 32D
 0123                              23,3615   77624 1           CALL
 0124   REF   2  LAST  454        23,3616   47637 0                TRG*NBSM
 0125                              23,3617   34041 0           STCALL 32D         SINCE THERE'S NO STGOTO
 0126   REF  44  LAST 1368        23,3620   00047 1                X2

R0127        THESE INTERFACE ROUTINES ARE PERMANENT.   ALL RESTORE USER'S EBANK
R0128   SETTING.   ALL ARE STRICT INTERPRETIVE SUBROUTINES, CALLED USING "CALL",
R0129   RETURNING VIA QPRET.   ALL EXPECT AND RETURN THE VECTOR TO BE TRANSFOR-
R0130   MED INTERPRETER-STYLE IN MPAC; COMPONENTS AT MPAC, MPAC +3, AND MPAC +5.

R0131        TRG*SMNB AND TRG*NBSM BOTH EXPECT TO SEE THE 2'S COMPLEMENT ANGLES
R0132   AT CDUSPOT (ORDER Y Z X, AT CDUSPOT, CDUSPOT +2, AND CDUSPOT +4; ODD
R0133   LOCATIONS NEED NOT BE ZEROED).   TRG*NBSM DOES THE NB TO SM TRANSFOR-
R0134   MATION;  TRG*SMNB, VICE VERSA.

R0135        CDU*NBSM DOES ITS TRANSFORMATION USING THE PRESENT CONTENTS OF
R0136   THE CDU COUNTERS.   OTHERWISE IT IS LIKE TRG*NBSM.

R01361       CDU*SMNB IS THE COMPLEMENT OF CDU*NBSM.

 01362                             23,3621    77776 1  CDU*SMNB EXIT
 01363  REF   2  LAST 1365        23,3622   0 3507 0           TC     CDUTRIGS
 01364  REF   1                   23,3623   1 3626 1           TCF    C*MM*N1

 0137                              23,3624    77776 1  TRG*SMNB EXIT
 0138   REF   2  LAST 1365        23,3625   0 3515 0           TC     CD*TR*GS
 0139   REF   3  LAST 1175        23,3626   0 7501 1  C*MM*N1  TC     MPACVBUF    AX*SR*T EXPECTS VECTOR IN VBUF
 0140   REF  44  LAST 1204        23,3627   4 6214 1           CS     THREE       SIGNAL FOR SM TO NB TRANSFORMATION
 0141   REF   1                   23,3630   0 3650 1  C*MM*N2  TC     AX*SR*T
 0142   REF 245  LAST 1365        23,3631   0 6006 1           TC     INTPRET
 0143                              23,3632    43575 1           VLOAD  RVQ
 0144   REF  55  LAST 1366        23,3633    00123 1                  VBUF

 0145                              23,3634    77776 1  CDU*NBSM EXIT
 0146   REF   3  LAST 1368        23,3635   0 3507 0           TC     CDUTRIGS
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0147  REF   1                23,3636  1 3641 0            TCF    C*MM*N3

0148                           23,3637   77776 1  TRG*NBSM EXIT
0149  REF   3  LAST 1368      23,3640  0 3515 0            TC     CD*TR*GS
0150  REF   4  LAST 1368      23,3641  0 7501 1  C*MM*N3   TC     MPACVBUF      FOR AX*SR*T
0151  REF  45  LAST 1368      23,3642  3 6214 0            CA     THREE         SIGNAL FOR NB TO SM TRANSFORMATION
0152  REF   1                23,3643  1 3630 0            TCF    C*MM*N2

R0153       *NBSM* AND *SMNB* EXPECT TO SEE THE SINES AND COSINES (AT SINCDU
R0154  AND COSCDU) RATHER THAN THE ANGLES THEMSELVES.   OTHERWISE THEY ARE
R0155  LIKE TRG*NBSM AND TRG*SMNB.

R0156       NOTE THAT JUST AS CD*TR*GS NEED BE CALLED ONLY ONCE FOR EACH SERIES
R0157  OF TRANSFORMATIONS USING THE SAME ANGLES, SO TOO ONLY ONE OF TRG*NBSM
R0158  AND TRG*SMNB NEED BE CALLED FOR EACH SERIES.   FOR SUBSEQUENT TRANSFOR-
R0159  MATIONS USE *NBSM* AND *SMNB*.

0160                           23,3644   77776 1  *SMNB*   EXIT
0161  REF   2  LAST 1368      23,3645  1 3626 1            TCF    C*MM*N1

0162                           23,3646   77776 1  *NBSM*   EXIT
0163  REF   2  LAST 1369      23,3647  1 3641 0            TCF    C*MM*N3

R0164       AX*SR*T COMBINES THE OLD SMNB AND NBSM.   FOR THE NB TO SM
R0165  TRANSFORMATION, ENTER WITH +3 IN A.   FOR SM TO NB, ENTER WITH -3.
R0166  THE VECTOR TO BE TRANSFORMED ARRIVES, AND IS RETURNED, IN VBUF.
R0167  AX*SR*T EXPECTS TO FIND THE SINES AND COSINES OF THE ANGLES OF ROTATION
R0168  AT SINCDU AND COSCDU, IN THE ORDER Y Z X.   A CALL TO CD*TR*GS, WITH
R0169  THE 2'S COMPLEMENT ANGLES (ORDER Y Z X) AT CDUSPOT, WILL TAKE CARE OF
R0170  THIS.   HERE IS A SAMPLE CALLING SEQUENCE:-

R0171                          TC     CDUTRIGS
R0172                          CS     THREE        ("CA  THREE" FOR NBSM)
R0173                          TC     AX*SR*T

R0174  THE CALL TO CD*TR*GS NEED NOT BE REPEATED, WHEN AX*SR*T IS CALLED MORE
R0175  THAN ONCE, UNLESS THE ANGLES HAVE CHANGED.

R0176       AX*SR*T IS GUARANTEED SAFE ONLY FOR VECTORS OF MAGNITUDE LESS THAN
R0177  UNITY.   A LOOK AT THE CASE IN WHICH A VECTOR OF GREATER MAGNITUDE
R0178  HAPPENS TO LIE ALONG AN AXIS OF THE SYSTEM TO WHICH IT IS TO BE TRANS-
R0179  FORMED CONVINCES ONE THAT THIS IS A RESTRICTION WHICH MUST BE ACCEPTED.

0180  REF   2  LAST 1365      23,3650  54 142 1  AX*SR*T  TS     DEXDEX        WHERE IT BECOMES THE INDEX OF INDEXES
0181                           23,3651  0 0006 1            EXTEND
0182  REF   1                23,3652  22 145 1            QXCH   RTNSAVER

0183  REF   3  LAST 1369      23,3653  10 142 1  R*TL**P   CCS    DEXDEX                    +3 --> 0     -3 --> 2
0184  REF   4  LAST 1369      23,3654  4 0142 1            CS     DEXDEX        THUS:       +2 --> 1     -2 --> 1
0185  REF  46  LAST 1369      23,3655  6 6214 0            AD     THREE                     +1 --> 2     -1 --> 0
```

```
0186                              23,3656  0 0006 1           EXTEND
0187   REF 338  LAST 1367         23,3657  5 0000 1           INDEX  A
0188   REF   1                    23,3660  3 3737 1           DCA    INDEXI
0189   REF   1                    23,3661  52 144 1           DXCH   DEXI

0190   REF 158  LAST 1326         23,3662  3 5017 1           CA     ONE
0191   REF 122  LAST 1219         23,3663  54 130 1           TS     BUF
0192                              23,3664  0 0006 1           EXTEND
0193   REF   2  LAST   71         23,3665  5 0143 1           INDEX  DEX1
0194   REF  56  LAST 1368         23,3666  4 0123 0           DCS    VBUF
0195   REF   1                    23,3667  1 3671 0           TCF    LOOP1          REALLY BE A SUBTRACT, AND VICE VERSA

0196   REF 123  LAST 1370         23,3670  52 131 0  LOOP2    DXCH   BUF            LOADING VECTOR COMPONENT, STORING INDEX

0197   REF 662  LAST 1366         23,3671  52 155 1  LOOP1    DXCH   MPAC
0198   REF   1                    23,3672  3 3735 0           CA     SINESLOC
0199   REF   3  LAST 1370         23,3673  6 0143 1           AD     DEX1
0200   REF  78  LAST 1181         23,3674  54 116 0           TS     ADDRWD

0201   REF  21  LAST 1190         23,3675  0 7056 0           TC     DMPSUB         MULTIPLY BY SIN(CDUANGLE)
0202   REF   5  LAST 1369         23,3676  10 142 1           CCS    DEXDEX
0203   REF 663  LAST 1370         23,3677  52 155 1           DXCH   MPAC           NBSM CASE
0204                              23,3700  1 3703 1           TCF    +3
0205                              23,3701  0 0006 1           EXTEND                SMNB CASE
0206   REF 664  LAST 1370         23,3702  4 0155 1           DCS    MPAC
0207   REF   1                    23,3703  52 134 0           DXCH   TERMITMP

0208   REF  38  LAST 1367         23,3704  3 6211 0           CA     SIX            SINCDU AND COSCDU (EACH 6 WORDS) MUST
0209   REF  79  LAST 1370         23,3705  26 116 0           ADS    ADDRWD           BE CONSECUTIVE AND IN THAT ORDER

0210                              23,3706  0 0006 1           EXTEND
0211   REF 124  LAST 1370         23,3707  5 0130 0           INDEX  BUF
0212   REF   4  LAST 1370         23,3710  5 0143 1           INDEX  DEXI
0213   REF  57  LAST 1370         23,3711  3 0123 1           DCA    VBUF
0214   REF 665  LAST 1370         23,3712  52 155 1           DXCH   MPAC
0215   REF  22  LAST 1370         23,3713  0 7056 0           TC     DMPSUB         MULTIPLY BY COS(CDUANGLE)
0216   REF 666  LAST 1370         23,3714  52 155 1           DXCH   MPAC
0217   REF   2  LAST 1370         23,3715  20 134 0           DAS    TERMITMP
0218   REF   3  LAST 1370         23,3716  52 134 0           DXCH   TERMITMP
0219                              23,3717  20 001 1           DDOUBL
0220   REF 125  LAST 1370         23,3720  50 130 0           INDEX  BUF
0221   REF   5  LAST 1370         23,3721  50 143 1           INDEX  DEXI
0222   REF  58  LAST 1370         23,3722  52 123 0           DXCH   VBUF
0223   REF 126  LAST 1370         23,3723  52 131 0           DXCH   BUF            LOADING INDEX, STORING VECTOR COMPONENT

0224   REF 339  LAST 1370         23,3724  10 000 0           CCS    A              'CAUSE THAT'S WHERE THE INDEX NOW IS
0225   REF   1                    23,3725  1 3670 1           TCF    LOOP2

0226                              23,3726  0 0006 1           EXTEND
0227   REF   6  LAST 1370         23,3727  26 142 1           DIM    DEXDEX         DECREMENT MAGNITUDE PRESERVING SIGN
```

L POWERED FLIGHT SUBROUTINES USER'S PAGE NO. 7 E0 S3

```
0228  REF  7  LAST 1370   23,3730  10 142 1  TSTPOINT CCS     DEXDEX      ONLY THE BRANCHING FUNCTION IS USED
0229  REF  1               23,3731  1 3653 0           TCF     R*TL**P
0230  REF  2  LAST 1369   23,3732  0 0145 1           TC      RTNSAVER
0231  REF  2  LAST 1371   23,3733  1 3653 0           TCF     R*TL**P
0232  REF  3  LAST 1371   23,3734  0 0145 1           TC      RTNSAVER

0233  REF  6  LAST 1367   23,3735   00736 0  SINESLOC ADRES   SINCDU      FOR USE IN SETTING ADDRWD

0234                       23,3736   00004 0  INDEXI   DEC     4          **********    DON'T    **********
0235                       23,3737   00002 0           DEC     2          **********    TOUCH    **********
0236                       23,3740   00000 1           DEC     0          **********    THESE    **********
0237                       23,3741   00004 0           DEC     4          **********  CONSTANTS  **********

R0238 ********************************************************************************************************************************
```

L POWERED FLIGHT SUBROUTINES USER'S PAGE NO. 8 E0 S3

P0240 THIS SUBROUTINE COMPUTES INCREMENTAL CHANGES IN CDU(GIMBAL) ANGLES FROM INCREMENTAL CHANGES ABOUT SM AXES. IT
R0242 REQUIRES SM INCREMENTS AS A DP VECTOR SCALED AT ONE REVOLUTION(DTHETASM,+2,+4). SIN,COS(CDUY,Z,X) ARE IN
R0244 SINCDU,+2,+4 AND COSCDU,+2,+4 RESPECTIVELY,SCALED TO ONE HALF. CDU INCREENTS ARE PLACED IN DCDU,+2,+4 SCALED TO
R0246 ONE REVOLUTION.

R0247 * COS(IGA)SEC(MGA) 0 -SIN(IGA)SEC(MGA) *
R0248 * *
R0249 * -COS(IGA)TAN(MGA) 1 SIN(IGA)TAN(MGA) *
R0250 * *
R0251 * SIN(IGA) 0 COS(IGA) *

```
0252                                14,3422                 BANK    14
0253  REF   1                      23,2000                 SETLOC  POWFLIT1
0254                                23,3742                 BANK
0255                                23,3742   41345 0 SMCDURES DLOAD  DMP
0256  REF   7  LAST  594           23,3743   03212 0         DTHETASM
0257  REF   4  LAST  763           23,3744   00745 1         COSCDUY

0258                                23,3745   41325 0         PDDL    DMP
0259  REF   8  LAST 1372           23,3746   03216 1         DTHETASM +4
0260  REF   4  LAST  763           23,3747   00737 1         SINCDUY

0261                                23,3750   77621 1         BDSU
0262                                23,3751   77671 1         DDV
0263  REF   7  LAST  967           23,3752   00747 0         COSCDUZ
0264  REF   6  LAST  596           23,3753   03204 1         STORE   DCDU

0265                                23,3754   72405 0         DMP     SL1             SCALE
0266  REF   4  LAST  763           23,3755   00741 0         SINCDUZ
0267                                23,3756   77621 1         BDSU

0268  REF   9  LAST 1372           23,3757   03214 0         DTHETASM +2
0269  REF   7  LAST 1372           23,3760   17206 0         STODL   DCDU +2
0270  REF  10  LAST 1372           23,3761   03212 0         DTHETASM

0271                                23,3762   65205 0         DMP     PDDL
0272  REF   5  LAST 1372           23,3763   00737 1         SINCDUY
0273  REF  11  LAST 1372           23,3764   03216 1         DTHETASM +4

0274                                23,3765   43205 1         DMP     DAD
0275  REF   5  LAST 1372           23,3766   00745 1         COSCDUY
0276                                23,3767   77752 1         SL1
0277  REF   8  LAST 1372           23,3770   03210 1         STORE   DCDU +4
0278                                23,3771   77616 0         RVQ
```

L TIME OF FREE FALL USER'S PAGE NO. 1 EO S3

R0001 THE TFF SUBROUTINES MAY BE USED IN EITHER EARTH OR MOON CENTERED COORDINATES. THE TFF ROUTINES NEVER
R0003 KNOW WHICH ORIGIN APPLIES. IT IS THE USER WHO KNOWS, AND WHO SUPPLIES RONE, VONE AND 1/SQRT(MU) AT THE
R0005 APPROPRIATE SCALE LEVEL FOR THE PROPER PRIMARY BODY.

R0006	EARTH ORIGIN	POSITION	-29	METERS
R0007		VELOCITY	-7	METERS/CENTISECOND
R0009		1/SQRT(MU)	+17	SQRT(CS SQ/METERS CUBED)
R0011	MOON ORIGIN	POSITION	-27	METERS
R0012		VELOCITY	-5	METERS/CENTISECONDS
R0014		1/SQRT(MU)	+14	SQRT(CS SQ/METERS CUBED)

R0016 ALL DATA PROVIDED TO AND RECEIVED FROM ANY TFF SUBROUTINE WILL BE AT ONE OF THE LEVELS ABOVE. IN ALL CASES,
R0018 THE FREE FALL TIME IS RETURNED IN CENTISECONDS AT (-28). PROGRAM TFF/CONIC WILL GENERATE VONE/RTMU AND
R0020 LEAVE IT IN VONE' AT (+10) IF EARTH ORIGIN AND (+9) IF MOON ORIGIN.
R0021 THE USER MUST STORE THE STATE VECTOR IN RONE, VONE AND MU IN THE FORM 1/SQRT(MU) IN TFF/RTMU
R0023 AT THE PROPER SCALE BEFORE CALLING TFF/CONIC. SINCE RONE, VONE ARE IN THE EXTENDED VERB STORAGE AREA,
R0025 THE USER MUST ALSO LOCK OUT THE EXTENDED VERBS, AND RELEASE THEM WHEN FINISHED.
R0027 PROGRAMS CALC/TFF AND CALC/TPER ASSUME THAT THE TERMINAL RADIUS IS LESS THAN THE PRESENT
R0029 RADIUS. THIS RESTRICTION CAN BE REMOVED BY A 15 W CODING CHANGE, BUT AT PRESENT IT IS NOT DEEMED NECESSARY.
R0031
R0032 THE FOLLOWING ERASABLE QUANTITIES ARE USED BY THE TFF ROUTINES, AND ARE LOCATED IN THE PUSH LIST.
R0034

A0035 BELOW E: IS USED FOR EARTH ORIGIN SCALE
A0036 M: IS USED FOR MOON ORIGIN SCALE

A0037		TFFSW	=	119D BIT1	0 = CALCTFF	1 = CALCTPER
0038	0012	TFFDELQ	=	10D	Q2-Q1	E: (-16) M: (-15)
0039	0014	RMAG1	=	12D	ABVAL(RN) M	E: (-29) M: (-27)
A0040		RPER	=	14D	PERIGEE RADIUS M	E: (-29) M: (-27)
0041	0016	TFFQ1	=	14D	R.V / SQRT(MUE)	E: (-16) M: (-15)
A0042		SDELF/2			SIN(THETA) /2	
0043	0016	CDELF/2	=	14D	COS(THETA) /2	
A0044		RAPO	=	16D	APOGEE RADIUS M	E: (-29) M: (-27)
0045	0020	NRTERM	=	16D	TERMINAL RADIUS M	E: (-29+NR)
A0046						M: (-27+NR)
0047	0022	RTERM	=	18D	TERMINAL RADIUS M	E: (-29) M: (-27)
0048	0024	TFFVSQ	=	20D	-(V SQUARED/MU) 1/M	E: (20) M: (18)
0049	0026	TFF1/ALF	=	22D	SEMI MAJ AXIS M	E: (-22-2 NA)
A0050						M: (-20-2 NA)
0051	0030	TFFRTALF	=	24D	SQRT(ALFA)	E: (10+NA) M: (9+NA)
0052	0032	TFFALFA	=	26D	ALFA 1/M	E: (26-NR) M: (24-NR)
0053	0034	TFFNP	=	28D	SEMI LATUS RECTUM M	E: (-38+2 NR)
A0054						M: (-36+2 NR)
0055	0036	TFF/RTMU	=	30D	1/SQRT(MU)	E: (17) M: (14)
0056	0040	NRMAG	=	32D	PRESENT RADIUS M	E: (-29+NR)
A0057						M: (-27+NR)
0058	0042	TFFX	=	34D		
0059	0044	TFFTEM	=	36D	TEMPORARY	

```
A0060                   REGISTERS S1, S2 ARE UNTOUCHED BY ANY TFF SUBROUTINE
A0061                   INDEX REGISTERS X1, X2 ARE USED BY ALL TFF SUBROUTINES. THEY ARE ESTAB-
A0062                   LISHED IN TFF/CONIC AND MUST BE PRESERVED BETWEEN CALLS TO SUBSEQUENT
A0063                   SUBROUTINES.
A0064                   -NR                     C(X1) = NORM COUNT OF RMAG
A0065                   -NA                     C(X2)= NORM COUNT OF SQRT(ABS(ALFA))
```

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P0066

R0067 SUBROUTINE NAME: TFFCONIC DATE: 01.29.67
R0069 MOD NO: 0 LOG SECTION: TIME OF FREE FALL
R0071 MOD BY: RR BAIRNSFATHER
R0072 MOD NO: 1 MOD BY: RR BAIRNSFATHER DATE: 11 APR 67
R0073 MOD NO: 2 MOD BY: RR BAIRNSFATHER DATE: 21 NOV 67 ADD MOON MU.
R0075 MOD NO: 3 MOD BY: RR BAIRNSFATHER DATE: 21 MAR 68 ACCEPT DIFFERENT EARTH/MOON SCALES
R0077 FUNCTIONAL DESCRIPTION: THIS SUBROUTINE IS CALLED TO COMPUTE THOSE CONIC PARAMETERS REQUIRED BY THE TFF
R0079 SUBROUTINES AND TO ESTABLISH THEM IN THE PUSH LIST AREA. THE PARAMETERS ARE LISTED UNDER OUTPUT.
R0081 THE EQUATIONS ARE
R0082 $\vec{H} = \vec{RN} * \vec{VN}$
R0083 ANGULAR MOMENTUM
R0085 $LCP = \vec{H} \cdot \vec{H} / MU$
R0086 SEMI LATUS RECTUM
R0088 $ALFA = 2/RN - \vec{VN} \cdot \vec{VN} / MU$
R0089 RECIPROCAL SEMI MAJ AXIS, SIGNED

R0091 AND ALFA IS POS FOR ELLIPTIC ORBITS
R0092 0 FOR PARABOLIC ORBITS
R0093 NEG FOR HYPERBOLIC ORBITS.
R0094 SUBROUTINE ALSO COMPUTES AND SAVES RMAG.
R0095 CALLING SEQUENCE:
R0096 TFFCONIC EXPECTS CALLER TO ENTER WITH CORRECT GRAVITATIONAL CONSTANT IN MPAC. IN THE FORM
R0098 1/SQRT(MU). PROGRAM WILL SAVE IN TFF/RTMU . THE SCALE IS DETERMINED BY WHETHER EARTH OR MOON
R0100 ORIGIN IS USED. THE CALLER MUST LOCK OUT THE EXTENDED VERBS BEFORE PROVIDING STATE VECTOR IN RONE,
R0102 VONE AT PROPER SCALE. THE EXTENDED VERBS MUST BE RESTORED WHEN THE CALLER IS FINISHED USING THE
R0104 TFF ROUTINES.
R0105 ENTRY POINT TFFCONMU EXPECTS THAT TFF/RTMU IS ALREADY LOADED.
R0107 TO SPECIFY MU: DLOAD CALL IF MU ALREADY STORED: CALL
R0109 YOURMU 1/RTMU E: (17) M: (14) TFFCONMU
R0111 TFFCONIC
R0112 PUSHLOC = PDL+0. ARBITRARY IF LEQ 18D

R0113 SUBROUTINES CALLED: NONE
R0114 NORMAL EXIT MODES: RVQ
R0115 ALARMS: NONE
R0116 OUTPUT: THE FOLLOWING ARE STORED IN THE PUSH LIST AREA.
R0117 RMAGI E:(-29) M:(-27) M RN, PRESENT RADIUS LENGTH.
R0118 NRMAG E: (-29+NR) M RMAG, NORMALIZED
R0119 M: (-27+NR)
R0120 XI -NR, NORM COUNT
R0121 TFFNP E: (-38+2NR) M LCP, SEMI LATUS RECTUM, WEIGHTED BY NR. FOR VGAMCALC
R0123 M: (-36+2NR)
R0124 TFF/RTMU E:(17) M:(14) 1/SQRT(MU)
R0125 TFFVSQ E:(20) M:(18) 1/M -(V SQ/MU): PRESENT VELOCITY,NORMLIZED. FOR VGAMCALC
R0127 TFFALFA E: (26-NR) 1/M ALFA, WEIGHTED BY NR
R0128 M: (24-NR)
R0129 TFFRTALF E: (10+NA) SQRT(ALFA), NORMALIZED
R0130 M: (9+NA)

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R0131            X2                          -NA, NORM COUNT
R0132            TFF1/ALF  E: (-22-2NA) SIGNED SEMI MAJ AXIS, WEIGHTED BY NA
R0133                      M: (-20-2NA)
R0134            PUSHLOC AT PDL+0
R0135            THE FOLLOWING  IS STORED IN GENERAL ERASABLE
R0136            VONE'  E:(10)  M:(9)   V/RT(MU), NORMALIZED VELOCITY
R0137  ERASABLE INITIALIZATION REQUIRED:
R0138            RONE   E:(-29)  M:(-27)  M      STATE VECTOR                LEFT BY CALLER
R0140            VONE   E:(-7)   M:(-5)   M/CS   STATE VECTOR                LEFT BY CALLER
R0142            TFF/RTMU  E:(17)  M:(14)      1/RT(CS SQ/M CUBE)            IF ENTER VIA  TFFCONMU.
R0144  DEBRIS:   QPRET.    PDL+0 ... PDL+3
R0145

 0146                              33,3776                    BANK   33
 0147  REF   1                    27,2000                    SETLOC TOF-FF
 0148                              27,2757                    BANK

 0149  REF   1                                               COUNT* $$/TFF

 0150  REF   5 LAST  814   27,2757   00037 0  TFFCONIC STORE  TFF/RTMU      1/SQRT(MU)       E: (17)  M: (14)

 0151                              27,2760   53575 0  TFFCONMU VLOAD  UNIT          COME HERE WITH TFFRTMU LOADED.
 0152  REF  16 LAST  790   27,2761   02327 0                   RONE          SAVED RN.  M     E: (-29)  M: (-27)
 0153                              27,2762   77725 1  PDDL                   UR/2 TO PDL+0, +5
 0154                              27,2763   00045 0           36D           MAGNITUDE
 0155  REF   1                    27,2764   00015 0  STORE    RMAG1         M    E: (-29)   M: (-27)

 0156                              27,2765   77701 1  NORM
 0157  REF  97 LAST 1342   27,2766   00047 1           X1            -NR
 0158  REF   4 LAST  815   27,2767   24041 1  STOVL    NRMAG         RMAG  M   E: (-29+NR)  M: (-27+NR)
 0159  REF  12 LAST  790   27,2770   02335 0           VONE          SAVED VN.  M/CS   E: (-7)   M: (-5)
 0160                              27,2771   77761 1  VXSC
 0161  REF   6 LAST 1376   27,2772   00037 0           TFF/RTMU      E: (17)   M: (14)
 0162  REF   2 LAST   92   27,2773   02372 0  STORE    VONE'         VN/SQRT(MU)   E: (10)   M: (9)

 0163                              27,2774   47361 0  VXSC     VXV
 0164  REF   5 LAST 1376   27,2775   00041 1           NRMAG         E: (-29+NR)  M: (-27+NR)
A0165                                                              UR/2 FROM PDL
 0166                              27,2776   47572 1  VSL1     VSQ           BEFORE:  E:(-19+NR)  M:(-18+NR)
 0167  REF   2 LAST  814   27,2777   14035 1  STODL    TFFNP         LC P  M   E:(-38+2NR)  M:(-36+2NR)
A0168                                                              SAVE ALSO FOR VGAMCALC
 0169  REF   1                    27,3000   15325 1           TFF1/4
 0170                              27,3001   63271 0  DDV      PDVL          (2/RMAG)  1/M   E:(26-NR)   M:(24-NR)
 0171  REF   6 LAST 1376   27,3002   00041 1           NRMAG         RMAG  M   E:(-29+NR)  M:(-27+NR)
 0172  REF   3 LAST 1376   27,3003   02372 0           VONE'         SAVED VN.   E: (10)   M: (9)
 0173                              27,3004   57436 1  VSQ      DCOMP         KEEP MPAC+2 HONEST FOR SQRT.
 0174  REF   2 LAST  814   27,3005   00025 0  STORE    TFFVSQ        -(V SQ/MU)   E:(20)   M:(18)
A0175                                                              SAVE FOR VGAMCALC
 0176                              27,3006   43257 0  SR*      DAD
```

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 0177                          27,3007  20573 1                 0 -6,1          GET -VSQ/MU   E:(26-NR)   M:(24-NR)
 0178                          27,3010  77626 0          STADR
A0179                                                           2/RMAG   FROM PDL+2
 0180  REF   1                27,3011  77744 0          STORE  TFFALFA         ALFA  1/M   E:(26-NR)   M:(24-NR)
 0181                          27,3012  41457 1          SL*    PUSH            TEMP SAVE ALFA    E:(20)   M:(18)
 0182                          27,3013  20173 0                 0 -6,1
 0183                          27,3014  75446 0          ABS    SQRT            E:(10)   M:(9)
 0184                          27,3015  77701 1          NORM
 0185  REF  45  LAST 1368      27,3016  00050 1                 X2              X2 = -NA
 0186  REF   1                27,3017  00031 0          STORE  TFFRTALF        SQRT( ABS(ALFA) )  E:(10+NA)   M:(9+NA)
 0187                          27,3020  75316 1          DSQ    SIGN            NOT SO ACCURATE, BUT OK
A0188                                                           ALFA FROM PDL+2   E:(20)   M:(18)
 0189                          27,3021  55254 1          BZE    BDDV            SET 1/ALFA =0, TO SHOW SMALL ALFA
 0190                          27,3022  57024 0                 +2
 0191  REF   2  LAST 1376      27,3023  15325 1                 TFF1/4
 0192  REF   1                27,3024  00027 1  +2     STORE  TFF1/ALF        1/ALFA   E:(-22-2 NA)   M:(-20-2 NA)
 0193                          27,3025  77616 0  DUMPCNIC RVQ

A0194                                                                                                   39 W
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P0195 SUBROUTINE NAME: TFFRP/RA DATE: 01.17.67
R0197 MOD NO: 0 LOG SECTION: TIME OF FREE FALL
R0199 MOD BY: RR BAIRNSFATHER
R0200 MOD NO: 1 MOD BY: RR BAIRNSFATHER DATE: 11 APR 67
R0201 MOD NO: 2 MOD BY: RR BAIRNSFATHER DATE: 21 MAR 68 ACCEPT DIFFERENT EARTH/MOON SCALES
R0203 ALSO IMPROVE ACCURACY OF RAPO.
R0205 FUNCTIONAL DESCRIPTION: USED BY CALCTPER AND TFF DISPLAYS TO CALCULATE PERIGEE RADIUS AND ALSO
R0207 APOGEE RADIUS FOR A GENERAL CONIC.
R0208 PROGRAM GIVES PERIGEE RADIUS AS APOGEE RADIUS IS GIVEN BY
R0210 RP = P /(1+E) RA = (1+E) / ALFA
R0212 WHERE 2
R0213 E = 1 - P ALFA
R0214 IF RA IS NEGATIVE OR SHOWS DIVIDE OVERFLOW, THEN RA = POSMAX BECAUSE
R0216 1. APOGEE RADIUS IS NOT MEANINGFUL FOR HYPERBOLA
R0217 2. APOGEE RADIUS IS NOT DEFINED FOR PARABOLA
R0218 3. APOGEE RADIUS EXCEEDS THE SCALING FOR ELLIPSE.
R0219 THIS SUBROUTINE REQUIRES THE SIGNED RECIPROCAL SEMI MAJ AXIS, ALFA, AND SEMI LATUS RECTUM AS DATA.
R0221 CALLING SEQUENCE: CALL
R0222 TFFRP/RA
R0223 PUSHLOC = PDL+0, ARBITRARY IF LEQ 10D
R0224 C(MPAC) UNSPECIFIED

R0225 SUBROUTINES CALLED: NONE
R0226 NORMAL EXIT MODE: RVQ
R0227 IF ELLIPSE, WITHIN NORMAL SCALING, RAPO IS CORRECT.
R0228 OTHERWISE, RAPO = POSMAX.
R0229 ALARMS: NONE
R0230 OUTPUT: STORED IN PUSH LIST AREA. SCALE OF OUTPUT AGREES WITH DATA SUPPLIED TO TFF/CONIC.
R0232 RPER E:(-29) M:(-27) M PERIGEE RADIUS DESTROYED BY CALCTFF/CALCTPER, TFFTRIG.
R0234 RAPO E:(-29) M:(-27) M APOGEE RADIUS WILL BE DESTROYED BY CALCTFF/CALCTPER
R0236 PUSHLOC AT PDL+0
R0237 ERASABLE INITIALIZATION REQUIRED:
R0238 TFFALFA E:(26-NR) M 1/SEMI MAJ AXIS LEFT BY TFFCONIC
R0240 M:(24-NR)
R0241 TFFNP E: (-38+2NR) M LC P, SEMI LATUS RECTUM LEFT BY TFFCONIC
R0243 M: (-36+2NR)
R0244 X1 -NR, NORM COUNT OF RMAG LEFT BY TFFCONIC
R0246 X2 -NA, NORM COUNT OF ALFA LEFT BY TFFCONIC
R0248 DEBRIS: QPRET, PDL+0 ... PDL+1

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P0249
 0250                          0020          RAPO     =      16D          APOGEE RADIUS  M  E:(-29)  M:(-27)
 0251                          0016          RPER     =      14D          PERIGEE RADIUS  M  E:(-29)  M:(-27)
A0252
 0253                        27,3026  41345 0 TFFRP/RA DLOAD  DMP
 0254  REF  2 LAST 1377     27,3027  00033 1                 TFFALFA      ALFA  1/M  E:(26-NR)   M:(24-NR)
 0255  REF  3 LAST 1376     27,3030  00035 1                 TFFNP        LC P  M   E:(-38+2NR)   M:(-36+2NR)
 0256                        27,3031  57457 0         SR*     DCOMP        ALFA P (-12+NR)
 0257                        27,3032  20571 0                 0 -8D,1      ALFA P  (-4)
 0258                        27,3033  51415 0         DAD     ABS          (DCOMP GIVES VALID TP RESULT FOR SQRT)
A0259                                                                     (ABS PROTECTS SQRT IF E IS VERY NEAR 0)
 0260  REF  4 LAST  879      27,3034  17366 1                 DP2(-4)
 0261                        27,3035  43366 0         SQRT    DAD          E SQ = (1- P ALFA)   (-4)
 0262  REF  3 LAST 1377     27,3036  15325 1                 TFF1/4
 0263                        27,3037  55206 0         PUSH    BDDV         (1+E)  (-2)  TO PDL+0
 0264  REF  4 LAST 1379     27,3040  00035 1                 TFFNP        LCP  M E:(-38+2NR)   M:(-36+2NR)
 0265                        27,3041  53657 0         SR*     SR*          (DOES SR THEN SL TO AVOID OVFL)
 0266                        27,3042  20601 1                 0,1          X1=-NR
 0267                        27,3043  20572 0                 0 -7,1       (EFFECTIVE SL)
 0268  REF  3 LAST  523      27,3044  14017 1         STODL   RPER         PERIGEE RADIUS  M   E:(-29)   M:(-27)
A0269                                                                     (1+E)  (-2)   FROM PDL+0
 0270                        27,3045  41005 1         DMP     BOVB
 0271  REF  2 LAST 1377     27,3046  00027 1                 TFF1/ALF     E:(-22-2NA)  M:(-20-2NA)
 0272  REF 11 LAST 1335     27,3047  57352 1                 TCDANZIG     CLEAR OVFIND, IF ON.
 0273                        27,3050  53654 0         BZE     SL*
 0274  REF  1               27,3051  57060 0                 MAXRA        SET POSMAX. IF ALFA=0
 0275                        27,3052  57603 0                 0 -5,2       -5+NA
 0276                        27,3053  40057 1         SL*     BOV
 0277                        27,3054  57576 1                 0,2
 0278  REF  2 LAST 1379     27,3055  57060 0                 MAXRA        SET POSMAX IF OVFL.
 0279                        27,3056  77644 1         BPL                  CONTINUE WITH VALID RAPO.
 0280                        27,3057  57062 1                 +3
 0281                        27,3060  77745 1 MAXRA   DLOAD                RAPO CALC IS NOT VALID. SET RAPO =
 0282  REF  4 LAST  879      27,3061  17372 1                 NEARONE      POSMAX AS A TAG.
 0283  REF  1               27,3062  00021 1 +3      STORE   RAPO         APOGEE RADIUS  M   E:(-29)   M:(-27)
 0284                        27,3063  77616 0 DUMPRPRA RVQ

A0285                                                                                                  30 W
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P0286 SUBROUTINE NAME: CALCTPER / CALCTFF DATE: 01.29.67
R0288 MOD NO: 0 LOG SECTION: TIME OF FREE FALL
R0290 MOD BY: RR BAIRNSFATHER
R0291 MOD NO: 1 MOD BY: RR BAIRNSFATHER DATE: 21 MAR 67
R0292 MOD NO: 2 MOD BY: RR BAIRNSFATHER DATE: 14 APR 67
R0293 MOD NO: 3 MOD BY: RR BAIRNSFATHER DATE: 8JUL 67 NEAR EARTH MUE AND NEG TFF (GONEPAST)
R0295 MOD NO: 4 MOD BY: RR BAIRNSFATHER DATE: 21 NOV 67 ADD VARIABLE MU.
R0297 MOD NO: 5 MOD BY: RR BAIRNSFATHER DATE: 21 MAR 68 ACCEPT DIFFERENT EARTH/MOON SCALES
R0299 FUNCTIONAL DESCRIPTION: PROGRAM CALCULATES THE FREE-FALL TIME OF FLIGHT FROM PRESENT POSITION RN AND
R0301 VELOCITY VN TO A RADIUS LENGTH SPECIFIED BY RTERM , SUPPLIED BY THE USER. THE POSITION VECTOR
R0303 RN MAY BE ON EITHER SIDE OF THE CONIC, BUT RTERM IS CONSIDERED ON THE INBOUND SIDE.
R0305 THE EQUATIONS ARE

R0306 Q2 = -SQRT(RTERM (2-RTERM ALFA) - LCP) (INBOUND SIDE)) LEQ +- LCE/SQRT(ALFA)
R0308 - -
R0309 Q1 = RN.VN / SQRT(MU) LEQ +- LCE/SQRT(ALFA)

R0311 Z = NUM / DEN LEQ +- 1/SQRT(ALFA)

R0313 WHERE, IF INBOUND
R0314 NUM = RTERM - RN LEQ +- 2 LCE/ALFA
R0316 DEN = Q2+Q1 LEQ +- 2 LCE/SQRT(ALFA)

R0318 AND, IF OUTBOUND
R0319 NUM = Q2-Q1 LEQ +- 2 LCE/SQRT(ALFA)
R0321 DEN = 2 - ALFA (RTERM + RN) . LEQ +- 2 LCE

R0323 IF ALFA ZZ < 1.0 (FOR ALL CONICS EXCEPT ELLIPSES HAVING ABS(DEL ECC ANOM) G 90 DEG)

R0325 THEN X = ALFA Z Z
R0326 AND TFF = (RTERM +RN -2 ZZ T(X)) Z/SQRT(MU)

R0327 EXCEPT IF ALFA PNZ, AND IF TFF NEG,
R0328 THEN TFF = 2 PI /(ALFA SQRT(ALFA)) + TFF

R0329 OR IF ALFA ZZ GEQ 1.0 (FOR ELLIPSES HAVING ABS(DEL ECC ANOM) GEQ 90 DEG)

R0331 THEN X = 1/ALFA Z Z
R0332 AND TFF = (PI/SQRT(ALFA) -Q2 +Q1 +2(X T(X) -1) /ALFA Z) /ALFA SQRT(MU)

R0334 WHERE T(X) IS A POLYNOMIAL APPROXIMATION TO THE SERIES
R0335 2 3 2
R0336 1/3 -X/5 +X /7 -X /9 ... (X < 1.0)

R0337 CALLING SEQUENCE: TIME TO RTERM TIME TO PERIGEE
R0339 CALL CALL
R0340 CALCTFF CALCTPER
R0342 C(MPAC) = TERMNL RAD M C(MPAC) = PERIGEE RAD M
R0344 FOR EITHER, E: (-29) M: (-27)
R0345 FOR EITHER, PUSHLOC = PDL+0 , ARBITRARY IF LEQ 8D.

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R0346   SUBROUTINES CALLED:  T(X),  VIA RTB
R0347   NORMAL EXIT MODE:  RVQ
R0348             HOWEVER, PROGRAM EXITS WITH ONE OF THE FOLLOWING VALUES FOR TFF (-28) CS  IN MPAC. USER MUST STORE.
R0350                    A.  TFF= FLIGHT TIME. NORMAL CASE FOR POSITIVE FLIGHT TIME LESS THAN ONE ORBITAL PERIOD.
R0352                    B.  (THIS OPTION IS NO LONGER USED.)
R0353                    C.  TFF = POSMAX.  THIS INDICATES THAT THE CONIC FROM THE PRESENT POSITION WILL NOT RETURN TO
R0355                        THE SPECIFIED ALTITUDE.  ALSO INDICATES OUTBOUND PARABOLA OR HYPERBOLA.
R0357   OUTPUT:  C(MPAC)  (-28)  CS      TIME OF FLIGHT, OR TIME TO PERIGEE
R0358             TFFX     (0)          X,                                  LEFT FOR ENTRY DISPLAY TFF ROUTINES
R0360             NRTERM   E: (-29+NR)  M  RTERM, WEIGHTED BY NR            LEFT FOR ENTRY DISPLAY TFF ROUTINES
R0362                      M: (-27+NR)
R0363             TFFTEM   E: (-59+2NR) LCP Z Z SGN(SDELF)                  LEFT FOR ENTRY DISPLAY TFF ROUTINES
R0365                      M: (-55+2NR) LCP /ALFA SGN(SDELF)                LEFT FOR ENTRY DISPLAY TFF ROUTINES
R0367             NOTE:  TFFTEM = PDL 36D AND WILL BE DESTROYED BY .:UNIT:.
R0368             RMAG1  E:(-29)  M:(-27)  PDL 12 NOT TOUCHED.
R0369             TFFQ1  E:(-16)  M:(-15)  PDL 14D
R0370             TFFDELQ E:(-16) M:(-15)  PDL 10D
R0371             PUSHLOC AT PDL+0
R0372   ERASABLE INITIALIZATION REQUIRED:
R0373             RONE   E:(-29)  M:(-27)  M   STATE VECTOR                 LEFT BY USER
R0375             VONE'  E:(+10)  M:(+9)   VN/SQRT(MU)                      LEFT BY TFF/CONIC
R0377             RMAG1  E:(-29)  M:(-27)  PRESENT RADIUS,  M               LEFT BY TFFCONIC
R0379             C(MPAC)E:(-29)  M:(-27)  RTERM, TERMINAL RADIUS LENGTH, M LEFT BY USER
R0381             THE FOLLOWING ARE STORED IN THE PUSH LIST AREA.
R0382             TFF/RTMU  E:(17)  M:(14)  1/SQRT(MU)                      LEFT BY TFFCONIC.
R0384             NRMAG  E: (-29+NR)  M  RMAG, NORMALIZED                   LEFT BY TFFCONIC
R0386                    M: (-27+NR)
R0387             X1                    -NR, NORM COUNT                     LEFT BY TFFCONIC
R0389             TFFNP  E: (-38+2NR)  M   LCP, SEMI LATUS RECTUM, WEIGHT  NR  LEFT BY TFFCONIC
R0391                    M: (-36+2NR)
R0392             TFFALFA  E: (26-NR)    1/M  ALFA, WEIGHT  NR              LEFT BY TFFCONIC
R0394                      M: (24-NR)
R0395             TFFRTALF  E:(10+NA)    SQRT(ALFA), NORMALIZED              LEFT BY TFFCONIC
R0397                       M:(9+NA)
R0398             X2                    -NA, NORM COUNT                     LEFT BY TFFCONIC
R0400             TFF1/ALF  E: (-22-2NA)  SIGNED SEMIMAJ AXIS, WEIGHTED BY NA  LEFT BY TFFCONIC
R0402                       M: (-20-2NA)
R0403   DEBRIS:  QPRET,   PDL+0 ... PDL+3
R0404             RTERM  E:(-29)  M:(-27)  RTERM, TERMINAL RADIUS LENGTH
R0405             RAPO   E:(-29)  M:(-27)  PDL 16D  (=NRTERM)
R0406             RPER   E:(-29)  M:(-27)  PDL 14D   (=TFFQ1)
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P0407
 0408                          27,3064  77614 1  CALCTPER SETGO                ENTER WITH RPER  IN MPAC
 0409  REF   1                 27,3065  03436 0                  TFFSW
 0410                          27,3066  57071 0                  +3
 0411                          27,3067  77614 1  CALCTFF  CLEAR                ENTER WITH RTERM IN MPAC
 0412  REF   2  LAST 1382     27,3070  03676 0                  TFFSW
 0413  REF   3  LAST  810     27,3071  00023 0  +3      STORE   RTERM          E: (-29)  M: (-27)
 0414                          27,3072  77657 0          SL*
 0415                          27,3073  20201 0                  0,1           X1=-NR
 0416  REF   6  LAST  815     27,3074  00021 1          STORE   NRTERM         RTERM  E: (-29+NR)  M: (-27+NR)
 0417                          27,3075  44205 0          DMP     BDSU
 0418  REF   3  LAST 1379     27,3076  00033 1                  TFFALFA        ALFA  E: (26-NR)  M: (24-NR)
 0419  REF   4  LAST 1379     27,3077  15325 1                  TFF1/4
 0420                          27,3100  41206 0          PUSH    DMP           (2-ALFA RTERM)  (-3)  TO PDL+0
 0421  REF   7  LAST 1382     27,3101  00021 1                  NRTERM         E: (-29+NR)  M: (-27+NR)
 0422                          27,3102  53725 1          PDDL    SR*            RTERM(2-ALFA RTERM) TO PDL+2
A0423                                                                          E: (-32+NR)   M: (-30+NR)
 0424  REF   5  LAST 1379     27,3103  00035 1                  TFFNP          LC P  E:(-38+2NR)  M:(-36+2NR)
 0425                          27,3104  20573 1                  0 -6,1        X1 = -NR
 0426                          27,3105  43276 0          DCOMP   DAD            DUE TO SHIFTS, KEEP PRECISION FOR SQRT
A0427                                                                          RTERM(2-ALFA RTERM) FROM PDL+2
A0428                                                                          E: (-32+NR)  M: (-30+NR)
 0429                          27,3106  77657 0          SR*                   LEAVE  E: (-32)  M: (-30)
 0430                          27,3107  20601 1                  0,1           X1 = -NR
 0431                          27,3110  71214 0          BOFF    DLOAD          CHECK TFF / TPER SWITCH
 0432  REF   3  LAST 1382     27,3111  03756 0                  TFFSW
 0433                          27,3112  57114 1                  +2            IF TFF, CONTINUE
 0434  REF   1                 27,3113  15335 0                  TFFZEROS      IF TPER, SET Q2 = 0
 0435                          27,3114  75440 0  +2      BMN     SQRT           E: (-16)  M: (-15)

 0436  REF   1                 27,3115  57247 1                  MAXTFF1        NO FREE FALL CONIC TO RTERM FROM HERE
A0437                                                                          RESET PDL, SET TFF=POSMAX, AND EXIT.

 0438                          27,3116  41076 0          DCOMP   BOVB           RT IS ON INBOUND SIDE.  ASSURE OVFIND=0
 0439  REF  12  LAST 1379     27,3117  57352 1                  TCDANZIG       ANY PORT IN A STORM.
 0440  REF   3  LAST  816     27,3120  24045 0          STOVL   TFFTEM         Q2   E: (-16)  M: (-15)
 0441  REF   4  LAST 1376     27,3121  02372 0                  VONE'          VN/SQRT(MU) E: (10)  M: (9)
 0442                          27,3122  52441 1          DOT     SL3
 0443  REF  17  LAST 1376     27,3123  02327 0                  RONE           SAVED RN.  E: (-29)  M: (-27)
 0444  REF   1                 27,3124  00017 1          STORE   TFFQ1          Q1, SAVE FOR GONEPAST TEST.
A0445                                                                          E: (-16)  M: (-15)
 0446                          27,3125  44240 1          BMN     BDSU
 0447  REF   1                 27,3126  57147 1                  INBOUND        USE ALTERNATE Z
 0448  REF   4  LAST 1382     27,3127  00045 0                  TFFTEM         Q2  E: (-16)  M: (-15)

A0449                                        OUTBOUND  Z CALC CONTINUES HERE

 0450  REF   2  LAST  815     27,3130  14043 0          STODL   TFFX           NUM=Q2-Q1  E: (-16)  M: (-15)
 0451  REF   4  LAST 1382     27,3131  00033 1                  TFFALFA        ALFA  E: (26-NR)  M: (24-NR)
 0452                          27,3132  44205 0          DMP     BDSU
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 0453   REF  7  LAST 1376   27,3133   00041 1                    NRMAG     RMAG  E: (-29+NR)  M: (-27+NR)
A0454                                                                      (2-RTERM ALFA)  (-3) FROM PDL+0
 0455                       27,3134   51406 1  SAVEDEN  PUSH     ABS       DEN TO PDL+0  E: (-3) OR (-16)
A0456                                                                                    M: (-3) OR (-15)
 0457                       27,3135   40015 1           DAD      BOV       INDETERMINANCY TEST
 0458   REF  1              27,3136   17360 1                    LIM(-22)  =1.0-B(-22)
 0459   REF  1              27,3137   57160 1                    TFFXTEST  GO IF DEN >/= B(-22)
 0460                       27,3140   65345 0           DLOAD,   PDDL      SET DEN=0  OTHERWISE
 0461   REF  2  LAST 1382   27,3141   15335 0                    TFFZEROS
A0462                                                                      XCH ZERO WITH PDL+0
 0463                       27,3142   57545 1           DLOAD    DCOMP
 0464   REF  5  LAST 1382   27,3143   00033 1                    TFFALFA   ALFA  E: (26-NR)  M: (24-NR)
 0465                       27,3144   71240 1           BMN      DLOAD     FOR TPER: Z INDET AT DELE/2=0 AND 90.
 0466   REF  1              27,3145   57254 0                    TFFEL1    ASSUME 90, AND LEAVE 0 IN PDL: 1/Z=D/N

A0467                                                                      Z INDET. AT PERIGEE FOR PARAB OR HYPERB.
 0468                       27,3146   77616 0  DUMPTFF1 RVQ               RETURN  TFF =0

A0469                                         INBOUND  Z  CALC CONTINUES HERE
 0470                       27,3147   77745 1  INBOUND  DLOAD             RESET PDL+0
 0471                       27,3150   45345 1           DLOAD    DSU       ALTERNATE Z CALC
 0472   REF  4  LAST 1382   27,3151   00023 0                    RTERM     E: (-29)  M: (-27)
 0473   REF  2  LAST 1376   27,3152   00015 0                    RMAG1     E: (-29)  M: (-27)
 0474   REF  3  LAST 1382   27,3153   14043 0           STODL    TFFX      NUM=RTERM-RN  E: (-29)  M: (-27)
 0475   REF  5  LAST 1382   27,3154   00045 0                    TFFTEM    Q2  E: (-16)  M: (-15)
 0476                       27,3155   52015 1           DAD      GOTO
 0477   REF  2  LAST 1382   27,3156   00017 1                    TFFQ1     Q1  E: (-16)  M: (-15)
 0478   REF  1              27,3157   57134 0                    SAVEDEN   DEN = Q2+Q1  E: (-16)  M: (-15)

 0479                       27,3160   65215 1  TFFXTEST DAD      PDDL       (ABS(DEN) TO PDL+2))  E: (-3) OR (-16)
A0480                                                                                             M: (-3) OR (-15)
 0481   REF  1              27,3161   17362 0                    DP(-22)   RESTORE ABS(DEN) TO MPAC
 0482   REF  4  LAST 1383   27,3162   00043 0                    TFFX      NUM E:(-16) OR (-29)  M:(-15) OR (-27)
 0483                       27,3163   53605 1           DMP      SR*
 0484   REF  2  LAST 1377   27,3164   00031 0                    TFFRTALF  SQRT(ALFA)  E: (10+NA)  M: (9+NA)
 0485                       27,3165   57201 0                    0 -3,2    X2=-NA
 0486                       27,3166   77671 1           DDV                C(MPAC) =NUM SQRT(ALFA)  E:(-3) OR (-16)
A0487                                                                                             M:(-3) OR (-15)
A0488                                                                      ABS(DEN) FROM PDL+2  E:(-3) OR (-16)
A0489                                                                                          M:(-3) OR (-15)
 0490                       27,3167   40145 0           DLOAD    BOV       (THE DLOAD IS SHARED WITH TFFELL)
 0491   REF  5  LAST 1383   27,3170   00043 0                    TFFX      NUM  E: (-16) OR (-29)  M:(-15) OR (-27)
 0492   REF  1              27,3171   57252 0                    TFFELL    USE EQN FOR DELE GEQ 90, LEQ -90

A0493                                         OTHERWISE, CONTINUE FOR GENERAL CONIC FOR TFF EQN

 0494                       27,3172   45471 1           DDV      STADR
A0495                                                                      DEN FROM PDL+0  E: (-3) OR (-16)
A0496                                                                                     M: (-3) OR (-15)
 0497   REF  6  LAST 1383   27,3173   77732 1           STORE    TFFTEM    Z  SAVE FOR SIGN OF SDELF.
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A0498                                                                   E: (-13)  M: (-12)
 0499                          27,3174   63406 0        PUSH   DSQ      Z TO PDL+0
 0500                          27,3175   41206 0        PUSH   DMP      Z SQ TO PDL+2  E: (-26)  M: (-24)
 0501  REF   6  LAST 1382     27,3176   00035 1               TFFNP    LC P  E: (-38+2NR)  M: (-36+2NR)
 0502                          27,3177   75261 0        SL     SIGN
 0503                          27,3200   20206 1               5
 0504  REF   7  LAST 1383     27,3201   00045 0               TFFTEM   AFFIX SIGN FOR SDELF (ENTRY DISPLAY)
 0505  REF   8  LAST 1384     27,3202   14045 0        STODL  TFFTEM   P ZSQ  E: (-59+2NR)  M: (-55+2NR)
A0506                                                                   (ARG IS USED IN TFF/TRIG)
A0507                                                                   ZSQ FROM PDL+2  E: (-26)  M: (-24)
 0508                          27,3203   41206 0        PUSH   DMP      RESTORE PUSH LOC
 0509  REF   6  LAST 1383     27,3204   00033 1               TFFALFA  ALFA  E: (26-NR)  M: (24-NR)
 0510                          27,3205   77657 0        SL*
 0511                          27,3206   20201 0               0,1      X1=-NR
 0512  REF   6  LAST 1383     27,3207   00043 0        STORE  TFFX     X
 0513                          27,3210   41234 1        RTB    DMP
 0514  REF   1                27,3211   57334 1               T(X)      POLY
A0515                                                                   ZSQ FROM PDL+2  E: (-26)  M: (-24)
 0516                          27,3212   44302 0        SR2    BDSU     2 ZSQ T(X)  E: (-29)  M: (-27)
 0517  REF   5  LAST 1383     27,3213   00023 0               RTERM    RTERM  E: (-29)  M: (-27)
 0518                          27,3214   41215 1        DAD    DMP
 0519  REF   3  LAST 1383     27,3215   00015 0               RMAG1    E: (-29)  M: (-27)
A0520                                                                   Z FROM PDL+0  E: (-13)  M: (-12)
 0521                          27,3216   51042 0        SR3    BPL      TFF SQRT(MU)  E: (-45)  M: (-42)
 0522  REF   1                27,3217   57240 0               ENDTFF   (NO PUSH UP)
 0523                          27,3220   75206 1        PUSH   SIGN     TFF SQRT(MU)  TO PDL+0
 0524  REF   3  LAST 1383     27,3221   00017 1               TFFQ1    Q1 FOR GONEPAST TEST
 0525                          27,3222   71244 0        BPL    DLOAD    GONE PAST ?
 0526  REF   1                27,3223   57244 1               NEGTFF   YES. TFF < 0 .
 0527  REF   3  LAST 1379     27,3224   00027 1               TFF1/ALF 1/ALFA  E: (-22-2NA)  M: (-20-2NA)
 0528                          27,3225   51076 1        DCOMP  BPL      ALFA > 0 ?
 0529  REF   2  LAST 1384     27,3226   57244 1               NEGTFF   NO. TFF IS NEGATIVE.

A0530                                   CORRECT FOR ORBITAL PERIOD.

 0531                          27,3227   77676 0               DCOMP                YES. CORRECT FOR ORB PERIOD.
 0532                          27,3230   56205 0        DMP    DDV
 0533  REF   1                27,3231   17356 1               PI/16    2 PI (-5)
 0534  REF   3  LAST 1383     27,3232   00031 0               TFFRTALF SQRT(ALFA)  E: (10+NA)  M: (9+NA)
 0535                          27,3233   53657 0        SL*    SL*
 0536                          27,3234   57602 1               0 -4,2   X2=-NA
 0537                          27,3235   57602 1               0 -4,2
 0538                          27,3236   43257 0        SL*    DAD
 0539                          27,3237   57576 1               0,2
A0540                                                                   TFF SQRT(MU) FROM PDL+0  E:(-45) M:(-42)
 0541                          27,3240   40005 0  ENDTFF DMP    BOV      TFF SQRT(MU) IN MPAC     E:(-45) M:(-42)
 0542  REF   7  LAST 1376     27,3241   00037 0               TFF/RTMU E: (17)  M: (14)
 0543  REF   1                27,3242   57250 1               MAXTFF   SET POSMAX IF OVFL.

 0544                          27,3243   77616 0  DUMPTFF2 RVQ                  RETURN  TFF   (-28) CS IN MPAC.
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 0545                          27,3244   77745 1  NEGTFF   DLOAD
A0546                                                                TFF SQRT(MU)  FROM PDL+0, NEGATIVE.
 0547                          27,3245   77650 1           GOTO
 0548  REF   2  LAST 1384     27,3246   57240 0                    ENDTFF

 0549                          27,3247   77745 1  MAXTFF1  DLOAD              RESET PDL
 0550                          27,3250   43545 1  MAXTFF   DLOAD  RVQ
 0551  REF   5  LAST 1379     27,3251   17372 1                    NEARONE

R0552  TIME OF FLIGHT ELLIPSE WHEN DEL (ECCENTRIC ANOM) GEQ 90 AND LEQ -90.

A0553                                                                NUM FROM TFFX.  E: (-16) OR (-29)
A0554                                                                                M: (-15) OR (-27)
 0555                          27,3252   77712 0  TFFELL   SL2              NUM  E:(-14) OR (-27)  M:(-13) OR (-25)
 0556                          27,3253   41465 0           BDDV   PUSH       TEMP SAVE D/N IN PDL+0
A0557                                                                DEN FROM PDL+0 E:(-3)/( 16) M:(-3)/(-15)
A0558                                                                N/D TO PDL+0  E: (11)  M: (10)
 0559                          27,3254   45345 1  TFFEL1   DLOAD  DSU       (ENTER WITH D/N=0 IN PDL+0)
 0560  REF   9  LAST 1384     27,3255   00045 0                    TFFTEM    Q2  E: (-16)  M: (-15)
 0561  REF   4  LAST 1384     27,3256   00017 1                    TFFQ1     Q1  E: (-16)  M: (-15)
 0562  REF   1                27,3257   14013 0           STODL  TFFDELQ    Q2-Q1  E: (-16)  M: (-15)
A0563                                                                D/N FROM PDL+0
 0564                          27,3260   77626 0           STADR
 0565  REF  10  LAST 1385     27,3261   77732 1           STORE  TFFTEM     D/N  E: (11)  M: (10)
 0566                          27,3262   53605 1  DMP      SL*
 0567  REF   4  LAST 1384     27,3263   00027 1                    TFF1/ALF  1/ALFA E: (-22-2NA)  M: (-20-2NA)
 0568                          27,3264   57576 1                    0,2       1/ALFA Z  E: (-11-NA)  M: (-10-NA)
 0569                          27,3265   41206 0  PUSH     DMP               TO PDL+0
 0570  REF  11  LAST 1385     27,3266   00045 0                    TFFTEM    1/Z  E: (11)  M: (10)
 0571                          27,3267   41057 0  SL*      BDVB
 0572                          27,3270   57576 1                    0,2       X2= -NA
 0573  REF  16  LAST 1324     27,3271   45712 1                    SIGNMPAC  IN CASE X= 1.0, CONTINUE
 0574  REF   7  LAST 1384     27,3272   00043 0  STORE    TFFX              X=1/ALFA ZSQ
 0575                          27,3273   41234 1  RTB      DMP
 0576  REF   2  LAST 1384     27,3274   57334 1                    T(X)      POLY
 0577  REF   8  LAST 1385     27,3275   00043 0                    TFFX
 0578                          27,3276   45242 1  SR3      DSU
 0579  REF   1                27,3277   17364 0                    DP2(-3)
 0580                          27,3300   41405 0  DMP      PUSH              2(X T(X)-1) /Z ALFA  E: (-15-NA)
A0581                                                                                          M: (-14-NA)
A0582                                                                1/ALFA Z FROM PDL+0  E: (-11-NA)
A0583                                                                                          M: (-10-NA)
 0584                          27,3301   41345 0  DLOAD    DMP               GET SIGN FOR SDELF
 0585  REF  12  LAST 1385     27,3302   00045 0                    TFFTEM    1/Z  E: (11)  M: (10)
 0586  REF   4  LAST 1384     27,3303   00015 0                    RMAG1     E: (-29)  M: (-27)
 0587                          27,3304   43312 0  SL2      DAD
 0588  REF   5  LAST 1385     27,3305   00017 1                    TFFQ1     Q1  E: (-16)  M: (-15)
 0589  REF  13  LAST 1385     27,3306   14045 0  STODL    TFFTEM            (Q1+R 1/Z)  =SGN OF SDELF E:(-16) M:(-15
 0590  REF   7  LAST 1384     27,3307   00035 1                    TFFNP     LC P E: (-38+2NR) M: (-36+2NR)
 0591                          27,3310   53605 1  DMP      SL*               CALC FOR ARG FOR TFF/TRIG.
```

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```
0592  REF  5  LAST 1385   27,3311  00027 1          TFF1/ALF    1/ALFA   E:(-22-2NA)  M:(-20-2NA)
0593                      27,3312  57575 1          1,2         X2=-NA
0594                      27,3313  53765 0  SIGN    SL*
0595  REF 14  LAST 1385   27,3314  00045 0          TFFTEM      AFFIX SIGN FOR SDELF
0596                      27,3315  57576 1          0,2
0597  REF 15  LAST 1386   27,3316  14045 0  STODL   TFFTEM      P/ALFA  E:(-59+2NR)  M:(-55+2NR)
A0598                                               (ARG FOR USE IN TFF/TRIG)
0599  REF  6  LAST 1386   27,3317  00027 1          TFF1/ALF    1/ALFA E:(-22-2NA)  M:(-20-2NA)
0600                      27,3320  41366 1  SQRT    DMP
0601  REF  2  LAST 1384   27,3321  17356 1          PI/16       PI (-4)
0602                      27,3322  77615 0  DAD
A0603                                               2(XT(X)-1)/Z ALFA FROM PDL E:(-15-NA)
A0604                                                                        M:(-14-NA)
0605                      27,3323  45257 0  SL*     DSU
0606                      27,3324  57577 0          0 -1,2
0607  REF  2  LAST 1385   27,3325  00013 0          TFFDELQ     Q2-Q1  E: (-16)  M: (-15)
0608                      27,3326  53605 1  DMP     SL*
0609  REF  7  LAST 1386   27,3327  00027 1          TFF1/ALF    1/ALFA  E:(-22-2NA)  M:(-20-2NA)
0610                      27,3330  57601 1          0 -3,2
0611                      27,3331  52057 1  SL*     GOTO
0612                      27,3332  57602 1          0 -4,2
0613  REF  3  LAST 1385   27,3333  57240 0          ENDTFF      TFF SQRT(MU) IN MPAC E:(-45) M:(-42)
```

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P0614 PROGRAM NAME: T(X) DATE: 01.17.67
R0616 MOD NO: 0 LOG SECTION: TIME OF FREE FALL
R0618 MOD BY: RR BAIRNSFATHER
R0619 FUNCTIONAL DESCRIPTION: THE POLYNOMIAL T(X) IS USED BY TIME OF FLIGHT SUBROUTINES CALCTFF AND
R0621 CALCTPER TO APPROXIMATE THE SERIES
R0622 2 3
R0623 1/3 -X/5 +X /7 -X /9 ...

R0624 WHERE X = ALFA Z Z IF ALFA Z Z LEQ 1
R0625 X = 1/(ALFA Z Z) IF ALFA Z Z G 1

R0626 ALSO X IS NEG FOR HYPERBOLIC ORBITS
R0627 X = 0 FOR PARABOLIC ORBITS
R0628 X IS POSITIVE FOR ELLIPTIC ORBITS
R0629 FOR FLIGHT 278, THE POLYNOMIAL T(X) IS FITTED OVER THE RANGE (0,+1) AND HAS A MAXIMUM
R0631 DEVIATION FROM THE SERIES OF 2 E-5 (T(X) IS A CHEBYCHEV TYPE FIT AND WAS OBTAINED USING
R0633 MAC PROGRAM AUTCURFIT294RRB AND IS VALID TO THE SAME TOLERANCE OVER THE RANGE (-.08,+1).)
R0635 CALLING SEQUENCE: RTB
R0636 T(X)
R0637 C(MPAC) = X

R0638 SUBROUTINES CALLED: NONE
R0639 NORMAL EXIT MODE: TC DANZIG
R0640 ALARMS: NONE
R0641 OUTPUT: C(MPAC) = T(X)
R0642 ERASABLE INITIALIZATION REQUIRED:
R0643 C(MPAC) = X
R0644 DEBRIS: NONE

```
0645  REF  10  LAST 1293   27,3334  0 7171 1  T(X)      TC      POLY
0646                       27,3335   00004 0             DEC     4                    N-1
0647                       27,3336   12525 0             2DEC    3.333333333 E-1
0647                       27,3337   12525 0
0648                       27,3340   71463 0             2DEC*   -1.999819135 E-1 *
0648                       27,3341   57703 1
0649                       27,3342   04423 0             2DEC*   1.418148467  E-1 *
0649                       27,3343   17645 0
0650                       27,3344   74604 0             2DEC*   -1.01310997  E-1 *
0650                       27,3345   43667 1
0651                       27,3346   01626 1             2DEC*   5.609004986  E-2 *
0651                       27,3347   37256 1
0652                       27,3350   77404 1             2DEC*   -1.536156925 E-2 *
0652                       27,3351   52071 0
0653  REF  67  LAST 1316   27,3352  0 6030 1  ENDT(X)   TC      DANZIG

0654  REF   1              27,3352            TCDANZIG =      ENDT(X)
```

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```
P0655   TFF CONSTANTS
 0656                       32,3770                  BANK   32

 0657   REF   1             27.2000                  SETLOC TOF-FF1
 0658                       27,3353                  BANK

A0659                                                       NOTE _  NOTE _ ADJUSTED MUE FOR NEAR EARTH TRAJ.

A0660                                   MUE      =      3.990 815 471 E10  M CUBE/CS SQ
A0661                                   RTMUE    =      1.997702549 E5 B-18*     MODIFIED EARTH MU

 0662                       27,3353  24775 1  1/RTMU   2DEC*  .5005750271 E-5 B17*     MODIFIED EARTH MU
 0662                       27,3354  30424 0
A0663                                                       NOTE _  NOTE _ ADJUSTED MUE FOR NEAR EARTH TRAJ.

A0664                                   MUM      =      4.902 778  E8     M CUBE /CS SQ

A0665                                   RTMUM    2DEC*  2.21422176 E4 B-18*
 0666                       27,3355  06220 1  PI/16    2DEC   3.141592653 B-4
 0666                       27,3356  37553 0
 0667                       27,3357  37777 1  LIM(-22) 2OCT   37777 37700      1.0 -B(-22)
 0667                       27,3360  37700 1
 0668                       27,3361  00000 1  DP(-22)  2OCT   00000 00100      B(-22)
 0668                       27,3362  00100 0
 0669                       27,3363  04000 0  DP2(-3)  2DEC   1  B-3
 0669                       27,3364  00000 1
 0670                       27,3365  02000 0  DP2(-4)  2DEC   1 B-4            1/16
 0670                       27,3366  00000 1
R0671   RPADI     2DEC   6373338 B-29    M  (-29)  =20 909 901.57 FT

 0672   REF   5 LAST  546  22,3151                   RPADI    =      RPAD
 0673                       27,3367  00305 1  R300K    2DEC   6464778 B-29      (-29)  M
 0673                       27,3370  11205 0
 0674                       27,3371  37777 1  NEARONE  2DEC   .999999999
 0674                       27,3372  37777 1
 0675   REF  31 LAST 1355   26,3334                   TFFZEROS EQUALS HI6ZEROS
 0676   REF   4 LAST  935   26,3324                   TFF1/4   EQUALS HIDP1/4
```

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```
0001                    32,3770             BANK   32
0002  REF   1           14,2000             SETLOC STARTAB
0003                    14,3422             BANK

0004  REF   1                               COUNT  14/STARS

0500                    14,3422  15262 0    2DEC   +.8342971408 B-1    STAR 37    X
0500                    14,3423  21773 1
0501                    14,3424  74130 0    2DEC   -.2392481515 B-1    STAR 37    Y
0501                    14,3425  42420 1
0502                    14,3426  70033 0    2DEC   -.4966976975 B-1    STAR 37    Z
0502                    14,3427  41533 1
0503                    14,3430  15014 0    2DEC   +.8139832631 B-1    STAR 36    X
0503                    14,3431  04650 0
0504                    14,3432  67067 1    2DEC   -.5557243189 B-1    STAR 36    Y
0504                    14,3433  60150 0
0505                    14,3434  02551 1    2DEC   +.1691204557 B-1    STAR 36    Z
0505                    14,3435  15723 0
0506                    14,3436  07210 0    2DEC   +.4541086270 B-1    STAR 35    X
0506                    14,3437  01664 1
0507                    14,3440  67276 0    2DEC   -.5392368197 B-1    STAR 35    Y
0507                    14,3441  62232 0
0508                    14,3442  13262 0    2DEC   +.7092312789 B-1    STAR 35    Z
0508                    14,3443  00563 1
0509                    14,3444  05076 0    2DEC   +.3201817378 B-1    STAR 34    X
0509                    14,3445  35561 0
0510                    14,3446  70716 0    2DEC   -.4436021946 B-1    STAR 34    Y
0510                    14,3447  40260 1
0511                    14,3450  62466 1    2DEC   -.8370786986 B-1    STAR 34    Z
0511                    14,3451  64656 0
0512                    14,3452  10652 1    2DEC   +.5520184464 B-1    STAR 33    X
0512                    14,3453  04246 0
0513                    14,3454  63235 0    2DEC   -.7933187400 B-1    STAR 33    Y
0513                    14,3455  44200 0
0514                    14,3456  73710 0    2DEC   -.2567508745 B-1    STAR 33    Z
0514                    14,3457  66230 0
0515                    14,3460  07204 0    2DEC   +.4537196908 B-1    STAR 32    X
0515                    14,3461  33712 0
0516                    14,3462  61747 1    2DEC   -.8779508801 B-1    STAR 32    Y
0516                    14,3463  72343 0
0517                    14,3464  02343 1    2DEC   +.1527766153 B-1    STAR 32    Z
0517                    14,3465  21362 0
0518                    14,3466  03237 1    2DEC   +.2069525789 B-1    STAR 31    X
0518                    14,3467  13301 1
0519                    14,3470  62030 0    2DEC   -.8719885748 B-1    STAR 31    Y
0519                    14,3471  65332 0
0520                    14,3472  70715 0    2DEC   -.4436288486 B-1    STAR 31    Z
0520                    14,3473  71267 1
0521                    14,3474  01745 0    2DEC   +.1217293692 B-1    STAR 30    X
0521                    14,3475  06477 0
```

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0522	14,3476	63531 0	2DEC	-.7702732847 B-1	STAR 30	Y
0522	14,3477	75365 0				
0523	14,3500	12010 0	2DEC	+.6259880410 B-1	STAR 30	Z
0523	14,3501	03005 1				
0524	14,3502	76146 0	2DEC	-.1124304773 B-1	STAR 29	X
0524	14,3503	77014 1				
0525	14,3504	60371 1	2DEC	-.9694934200 B-1	STAR 29	Y
0525	14,3505	75073 1				
0526	14,3506	03370 0	2DEC	+.2178116072 B-1	STAR 29	Z
0526	14,3507	12003 1				
0527	14,3510	76125 0	2DEC	-.1146237858 B-1	STAR 28	X
0527	14,3511	40037 1				
0528	14,3512	72436 0	2DEC	-.3399692557 B-1	STAR 28	Y
0528	14,3513	77062 0				
0529	14,3514	61041 0	2DEC	-.9334250333 B-1	STAR 28	Z
0529	14,3515	54164 0				
0530	14,3516	72277 0	2DEC	-.3516499609 B-1	STAR 27	X
0530	14,3517	51044 0				
0531	14,3520	62641 0	2DEC	-.8240752703 B-1	STAR 27	Y
0531	14,3521	45471 1				
0532	14,3522	70711 1	2DEC	-.4441196390 B-1	STAR 27	Z
0532	14,3523	70546 1				
0533	14,3524	67364 1	2DEC	-.5326876930 B-1	STAR 26	X
0533	14,3525	47073 0				
0534	14,3526	64425 0	2DEC	-.7160644554 B-1	STAR 26	Y
0534	14,3527	77777 0				
0535	14,3530	07157 0	2DEC	+.4511047742 B-1	STAR 26	Z
0535	14,3531	16322 0				
0536	14,3532	63327 1	2DEC	-.7861763936 B-1	STAR 25	X
0536	14,3533	64446 0				
0537	14,3534	67515 1	2DEC	-.5217996305 B-1	STAR 25	Y
0537	14,3535	55266 0				
0538	14,3536	05230 0	2DEC	+.3311371675 B-1	STAR 25	Z
0538	14,3537	25476 0				
0539	14,3540	64754 0	2DEC	-.6898393233 B-1	STAR 24	X
0539	14,3541	72604 0				
0540	14,3542	71235 0	2DEC	-.4182330640 B-1	STAR 24	Y
0540	14,3543	72553 1				
0541	14,3544	66427 0	2DEC	-.5909338474 B-1	STAR 24	Z
0541	14,3545	42171 0				
0542	14,3546	66546 0	2DEC	-.5812035376 B-1	STAR 23	X
0542	14,3547	70765 1				
0543	14,3550	73260 1	2DEC	-.2909171294 B-1	STAR 23	Y
0543	14,3551	71643 0				
0544	14,3552	14121 0	2DEC	+.7599800468 B-1	STAR 23	Z
0544	14,3553	30153 0				
0545	14,3554	61247 1	2DEC	-.9170097662 B-1	STAR 22	X
0545	14,3555	73310 1				
0546	14,3556	72313 0	2DEC	-.3502146628 B-1	STAR 22	Y
0546	14,3557	41247 0				

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0547	14,3560	74744 0	2DEC	-.1908999176 B-1	STAR 22	Z
0547	14,3561	44566 1				
0548	14,3562	70606 0	2DEC	-.4523440203 B-1	STAR 21	X
0548	14,3563	54564 1				
0549	14,3564	77153 0	2DEC	-.0493710140 B-1	STAR 21	Y
0549	14,3565	61536 0				
0550	14,3566	61601 1	2DEC	-.8904759346 B-1	STAR 21	Z
0550	14,3567	47046 0				
0551	14,3570	60604 0	2DEC	-.9525211695 B-1	STAR 20	X
0551	14,3571	76224 1				
0552	14,3572	77031 0	2DEC	-.0593434796 B-1	STAR 20	Y
0552	14,3573	73354 1				
0553	14,3574	73161 0	2DEC	-.2986331746 B-1	STAR 20	Z
0553	14,3575	63065 1				
0554	14,3576	60431 1	2DEC	-.9656605484 B-1	STAR 19	X
0554	14,3577	51702 0				
0555	14,3600	00656 1	2DEC	+.0525933156 B-1	STAR 19	Y
0555	14,3601	33013 0				
0556	14,3602	04044 0	2DEC	+.2544280809 B-1	STAR 19	Z
0556	14,3603	10627 0				
0557	14,3604	62164 0	2DEC	-.8608205219 B-1	STAR 18	X
0557	14,3605	45040 1				
0558	14,3606	07325 1	2DEC	+.4636213989 B-1	STAR 18	Y
0558	14,3607	37443 0				
0559	14,3610	03267 1	2DEC	+.2098647835 B-1	STAR 18	Z
0559	14,3611	06626 0				
0560	14,3612	63471 0	2DEC	-.7742591356 B-1	STAR 17	X
0560	14,3613	50471 0				
0561	14,3614	11660 1	2DEC	+.6152504197 B-1	STAR 17	Y
0561	14,3615	04151 0				
0562	14,3616	75501 1	2DEC	-.1482892839 B-1	STAR 17	Z
0562	14,3617	46664 1				
0563	14,3620	70430 1	2DEC	-.4657947941 B-1	STAR 16	X
0563	14,3621	46540 1				
0564	14,3622	07507 1	2DEC	+.4774785033 B-1	STAR 16	Y
0564	14,3623	20100 1				
0565	14,3624	13727 1	2DEC	+.7450164351 B-1	STAR 16	Z
0565	14,3625	05455 0				
0565	14,3626	72160 0	2DEC	-.3612508532 B-1	STAR 15	X
0566	14,3627	64202 0				
0567	14,3630	11144 0	2DEC	+.5747270840 B-1	STAR 15	Y
0567	14,3631	05203 0				
0568	14,3632	64200 1	2DEC	-.7342932655 B-1	STAR 15	Z
0568	14,3633	65331 0				
0569	14,3634	71322 1	2DEC	-.4118589524 B-1	STAR 14	X
0569	14,3635	41512 1				
0570	14,3636	16402 0	2DEC	+.9065485360 B-1	STAR 14	Y
0570	14,3637	16205 1				
0571	14,3640	01365 0	2DEC	+.0924226975 B-1	STAR 14	Z
0571	14,3641	04034 1				

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0572	14,3642	75054 1	2DEC	-.1820751783 B-1	STAR 13	X
0572	14,3643	56052 0				
0573	14,3644	17030 1	2DEC	+.9404899869 B-1	STAR 13	Y
0573	14,3645	17635 1				
0574	14,3646	73321 0	2DEC	-.2869271926 B-1	STAR 13	Z
0574	14,3647	57603 0				
0575	14,3650	77010 0	2DEC	-.0614937230 B-1	STAR 12	X
0575	14,3651	47623 0				
0576	14,3652	11515 0	2DEC	+.6031563286 B-1	STAR 12	Y
0576	14,3653	01640 1				
0577	14,3654	63215 1	2DEC	-.7952489957 B-1	STAR 12	Z
0577	14,3655	52176 0				
0578	14,3656	02143 0	2DEC	+.1371725575 B-1	STAR 11	X
0578	14,3657	26755 1				
0579	14,3660	12715 1	2DEC	+.6813721061 B-1	STAR 11	Y
0579	14,3661	31470 0				
0580	14,3662	13401 0	2DEC	+.7189685267 B-1	STAR 11	Z
0580	14,3663	31222 1				
0581	14,3664	03157 1	2DEC	+.2011399589 B-1	STAR 10	X
0581	14,3665	27504 0				
0582	14,3666	17402 1	2DEC	+.9690337941 B-1	STAR 10	Y
0582	14,3667	12312 1				
0583	14,3670	75552 1	2DEC	-.1432348512 B-1	STAR 10	Z
0583	14,3671	63657 0				
0584	14,3672	05471 0	2DEC	+.3507315038 B-1	STAR 9	X
0584	14,3673	06122 0				
0585	14,3674	16220 0	2DEC	+.8926333307 B-1	STAR 9	Y
0585	14,3675	16362 1				
0586	14,3676	04417 1	2DEC	+.2831839492 B-1	STAR 9	Z
0586	14,3677	32762 0				
0587	14,3700	06443 1	2DEC	+.4105636020 B-1	STAR 8	X
0587	14,3701	12622 1				
0588	14,3702	07766 1	2DEC	+.4988110001 B-1	STAR 8	Y
0588	14,3703	10237 0				
0589	14,3704	14154 1	2DEC	+.7632988371 B-1	STAR 8	Z
0589	14,3705	36154 1				
0590	14,3706	13200 1	2DEC	+.7032235469 B-1	STAR 7	X
0590	14,3707	31653 0				
0591	14,3710	13244 1	2DEC	+.7075846047 B-1	STAR 7	Y
0591	14,3711	21036 1				
0592	14,3712	01067 1	2DEC	+.0692868685 B-1	STAR 7	Z
0592	14,3713	23106 1				
0593	14,3714	10560 0	2DEC	+.5450107404 B-1	STAR 6	X
0593	14,3715	27227 0				
0594	14,3716	10402 0	2DEC	+.5314955466 B-1	STAR 6	Y
0594	14,3717	00275 1				
0595	14,3720	65477 0	2DEC	-.6484410356 B-1	STAR 6	Z
0595	14,3721	77044 1				
0596	14,3722	00153 0	2DEC	+.0130968840 B-1	STAR 5	X
0596	14,3723	11212 0				

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0597                14,3724   00077 1          2DEC   +.0078062795 B-1    STAR  5    Y
0597                14,3725   36275 1
0598                14,3726   17777 0          2DEC   +.9998837600 B-1    STAR  5    Z
0598                14,3727   01417 1
0599                14,3730   07674 0          2DEC   +.4917678276 B-1    STAR  4    X
0599                14,3731   21771 0
0600                14,3732   03416 1          2DEC   +.2204887125 B-1    STAR  4    Y
0600                14,3733   07626 1
0601                14,3734   62413 0          2DEC   -.8423473935 B-1    STAR  4    Z
0601                14,3735   57536 0
0602                14,3736   07510 1          2DEC   +.4775639450 B-1    STAR  3    X
0602                14,3737   06414 0
0603                14,3740   01673 1          2DEC   +.1166004340 B-1    STAR  3    Y
0603                14,3741   06065 1
0604                14,3742   15735 1          2DEC   +.8708254803 B-1    STAR  3    Z
0604                14,3743   31531 1
0605                14,3744   16745 0          2DEC   +.9342640400 B-1    STAR  2    X
0605                14,3745   17555 1
0606                14,3746   02615 1          2DEC   +.1735073142 B-1    STAR  2    Y
0606                14,3747   13716 0
0607                14,3750   73010 1          2DEC   -.3115219339 B-1    STAR  2    Z
0607                14,3751   40311 0
0608                14,3752   15776 0          2DEC   +.8748658918 B-1    STAR  1    X
0608                14,3753   34660 0
0609                14,3754   00325 0          2DEC   +.0260879174 B-1    STAR  1    Y
0609                14,3755   26625 1
0610                14,3756   07572 0          2DEC   +.4836621670 B-1    STAR  1    Z
0610                14,3757   05105 0
0611                14,3760   15472 1 CATLOG   DEC    6970
```

L AGC BLOCK TWO SELF-CHECK USER'S PAGE NO. 1 E0 S3

R0001 PROGRAM DESCRIPTION
R0003 PROGRAM NAME - SELF-CHECK
R0005 MOD NO - 1
R0007 MOD BY - GAUNTT

DATE 20 DECEMBER 1967
LOG SECTION AGC BLOCK TWO SELF-CHECK
ASSEMBLY SUBROUTINE UTILITYM REV 25

R0008 FUNCTIONAL DESCRIPTION

R0009 PROGRAM HAS TWO MAIN PARTS. THE FIRST IS SELF-CHECK WHICH RUNS AS A ZERO PRIORITY JOB WITH NO CORE SET, AS
R0011 PART OF THE BACK-UP IDLE LOOP. THE SECOND IS SHOW-BANKSUM WHICH RUNS AS A REGULAR EXECUTIVE JOB WITH ITS OWN
R0013 STARTING VERB.
R0014 THE PURPOSE OF SELF-CHECK IS TO CHECK OUT VARIOUS PARTS OF THE COMPUTER AS OUTLINED BELOW IN THE OPTIONS.
R0016 THE PURPOSE OF SHOW-BANKSUM IS TO DISPLAY THE SUM OF EACH BANK , ONE AT A TIME.
R0020 IN ALL THERE ARE 7 POSSIBLE OPTIONS IN THIS BLOCK II VERSION OF SELF-CHECK. MORE DETAIL DESCRIPTION MAY BE
R0022 FOUND IN E-2065 BLOCK II AGC SELF-CHECK AND SHOW BANKSUM BY EDWIN D. SMALLY DECEMBER 1966, AND ADDENDA 2 AND 3.
R0024 THE DIFFERENT OPTIONS ARE CONTROLLED BY PUTTING DIFFERENT NUMBERS IN THE SMODE REGISTER (NOUN 27). BELOW IS
R0026 A DESCRIPTION OF WHAT PARTS OF THE COMPUTER THAT ARE CHECKED BY THE OPTIONS, AND THE CORRESPONDING NUMBER, IN
R0028 OCTAL, TO LOAD INTO SMODE.
R0032 +-4 ERASABLE MEMORY
R0033 +-5 FIXED MEMORY
R0034 +-1,2,3,6,7,10 EVERYTHING IN OPTIONS 4 AND 5.
R0036 -0 SAME AS +-10 UNTIL AN ERROR IS DETECTED.
R0037 +0 NO CHECK, PUTS COMPUTER INTO THE BACKUP IDLE LOOP.

R0038 WARNINGS

R0039 USE OF E MEMORY RESERVED FOR SELF-CHECK (EVEN IN IDLE LOOP) AS TEMP STORAGE BY OTHER PROGRAMS IS DANGEROUS.
R0041 SMODE SET GREATER THAN OCT 10 PUTS COMPUTER INTO BACKUP IDLE LOOP.

R0042 CALLING SEQUENCE

R0043 TO CALL SELF-CHECK KEY IN
R0044 V 21 N 27 E OPTION NUMBER E
R0047 TO CALL SHOW-BANKSUM KEY IN
R0048 V 91 E DISPLAYS FIRST BANK
R0049 V 33 E PROCEED, DISPLAYS NEXT BANK

R0050 EXIT MODES, NORMAL AND ALARM

R0051 SELF-CHECK NORMALLY CONTINUES INDEFINITELY UNLESS THERE IS AN ERROR DETECTED. IF SO + OPTION NUMBERS PUT
R0053 COMPUTER INTO BACKUP IDLE LOOP, - OPTION NUMBERS RESTART THE OPTION.
R0054 THE -0 OPTION PROCEEDS FROM THE LINE FOLLOWING THE LINE WHERE THE ERROR WAS DETECTED.
R0057 SHOW-BANKSUM PROCEEDS UNTIL A TERMINATE IS KEYED IN (V 34 E). THE COMPUTER IS PUT INTO THE BACKUP IDLE LOOP
R0059

R0060 OUTPUT

R0061 SELF-CHECK UPON DETECTING AN ERROR LOADS THE SELF-CHECK ALARM CONSTANT (01102) INTO THE FAILREG SET AND
R0063 TURNS ON THE ALARM LIGHT. THE OPERATOR MAY THEN DISPLAY THE THREE FAILREGS BY KEYING IN V 05 N 09 E. FOR FURTHER
R0065 INFORMATION HE MAY KEY IN V 05 N 08 E, THE DSKY DISPLAY IN R1 WILL BE ADDRESS+1 OF WHERE THE ERROR WAS DETECTED,
R0067 IN R2 THE BBCON OF SELF-CHECK, AND IN R3 THE TOTAL NUMBER OF ERRORS DETECTED BY SELF-CHECK SINCE THE LAST MAN
R0069 INITIATED FRESH START (SLAP1).
R0073 SHOW-BANKSUM STARTING WITH BANK 0 DISPLAYS IN R1 THE BANK SUM (A +-NUMBER EQUAL TO THE BANK NUMBER), IN R2
R0075 THE BANK NUMBER, AND IN R3 THE BUGGER WORD.

R0076 ERASABLE INITIALIZATION REQUIRED

R0077 ACCOMPLISHED BY FRESH START
R0078 SMODE SET TO +0

R0079 DEBRIS

R0080 ALL EXITS FROM THE CHECK OF ERASABLE (ERASCHK) RESTORE ORIGINAL CONTENTS TO REGISTERS UNDER CHECK.
R0082 EXCEPTION IS A RESTART. RESTART THAT OCCURS DURING ERASCHK RESTORES ERASABLE. UNLESS THERE IS EVIDENCE TO DOUBT
R0084 E MEMORY, IN WHICH CASE PROGRAM THEN DOES A FRESH START (DOFSTART).

```
0085                        25,3774                 BANK   25
0086  REF   1              43,2000                 SETLOC SELFCHEC
0087                        43,3234                 BANK

0088  REF   1                                       COUNT  43/SELF

0089  REF  76  LAST 1204    5017          SBIT1     EQUALS BIT1
0090  REF  47  LAST 1204    5016          SBIT2     EQUALS BIT2
0091  REF  33  LAST 1204    5015          SBIT3     EQUALS BIT3
0092  REF  37  LAST 1204    5014          SBIT4     EQUALS BIT4
0093  REF  34  LAST 1119    5013          SBIT5     EQUALS BIT5
0094  REF  42  LAST 1161    5012          SBIT6     EQUALS BIT6
0095  REF  45  LAST 1201    5011          SBIT7     EQUALS BIT7
0096  REF  26  LAST 1226    5010          SBIT8     EQUALS BIT8
0097  REF  32  LAST 1039    5007          SBIT9     EQUALS BIT9
0098  REF  37  LAST 1204    5006          SBIT10    EQUALS BIT10
0099  REF  34  LAST 1204    5005          SBIT11    EQUALS BIT11
0100  REF  33  LAST 1204    5004          SBIT12    EQUALS BIT12
0101  REF  48  LAST 1204    5003          SBIT13    EQUALS BIT13
0102  REF  73  LAST 1367    5002          SBIT14    EQUALS BIT14
0103  REF  49  LAST 1204    5001          SBIT15    EQUALS BIT15

0104  REF 261  LAST 1325    5021          S+ZERO    EQUALS ZERO
0105  REF  77  LAST 1395    5017          S+1       EQUALS BIT1
0106  REF  48  LAST 1395    5016          S+2       EQUALS BIT2
0107  REF  47  LAST 1369    6214          S+3       EQUALS THREE
0108  REF  19  LAST 1367    5015          S+4       EQUALS FOUR
0109  REF  26  LAST 1139    5022          S+5       EQUALS FIVE
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0110   REF  39  LAST 1370      6211             S+6       EQUALS SIX
0111   REF  18  LAST 1204      5023             S+7       EQUALS SEVEN
0112   REF  13  LAST 1194      4373             SBBITS    EQUALS LOW8        00377
0113   REF   6  LAST 1092      5033             CNTRCON   =      OCT50       USED IN CNTRCHK
0114                        43,3234  00061 0     ERASCON1  OCTAL  00061       USED IN ERASCHK
0115                        43,3235  01373 1     ERASCON2  OCTAL  01373       USED IN ERASCHK
0116   REF   9  LAST 1204      5051             ERASCON6  =      OCT1400     USED IN ERASCHK
0117                        43,3236  01461 0     ERASCON3  OCTAL  01461       USED IN ERASCHK
0118                        43,3237  01773 0     ERASCON4  OCTAL  01773       USED IN ERASCHK
0119   REF  19  LAST 1129      5054             S10BITS   EQUALS LOW10       01777, USED IN ERASCHK
0120   REF   4  LAST  959      5062             SBNK03    EQUALS PRI06       06000, USED IN ROPECHK
0121   REF   6  LAST 1204      4364             -MAXADRS  =      HI5         FOR ROPECHK
0122                        43,3240  00060 1     SIXTY     OCTAL  00060
0123                        43,3241  60017 1     SUPRCON   OCTAL  60017       USED IN ROPECHK
0124                        43,3242  17777 0     S13BITS   OCTAL  17777
0125                        43,3243  25252 0     CONC+S1   OCTAL  25252       USED IN CYCLSHFT
0126                        43,3244  52400 1     CONC+S2   OCTAL  52400       USED IN CYCLSHFT
0127                        43,3245  76777 1     ERASCON5  OCTAL  76777
0128   REF   2  LAST  205      5731             S-7       =      OCT77770
0129   REF   3  LAST 1113      6061             S-4       EQUALS NEG4
0130   REF   3  LAST  579      7714             S-3       EQUALS NEG3
0131   REF   6  LAST 1208      7715             S-2       EQUALS NEG2
0132   REF  27  LAST 1204      7716             S-1       EQUALS NEGONE
0133   REF  15  LAST 1101      5020             S-ZERO    EQUALS NEGO

0134   REF  46  LAST 1235    E3,1400                       EBANK= LST1
0135   REF   3  LAST  263    43,3246   01371 0  ADRS1     ADRES  SKEEP1
0136   REF   4  LAST 1220    43,3247   03340 0  SELFADRS  ADRES  SELFCHK      SELFCHK RETURN ADDRESS. SHOULD BE PUT
A0137                                                                        IN SELFRET WHEN GOING FROM SELFCHK TO
A0138                                                                        SHOWSUM AND PUT IN SKEEP1 WHEN GOING
A0139                                                                        FROM SHOWSUM TO SELF-CHECK.

0140   REF   6  LAST  186    43,3250  3 1360 0  PRERRORS  CA     ERESTORE    IS IT NECESSARY TO RESTORE ERASABLE
0141                        43,3251  0 0006 1             EXTEND
0142   REF   1              43,3252  1 3261 0             BZF    ERRORS      NO
0143                        43,3253  0 0006 1             EXTEND
0144   REF   3  LAST  186    43,3254  3 1376 1             DCA    SKEEP5
0145   REF   3  LAST  186    43,3255  51'377 0             INDEX  SKEEP7
0146                        43,3256  52 001 1             DXCH   0000        RESTORE THE TWO ERASABLE REGISTERS
0147   REF   2  LAST  263    43,3257  3 5021 1             CA     S+ZERO
0148   REF   7  LAST 1396    43,3260  55'360 1             TS     ERESTORE
0149                        43,3261  0 0004 0  ERRORS    INHINT
0150   REF 307  LAST 1317    43,3262  3 0002 0             CA     Q
0151   REF   3  LAST  389    43,3263  55'357 0             TS     SFAIL       SAVE Q FOR FAILURE LOCATION
0152   REF   3  LAST  271    43,3264  55'363 1             TS     ALMCADR     FOR DISPLAY WITH BBANK AND ERCOUNT
0153   REF   3  LAST  183    43,3265  25'365 0             INCR   ERCOUNT     KEEP TRACK OF NUMBER OF MALFUNCTIONS.
0154   REF   1              43,3266  0 5652 0  TCALARM2  TC     ALARM2
0155                        43,3267   01102 0             OCT    01102       SELF-CHECK MALFUNCTION INDICATOR
0156   REF   5  LAST  271    43,3270  11'362 0             CCS    SMODE
0157   REF   3  LAST 1396    43,3271  3 5021 1  SIDLOOP   CA     S+ZERO
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0158   REF   6  LAST 1396   43,3272  55'362 0          TS     SMODE
0159   REF   5  LAST 1396   43,3273  0 3340 0          TC     SELFCHK        GO TO IDLE LOOP
0160   REF   4  LAST 1396   43,3274  0 1357 1          TC     SFAIL          CONTINUE WITH SELF-CHECK

0161   REF 340  LAST 1370   43,3275  10 000 0 -1CHK    CCS    A
0162   REF   1              43,3276  1 3250 1          TCF    PRERRORS
0163   REF   2  LAST 1397   43,3277  1 3250 1          TCF    PRERRORS
0164   REF 341  LAST 1397   43,3300  10 000 0          CCS    A
0165   REF   3  LAST 1397   43,3301  1 3250 1          TCF    PRERRORS
0166   REF 308  LAST 1396   43,3302  0 0002 0          TC     Q

0167                        43,3303  0 0006 1 SMODECHK EXTEND
0168   REF   4  LAST 1396   43,3304  23'371 0          QXCH   SKEEP1
0169   REF   1              43,3305  0 3334 0          TC     CHECKNJ        CHECK FOR NEW JOB
0170   REF   7  LAST 1397   43,3306  11'362 0          CCS    SMODE
0171   REF   1              43,3307  0 3314 1          TC     SOPTIONS
0172   REF   1              43,3310  0 3305 1          TC     SMODECHK +2    TO BACKUP IDLE LOOP
0173   REF   2  LAST 1397   43,3311  0 3314 1          TC     SOPTIONS
0174   REF   2 .LAST   82   43,3312  25'366 0          INCR   SCOUNT
0175   REF   5  LAST 1397   43,3313  0 1371 0          TC     SKEEP1         CONTINUE WITH SELF-CHECK

0176   REF   1              43,3314  6 5731 1 SOPTIONS AD     S-7
0177                        43,3315  0 0006 1          EXTEND
0178                        43,3316  6 3320 0          BZMF   +2              FOR OPTIONS BELOW NINE.
0179   REF   1              43,3317  0 3271 0 BNKOPTN  TC     SIDLOOP        ILLEGAL OPTION.  GO TO IDLE LOOP.
0180   REF   3  LAST 1397   43,3320  25'366 0          INCR   SCOUNT         FOR OPTIONS BELOW NINE.
0181   REF   1              43,3321  6 5023 0          AD     S+7

0182   REF 342  LAST 1397   43,3322  50 000 1          INDEX  A
0183   REF   1              43,3323  0 3324 1          TC     SOPTION1
0184   REF   6  LAST 1397   43,3324  0 1371 0 SOPTION1 TC     SKEEP1         WAS TC+TCF
0185   REF   7  LAST 1397   43,3325  0 1371 0 SOPTION2 TC     SKEEP1         WAS IN:OUT1
0186   REF   8  LAST 1397   43,3326  0 1371 0 SOPTION3 TC     SKEEP1         WAS COUNTCHK
0187   REF   1              43,3327  0 3341 1 SOPTION4 TC     ERASCHK
0188   REF   1              43,3330  0 3522 1 SOPTION5 TC     ROPECHK
0189   REF   9  LAST 1397   43,3331  0 1371 0 SOPTION6 TC     SKEEP1
0190   REF  10  LAST 1397   43,3332  0 1371 0 SOPTION7 TC     SKEEP1
0191   REF  11  LAST 1397   43,3333  0 1371 0 SOPTON10 TC     SKEEP1         CONTINUE WITH SELF-CHECK

0192                        43,3334  0 0006 1 CHECKNJ  EXTEND
0193   REF   7  LAST 1220   43,3335  23'361 1          QXCH   SELFRET        SAVE RETURN ADDRESS WHILE TESTING NEWJOB
0194   REF  58  LAST 1260   43,3336  0 4701 0          TC     POSTJUMP       TO SEE IF ANY JOBS HAVE BECOME ACTIVE.
0195   REF   2  LAST 1215   43,3337   03231 1          CADR   ADVAN

0196   REF   2  LAST 1397   43,3340  0 3303 1 SELFCHK  TC     SMODECHK       ** CHARLEY, COME IN HERE

R0197   SKEEP7 HOLDS LOWEST OF TWO ADDRESSES BEING CHECKED.
R0198   SKEEP6 HOLDS B(X+1).
R0199   SKEEP5 HOLDS B(X).
R0200   SKEEP4 HOLDS C(EBANK) DURING ERASLOOP AND CHECKNJ.
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L AGC BLOCK TWO SELF-CHECK USER'S PAGE NO. 5 E3 S4

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R0201   SKEEP3 HOLDS LAST ADDRESS BEING CHECKED (HIGHEST ADDRESS).
R0202   SKEEP2 CONTROLS CHECKING OF NON-SWITCHABLE ERASABLE MEMORY WITH BANK NUMBERS IN EB.
R0204   ERASCHK TAKES APPROXMATELY 7 SECONDS
 0205   REF   2  LAST  263   43,3341  3 5017 1  ERASCHK   CA    S+1
 0206   REF   3  LAST  263   43,3342  55'372 1            TS    SKEEP2
 0207   REF   4  LAST 1396   43,3343  3 5021 1  OEBANK    CA    S+ZERO
 0208   REF  52  LAST 1194   43,3344  54 003 0            TS    EBANK
 0209   REF   1              43,3345  3 3236 0            CA    ERASCON3    01461
 0210   REF   4  LAST 1396   43,3346  55'377 1            TS    SKEEP7      STARTING ADDRESS
 0211   REF   1              43,3347  3 5054 0            CA    S10BITS     01777
 0212   REF   3  LAST  263   43,3350  55'373 0            TS    SKEEP3      LAST ADDRESS CHECKED
 0213   REF   1              43,3351  0 3371 1            TC    ERASLOOP

 0214   REF   1              43,3352  3 5051 0  E134567B  CA    ERASCON6    01400
 0215   REF   5  LAST 1398   43,3353  55'377 1            TS    SKEEP7      STARTING ADDRESS
 0216   REF   2  LAST 1398   43,3354  3 5054 0            CA    S10BITS     01777
 0217   REF   4  LAST 1398   43,3355  55'373 0            TS    SKEEP3      LAST ADDRESS CHECKED
 0218   REF   2  LAST 1398   43,3356  0 3371 1            TC    ERASLOOP

 0219   REF   2  LAST 1398   43,3357  3 5051 0  2EBANK    CA    ERASCON6    01400
 0220   REF   6  LAST 1398   43,3360  55'377 1            TS    SKEEP7      STARTING ADDRESS
 0221   REF   1              43,3361  3 3237 1            CA    ERASCON4    01773
 0222   REF   5  LAST 1398   43,3362  55'373 0            TS    SKEEP3      LAST ADDRESS CHECKED
 0223   REF   3  LAST 1398   43,3363  0 3371 1            TC    ERASLOOP

 0224   REF   4  LAST 1398   43,3364  55'372 1  NOEBANK   TS    SKEEP2      +0
 0225   REF   1              43,3365  3 3234 1            CA    ERASCON1    00061
 0226   REF   7  LAST 1398   43,3366  55'377 1            TS    SKEEP7      STARTING ADDRESS
 0227   REF   1              43,3367  3 3235 0            CA    ERASCON2    01373
 0228   REF   6  LAST 1398   43,3370  55'373 0            TS    SKEEP3      LAST ADDRESS CHECKED

 0229                        43,3371  0 0004 0  ERASLOOP  INHINT
 0230   REF  53  LAST 1398   43,3372  3 0003 1            CA    EBANK       STORES C(EBANK)
 0231   REF   3  LAST  186   43,3373  55'374 1            TS    SKEEP4
 0232                        43,3374  0 0006 1            EXTEND
 0233   REF   8  LAST 1398   43,3375  5 1377 0            NDX   SKEEP7
 0234                        43,3376  3 0001 0            DCA   0000
 0235   REF   4  LAST 1396   43,3377  53'376 0            DXCH  SKEEP5      STORES C(X) AND C(X+1) IN SKEEP6 AND 5.
 0236   REF   9  LAST 1398   43,3400  3 1377 0            CA    SKEEP7
 0237   REF   8  LAST 1396   43,3401  55'360 1            TS    ERESTORE    IF RESTART, RESTORE C(X) AND C(X+1)
 0238   REF 175  LAST 1325   43,3402  54 001 1            TS    L
 0239   REF 176  LAST 1398   43,3403  24 001 0            INCR  L
 0240   REF 343  LAST 1397   43,3404  50 000 1            NDX   A
 0241                        43,3405  52 001 1            DXCH  0000        PUTS OWN ADDRESS IN X AND X +1
 0242   REF  10  LAST 1398   43,3406  51'377 0            NDX   SKEEP7
 0243                        43,3407  4 0001 1            CS    0001        CS  X+1
 0244   REF  11  LAST 1398   43,3410  51'377 0            NDX   SKEEP7
 0245                        43,3411  6 0000 1            AD    0000        AD X
 0246   REF   1              43,3412  0 3275 1            TC    -ICHK
 0247   REF   9  LAST 1398   43,3413  3 1360 0            CA    ERESTORE    HAS ERASABLE BEEN RESTORED
```

L AGC BLOCK TWO SELF-CHECK USER'S PAGE NO. 6 E3 S4

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0248                              43,3414  0 0006 1            EXTEND
0249  REF   1                    43,3415  1 3441 1            BZF     ELOOPFIN        YES, EXIT ERASLOOP.
0250                              43,3416  0 0006 1            EXTEND
0251  REF  12  LAST 1398         43,3417  5 1377 0            NDX     SKEEP7
0252                              43,3420  4 0001 1            DCS     0000            COMPLEMENT OF ADDRESS OF X AND X+1
0253  REF  13  LAST 1399         43,3421  51'377 0            NDX     SKEEP7
0254                              43,3422  52 001 1            DXCH    0000            PUT COMPLEMENT OF ADDRESS OF X AND X+1
0255  REF  14  LAST 1399         43,3423  51'377 0            NDX     SKEEP7
0256                              43,3424  4 0000 0            CS      0000            CS  X
0257  REF  15  LAST 1399         43,3425  51'377 0            NDX     SKEEP7
0258                              43,3426  6 0001 0            AD      0001            AD X+1
0259  REF   2  LAST 1398         43,3427  0 3275 1            TC      -1CHK
0260  REF  10  LAST 1398         43,3430  3 1360 0            CA      ERESTORE        HAS ERASABLE BEEN RESTORED
0261                              43,3431  0 0006 1            EXTEND
0262  REF   2  LAST 1399         43,3432  1 3441 1            BZF     ELOOPFIN        YES, EXIT ERASLOOP.
0263                              43,3433  0 0006 1            EXTEND
0264  REF   5  LAST 1398         43,3434  3 1376 1            DCA     SKEEP5
0265  REF  16  LAST 1399         43,3435  51'377 0            NDX     SKEEP7
0266                              43,3436  52 001 1            DXCH    0000            PUT B(X) AND B(X+1) BACK INTO X AND X+1
0267  REF   5  LAST 1398         43,3437  3 5021 1            CA      S+ZERO
0268  REF  11  LAST 1399         43,3440  55'360 1            TS      ERESTORE        IF RESTART, DO NOT RESTORE C(X), C(X+1)
0269                              43,3441  0 0003 1  ELOOPFIN  RELINT
0270  REF   2  LAST 1397         43,3442  0 3334 0            TC      CHECKNJ         CHECK FOR NEW JOB
0271  REF   4  LAST 1398         43,3443  3 1374 0            CA      SKEEP4          REPLACES B(EBANK)
0272  REF  54  LAST 1398         43,3444  54 003 0            TS      EBANK
0273  REF  17  LAST 1399         43,3445  25'377 0            INCR    SKEEP7
0274  REF  18  LAST 1399         43,3446  4 1377 1            CS      SKEEP7
0275  REF   7  LAST 1398         43,3447  6 1373 1            AD      SKEEP3
0276                              43,3450  0 0006 1            EXTEND
0277                              43,3451  1 3453 1            BZF     +2
0278  REF   4  LAST 1398         43,3452  0 3371 1            TC      ERASLOOP        GO TO NEXT ADDRESS IN SAME BANK
0279  REF   5  LAST 1398         43,3453  11'372 1            CCS     SKEEP2
0280  REF   1                    43,3454  0 3364 0            TC      NOEBANK
0281  REF   6  LAST 1399         43,3455  25'372 0            INCR    SKEEP2          PUT +1 IN SKEEP2.
0282  REF  55  LAST 1399         43,3456  3 0003 1            CA      EBANK
0283  REF   1                    43,3457  6 5007 0            AD      SBIT9
0284  REF  56  LAST 1399         43,3460  54 003 0            TS      EBANK
0285  REF   1                    43,3461  6 3245 1            AD      ERASCON5        76777, CHECK FOR BANK E2
0286                              43,3462  0 0006 1            EXTEND
0287  REF   1                    43,3463  1 3357 1            BZF     2EBANK
0288  REF  57  LAST 1399         43,3464  10 003 0            CCS     EBANK
0289  REF   1                    43,3465  0 3352 0            TC      E134567B        GO TO EBANKS 1,3,4,5,6, AND 7
0290  REF   3  LAST 1398         43,3466  3 5051 0            CA      ERASCON6        END OF ERASCHK
0291  REF  58  LAST 1399         43,3467  54 003 0            TS      EBANK
R0292 CNTRCHK PERFORMS A CS OF ALL REGISTERS FROM OCT. 60 THROUGH OCT. 10.
R0293 INCLUDED ARE ALL COUNTERS, T6-1, CYCLE AND SHIFT, AND ALL RUPT REGISTERS
0294  REF   1                    43,3470  3 5033 1  CNTRCHK   CA      CNTRCON         00050
0295  REF   7  LAST 1399         43,3471  55'372 1  CNTRLOOP  TS      SKEEP2
0296  REF   1                    43,3472  6 5014 1            AD      SBIT4           +10 OCTAL
0297  REF 344  LAST 1398         43,3473  50 000 1            INDEX   A
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0298                          43,3474  4 0000 0            CS      0000
0299   REF   8  LAST 1399     43,3475  11'372 1            CCS     SKEEP2
0300   REF   1                43,3476  0 3471 0            TC      CNTRLOOP

R0301  CYCLSHFT CHECKS THE CYCLE AND SHIFT REGISTERS
0302   REF   1                43,3477  3 3243 1  CYCLSHFT  CA      CONC+S1       25252
0303   REF  42  LAST 1196     43,3500  54 020 1            TS      CYR           C(CYR) = 12525
0304   REF  22  LAST 1186     43,3501  54 022 0            TS      CYL           C(CYL) = 52524
0305   REF  29  LAST 1186     43,3502  54 021 0            TS      SR            C(SR) = 12525
0306   REF  11  LAST 1108     43,3503  54 023 1            TS      EDOP          C(EDOP) = 00125
0307   REF  43  LAST 1400     43,3504  6 0020 0            AD      CYR           37777          C(CYR) = 45252
0308   REF  23  LAST 1400     43,3505  6 0022 1            AD      CYL           00-12524       C(CYL) = 25251
0309   REF  30  LAST 1400     43,3506  6 0021 1            AD      SR            00-25251       C(SR) = 05252
0310   REF  12  LAST 1400     43,3507  6 0023 0            AD      EDOP          00-25376       C(EDOP) = +0
0311   REF   1                43,3510  6 3244 0            AD      CONC+S2       C(CONC+S2) = 52400
0312   REF   3  LAST 1399     43,3511  0 3275 1            TC      -1CHK
0313   REF  44  LAST 1400     43,3512  6 0020 0            AD      CYR           45252
0314   REF  24  LAST 1400     43,3513  6 0022 1            AD      CYL           72523
0315   REF  31  LAST 1400     43,3514  6 0021 1            AD      SR            77775
0316   REF  13  LAST 1400     43,3515  6 0023 0            AD      EDOP          77775
0317   REF   3  LAST 1398     43,3516  6 5017 1            AD      S+1           77776
0318   REF   4  LAST 1400     43,3517  0 3275 1            TC      -1CHK

0319   REF   4  LAST 1397     43,3520  25'367 1            INCR    SCOUNT +1
0320   REF   3  LAST 1397     43,3521  0 3303 1            TC      SMODECHK
R0321  SKEEP1 HOLDS SUM
R0322  SKEEP2 HOLDS PRESENT CONTENTS OF ADDRESS IN ROPECHK AND SHOWSUM ROUTINES
R0323  SKEEP2 HOLDS BANK NUMBER IN LOW ORDER BITS DURING SHOWSUM DISPLAY
R0324  SKEEP3 HOLDS PRESENT ADDRESS (00000 TO 01777 IN COMMON FIXED BANKS)
R0325                               (04000 TO 07777 IN FXFX BANKS)
R0326  SKEEP3 HOLDS BUGGER WORD DURING SHOWSUM DISPLAY
R0327  SKEEP4 HOLDS BANK NUMBER AND SUPER BANK NUMBER
R0328  SKEEP5 COUNTS 2 SUCCESSIVE TC SELF WORDS
R0329  SKEEP6 CONTROLS ROPECHK OR SHOWSUM OPTION
R0330  SKEEP7 CONTROLS WHEN ROUNTINE IS IN COMMON FIXED OR FIXED FIXED BANKS

0331   REF   1                43,3522  3 5020 0  ROPECHK  CA      S-ZERO        *
03311  REF   4  LAST  263     43,3523  55'376 0            TS      SKEEP6        * -0 FOR ROPECHK.
03312  REF   6  LAST 1399     43,3524  3 5021 1  STSHOSUM  CA      S+ZERO        * SHOULD BE ROPECHK

0332   REF   5  LAST 1399     43,3525  55'374 1            TS      SKEEP4        BANK NUMBER
0333   REF   4  LAST 1400     43,3526  3 5017 1            CA      S+1
0334   REF  19  LAST 1399     43,3527  55'377 1  COMMFX    TS      SKEEP7
0335   REF   7  LAST 1400     43,3530  3 5021 1            CA      S+ZERO
0336   REF  12  LAST 1397     43,3531  55'371 1            TS      SKEEP1
0337   REF   8  LAST 1399     43,3532  55'373 0            TS      SKEEP3
0338   REF   5  LAST 1400     43,3533  3 5017 1            CA      S+1
0339   REF   6  LAST 1399     43,3534  55'375 0            TS      SKEEP5        COUNTS DOWN 2 TC SELF WORDS
0340   REF   6  LAST 1400     43,3535  3 1374 0  COMADRS   CA      SKEEP4
0341   REF 177  LAST 1398     43,3536  54 001 1            TS      L             TO SET SUPER BANK
```

L AGC BLOCK TWO SELF-CHECK USER'S PAGE NO. 8 E3 S4

```
0342   REF   7  LAST 1396   43,3537   7 4364 0            MASK   HI5
0343   REF   9  LAST 1400   43,3540   6 1373 1            AD     SKEEP3
0344   REF   2  LAST  358   43,3541   0 4715 0            TC     SUPDACAL       SUPER DATA CALL
0345   REF   1              43,3542   0 3565 1            TC     ADSUM
0346   REF   1              43,3543   6 5005 1            AD     SBIT11         02000
0347   REF   1              43,3544   0 3576 0            TC     ADRSCHK

0348   REF 345  LAST 1399   43,3545   4 0000 0  FXFX      CS     A
0349   REF  20  LAST 1400   43,3546   55'377 1            TS     SKEEP7
0350                        43,3547   0 0006 1            EXTEND
0351                        43,3550   1 3553 0            BZF    +3
0352   REF   1              43,3551   3 5004 0            CA     SBIT12         04000, STARTING ADDRESS OF BANK 02
0353                        43,3552   0 3554 0            TC     +2
0354   REF   1              43,3553   3 5062 0            CA     SBNK03         06000, STARTING ADDRESS OF BANK 03
0355   REF  10  LAST 1401   43,3554   55'373 0            TS     SKEEP3
0356   REF   8  LAST 1400   43,3555   3 5021 1            CA     S+ZERO
0357   REF  13  LAST 1400   43,3556   55'371 1            TS     SKEEP1
0358   REF   6  LAST 1400   43,3557   3 5017 1            CA     S+1
0359   REF   7  LAST 1400   43,3560   55'375 0            TS     SKEEP5         COUNTS DOWN 2 TC SELF WORDS
0360   REF  11  LAST 1401   43,3561   51'373 1  FXADRS    INDEX  SKEEP3
0361                        43,3562   3 0000 1            CA     0000
0362   REF   2  LAST 1401   43,3563   0 3565 1            TC     ADSUM
0363   REF   2  LAST 1401   43,3564   0 3576 0            TC     ADRSCHK

0364   REF   9  LAST 1400   43,3565   55'372 1  ADSUM     TS     SKEEP2
0365   REF  14  LAST 1401   43,3566   6 1371 0            AD     SKEEP1
0366   REF  15  LAST 1401   43,3567   55'371 1            TS     SKEEP1
0367   REF   9  LAST 1401   43,3570   3 5021 1            CAF    S+ZERO
0368   REF  16  LAST 1401   43,3571   6 1371 0            AD     SKEEP1
0369   REF  17  LAST 1401   43,3572   55'371 1            TS     SKEEP1
0370   REF  10  LAST 1401   43,3573   4 1372 1            CS     SKEEP2
0371   REF  12  LAST 1401   43,3574   6 1373 1            AD     SKEEP3
0372   REF 309  LAST 1397   43,3575   0 0002 0            TC     Q

0373   REF 346  LAST 1401   43,3576   22 000 1  ADRSCHK   LXCH   A
0374   REF  13  LAST 1401   43,3577   3 1373 1            CA     SKEEP3
0375   REF  20  LAST 1396   43,3600   7 5054 1            MASK   LOWIO          RELATIVE ADDRESS
0376   REF   1              43,3601   6 4364 1            AD     -MAXADRS       SUBTRACT MAX RELATIVE ADDRESS = 1777.
0377                        43,3602   0 0006 1            EXTEND
0378   REF   1              43,3603   1 3672 0            BZF    SOPTION        CHECKSUM FINISHED IF LAST ADDRESS.
0379   REF   8  LAST 1401   43,3604   11'375 0            CCS    SKEEP5         IS CHECKSUM FINISHED
0380                        43,3605   0 3610 0            TC     +3             NO
0381                        43,3606   0 3610 0            TC     +2             NO
0382   REF   2  LAST 1401   43,3607   0 3672 1            TC     SOPTION        GO TO ROPECHK SHOWSUM OPTION
0383   REF 178  LAST 1400   43,3610   10 001 1            CCS    L              -0 MEANS A TC SELF WORD.
0384   REF   1              43,3611   0 3620 0            TC     CONTINU
0385   REF   2  LAST 1401   43,3612   0 3620 0            TC     CONTINU
0386   REF   3  LAST 1401   43,3613   0 3620 0            TC     CONTINU
0387   REF   9  LAST 1401   43,3614   11'375 0            CCS    SKEEP5
0388   REF   4  LAST 1401   43,3615   0 3621 1            TC     CONTINU +1
```

```
0389  REF   1                43,3616  3 7716 0           CA     S-1
0390  REF   5  LAST 1401      43,3617  0 3621 1           TC     CONTINU +1      AD IN THE BUGGER WORD
0391  REF   7  LAST 1401      43,3620  3 5017 1  CONTINU  CA     S+1             MAKE SURE TWO CONSECUTIVE TC SELF WORDS
0392  REF  10  LAST 1401      43,3621  55'375 0           TS     SKEEP5
03921 REF   5  LAST 1400      43,3622  11'376 0           CCS    SKEEP6          *
03922 REF  22  LAST 1220      43,3623  10 067 1           CCS    NEWJOB          * +1, SHOWSUM
03923 REF   4  LAST  874      43,3624  0 5164 1           TC     CHANG1          *
03924                         43,3625  0 3627 1           TC     +2              *
0393  REF   3  LAST 1399      43,3626  0 3334 0           TC     CHECKNJ         -0 IN SKEEP6 FOR ROPECHK

0394  REF  14  LAST 1401      43,3627  25'373 1  ADRS+1   INCR   SKEEP3
0395  REF  21  LAST 1401      43,3630  11'377 1           CCS    SKEEP7
0396  REF   1                43,3631  0 3535 1           TC     COMADRS
0397  REF   2  LAST 1402      43,3632  0 3535 1           TC     COMADRS
0398  REF   1                43,3633  0 3561 0           TC     FXADRS
0399  REF   2  LAST 1402      43,3634  0 3561 0           TC     FXADRS

0400  REF   7  LAST 1400      43,3635  4 1374 1  NXTBNK   CS     SKEEP4
0401  REF   1                43,3636  6 3725 1           AD     LSTBNKCH        LAST BANK TO BE CHECKED
0402                         43,3637  0 0006 1           EXTEND
0403  REF   1                43,3640  1 3011 0           BZF    ENDSUMS         END OF SUMMING OF BANKS.
0404  REF   8  LAST 1402      43,3641  3 1374 0           CA     SKEEP4
0405  REF   2  LAST 1401      43,3642  6 5005 1           AD     SBIT11
0406  REF   9  LAST 1402      43,3643  55'374 1           TS     SKEEP4          37 TO 40 INCRMTS SKEEP4 BY END RND CARRY
0407  REF   1                43,3644  0 3650 1           TC     CHKSUPR
0408  REF   1                43,3645  3 5001 0  17TO20    CA     SBIT15
0409  REF  10  LAST 1402      43,3646  27'374 1           ADS    SKEEP4          SET FOR BANK 20
0410  REF   1                43,3647  0 3664 0           TC     GONXTBNK
0411  REF   8  LAST 1401      43,3650  7 4364 0  CHKSUPR  MASK   HI5
0412                         43,3651  0 0006 1           EXTEND
0413  REF   1                43,3652  1 3662 1           BZF    NXTSUPR         INCREMENT SUPER BANK
0414  REF   1                43,3653  6 3242 0  27TO30   AD     S13BITS
0415                         43,3654  0 0006 1           EXTEND
0416                         43,3655  1 3657 1           BZF    +2              BANK SET FOR 30
0417  REF   2  LAST 1402      43,3656  0 3664 0           TC     GONXTBNK
0418  REF   1                43,3657  3 3240 1           CA     SIXTY           FIRST SUPER BANK
0419  REF  11  LAST 1402      43,3660  27'374 1           ADS    SKEEP4
0420  REF   3  LAST 1402      43,3661  0 3664 0           TC     GONXTBNK
0421  REF   1                43,3662  6 3241 0  NXTSUPR  AD     SUPRCON         SET BNK 30 + INCR SUPR BNK AND CANCEL
0422  REF  12  LAST 1402      43,3663  27'374 1           ADS    SKEEP4          ERC BIT OF THE 37 TO 40 ADVANCE.
0423  REF  22  LAST 1402      43,3664  11'377 1  GONXTBNK CCS    SKEEP7
0424  REF   1                43,3665  0 3527 1           TC     COMMFX
0425  REF   8  LAST 1402      43,3666  3 5017 1           CA     S+1
0426  REF   1                43,3667  0 3545 0           TC     FXFX
0427  REF   1                43,3670  3 5011 1           CA     SBIT7           HAS TO BE LARGER THAN NO OF FXSW BANKS.
0428  REF   2  LAST 1402      43,3671  0 3527 1           TC     COMMFX

0429  REF  13  LAST 1402      43,3672  3 1374 0  SOPTION  CA     SKEEP4
0430  REF   9  LAST 1402      43,3673  7 4364 0           MASK   HI5             = BANK BITS
0431  REF   5  LAST  355      43,3674  0 4345 1           TC     LEFT5
```

```
0432   REF 179  LAST 1401   43,3675   54 001 1          TS      L          BANK NUMBER BEFORE SUPER BANK
0433   REF  14  LAST 1402   43,3676   3 1374 0          CA      SKEEP4
0434   REF   1              43,3677   7 4373 0          MASK    S8BITS     = SUPER BANK BITS
0435                        43,3700   0 0006 1          EXTEND
0436   REF   1              43,3701   1 3707 0          BZF     SOPT       BEFORE SUPER BANK
0437   REF  32  LAST 1400   43,3702   54 021 0          TS      SR         SUPER BANK NECESSARY
0438   REF 180  LAST 1403   43,3703   3 0001 0          CA      L
0439   REF  19  LAST 1396   43,3704   7 5023 1          MASK    SEVEN
0440   REF  33  LAST 1403   43,3705   6 0021 1          AD      SR
0441   REF 181  LAST 1403   43,3706   54 001 1          TS      L          BANK NUMBER WITH SUPER BANK
0442   REF   6  LAST 1402   43,3707   3 1376 1  SOPT    CA      SKEEP6     *
0443                        43,3710   0 0006 1          EXTEND             *
0444                        43,3711   1 3713 0          BZF     +2         * ON -0 CONTINUE WITH ROPE CHECK.
0445   REF   1              43,3712   0 2773 0          TC      SDISPLAY   * ON +1 GO TO DISPLAY OF SUM.
0446   REF  18  LAST 1401   43,3713   11'371 1          CCS     SKEEP1     FORCE SUM TO ABSOLUTE VALUE.
04461                       43,3714   0 3716 1          TC      +2
04462                       43,3715   0 3717 0          TC      +2
04463  REF   9  LAST 1402   43,3716   6 5017 1          AD      S+1
04464  REF  19  LAST 1403   43,3717   55'371 1          TS      SKEEP1
0447   REF 182  LAST 1403   43,3720   4 0001 1  BNKCHK  CS      L          = - BANK NUMBER
0448   REF  20  LAST 1403   43,3721   6 1371 0          AD      SKEEP1
0449   REF   2  LAST 1402   43,3722   6 7716 0          AD      S-1
0450   REF   5  LAST 1400   43,3723   0 3275 1          TC      -1CHK      CHECK SUM
0451   REF   2  LAST  263   43,3724   0 3635 1          TC      NXTBNK

0454   REF  23  LAST 1402        0067                   EBANK=  NEWJOB
0455                        43,3725   66100 0  LSTBNKCH BBCON*             * CONSTANT, LAST BANK.

0456   REF  12  LAST  935   30,2000                     SBANK=  LOWSUPER
```

L PHASE TABLE MAINTENANCE USER'S PAGE NO. 1 EO S?

```
P0001           SUBROUTINE TO UPDATE THE PROGRAM NUMBER DISPLAY ON THE DSKY.

0002   REF   2 LAST  221 TO  222:    20    20*          COUNT  02/PHASE

0003                            5354                    BLOCK  02
0004   REF   2  LAST  221      4000                    SETLOC FFTAG1
0005                            5354                    BANK

0006   REF 310  LAST 1401       5354  50 002 0  NEWMODEX INDEX  Q             UPDATE MODREG. ENTRY FOR MODE IN FIXED.
0007                            5355  3 0000 1          CAF    0
0008   REF 311  LAST 1404       5356  24 002 0          INCR   Q

0009   REF  15  LAST 1324       5357  55'011 1  NEWMODEA TS     MODREG        ENTRY FOR MODE IN A.
0014                            5360  3 5363 1  MMDSPLAY CAF    +3            DISPLAY MAJOR MODE.
0015   REF  31  LAST 1317       5361  22 006 1  PREBJUMP LXCH   BBANK         PUTS BBANK IN L
0016   REF   8  LAST 1330       5362  1 4704 1          TCF    BANKJUMP      PUTS Q INTO A
0017   REF   1                  5363   20440 0          CADR   SETUPDSP

R0018           RETURN TO CALLER +3 IF MODE = THAT AT CALLER +1. OTHERWISE RETURN TO CALLER +2.

0020   REF 312  LAST 1404       5364  50 002 0  CHECKMM  INDEX  Q
0021                            5365  4 0000 0          CS     0
0022   REF  16  LAST 1404       5366  6 1011 0          AD     MODREG
0023                            5367  0 0006 1          EXTEND
0024   REF   2  LAST 1210       5370  1 6710 0          BZF    Q+2
0025   REF   3  LAST  250       5371  1 6706 1          TCF    Q+1           NO MATCH

0026   REF   3  LAST 1404       6711             TCQ     =      Q+2 +1

0027                          14,3761                   BANK   14
0028   REF   1                10,2000                   SETLOC PHASETAB
0029                          10,2440                   BANK

0030   REF   1                                          COUNT  10/PHASE

0031                          10,2440  0 0004 0 SETUPDSP INHINT
0032   REF  25  LAST  828     10,2441  52 071 0          DXCH   RUPTREG1       SAVE CALLER-S RETURN 2CADR
0033   REF  14  LAST 1204     10,2442  3 4371 0          CAF    PRIO30           EITHER A TASK OR JOB CAN COME TO
0034   REF  31  LAST 1225     10,2443  0 5134 1          TC     NOVAC            NEWMODEX
0035   REF  17  LAST 1404        1011                   EBANK= MODREG
0036   REF   1                10,2444   03441 0         2CADR  DSPMMJOB
0036   REF   1                10,2445   60102 1
0037   REF  26  LAST 1404     10,2446  52 071 0          DXCH   RUPTREG1
0038                          10,2447  0 0003 1          RELINT
0039   REF  16  LAST  829     10,2450  52 006 0          DXCH   Z              RETURN

0040   REF   2  LAST  375     40,3441          DSPMMJOB EQUALS DSPMMJB


0041                            5372                    BLOCK  02
```

L PHASE TABLE MAINTENANCE

```
0042  REF  3  LAST 1404      4000          SETLOC FFTAG1
0043                         5372          BANK
```

P0044 PHASCHNG IS THE MAIN WAY OF MAKING PHASE CHANGES FOR RESTARTS. THERE ARE THREE FORMS OF PHASCHNG, KNOWN AS TYPE
R0046 A, TYPE B, AND TYPE C. THEY ARE ALL CALLED AS FOLLOWS, WHERE OCT XXXXX CONTAINS THE PHASE INFORMATION,

```
A0048                                   TC      PHASCHNG
A0049                                   OCT     XXXXX
```

R0050 TYPE A IS CONCERNED WITH FIXED PHASE CHANGES, THAT IS, PHASE INFORMATIONTHAT IS STORED PERMANENTLY. THESE
R0052 OPTIONS ARE, WHERE G STANDS FOR A GROUP AND .X FOR THE PHASE,

```
R0053                   G.0             INACTIVE, WILLNOT PERMIT A GROUP G RESTART
R0055                   G.1             WILL CAUSE THE LAST DISPLAY TO BE REACTIVATED. USED MAINLY IN MANNED FLIGHTS
R0057                   G.EVEN          A DOUBLE TABLE RESTART, CAN CAUSE ANY COMBINATION OF TWO JOBS, TASKS, AND/OR
R0059                                   LONGCALL TO BE RESTARTED.
R0060                   G.ODD NOT .1    A SINGLE TABLE RESTART, CAN CAUSE EITHER A JOB, TASK, OR LONGCALL RESTART
```

R0062 THIS INFORMATION IS PUT INTO THE OCTAL WORD AFTER TC PHASCHNG AS FOLLOWS

```
R0063                   TLO OOP PPP PPP GGG
```

R0065 WHERE EACH LETTER OR NUMBER STANDS FOR A BIT. THE G:S STAND FOR THE GROUP, OCTAL 1 - 7, THE P:S FOR THE PHASE,
R0067 OCTAL 0 - 127. O:S MUST BE 0. IF ONE WISHES TO HAVE THE TBASE OF GROUP G TO BE SET AT THIS TIME,
R0069 T IS SET TO 1, OTHERWISE IT IS SET TO 0. SIMIARLY IF ONE WISHES TO SET LONGBASE, THEN L IS SET TO 1, OTHERWISE
R0071 IT IS SET TO 0. SOME EXAMPLES,

```
A0072                                   TC      PHASCHNG        THIS WILL CAUSE GROUP 3 TOBE SET TO 0,
A0073                                   OCT     00003           MAKING GROUP 3 INACTIVE

A0074                                   TC      PHASCHNG        IF A RESTART OCCURS THIS WOULD CAUSE
A0075                                   OCT     00012           GROUP 2 TO RESTART THE LAST DISPLAY

A0076                                   TC      PHASCHNG        THIS SETS THE TBASE OF GROUP 4 AND IN
A0077                                   OCT     40064           CASE OF A RESTART WOULD START UP THE TWO
A0078                                                           THINGS LOCATED IN THE DOUBLE 4.6 RESTART
A0079                                                           LOCATION
A0080                                   TC      PHASCHNG        THIS SETS LONGBASE AND UPON A RESTART
A0081                                   OCT     20135           CAUSES 5.13 TO BE RESTARTED (SINCE
A0082                                                           LONGBASE WAS SET THIS SINGLE ENTRY
A0083                                                           SHOULD BE A LONGCALL)
A0084                                   TC      PHASCHNG        SINCE BOTH TBASE4 AND LONGBASE ARE SET,
A0085                                   OCT     60124           4.12 SHOULD CONTAIN BOTH A TASK AND A
A0086                                                           LONGCALL TO BE RESTARTED
```

R0087 TYPE C PHASCHNG CONTAINS THE VARIABLE TYPE OF PHASCHNG INFORMATION. INSTEAD OF THE INFORMATION BEING IN A
R0089 PERMANENT FORM, ONE STORES THE DESIRED RESTART INFORMATION IN A VARIABKE LOCATION. THE BITS ARE AS FOLLOWS,

```
R0091                   TLO IAD XXX CJW GGG
```

R0092 WHERE EACH LETTER OR NUMBER STANDS FOR A BIT. THE G:S STAND FOR THE GROUP, OCTAL 1 - 7. IF THE RESTART IS TO
R0094 BE BY WAITLIST, W IS SET TO 1, IF IT IS A JOB, J IS SET TO 1, IF IT IS A LONGCALL, C IS SET TO 1. ONLY ONE OF
R0096 THESE THREE BIT S MAY BE SET. X:S ARE IGNORED I MUST BE 1, AND O MUST BE 0. AGAIN T STANDS FOR THE TBASE,

R0098 AND L FOR LONGBASE. THE BITS A AND D ARE CONCERNED WITH THE VARIABLE INFORMATION. IF D IS SET TO 1, A PRIORITY
R0100 OR DELTA TIME WILL BE READ FROM THE NEXT LOCATION AFTER THE OCTAL INFORMATION, IF THIS IS TO BE INDIRECT, THAT
R0102 IS, THE NAME OF A LOCATION COMT+INING THE INFORMATION (DELTA TIME ONLY), THEN THIS IS GIVEN AS THE -GENADR OF
R0104 THAT LOCATION WHICH CONTAINS THE DELTA TIME. IF THE OLD PRIORITY OR DELTA TIME IS TO BE USED, THAT WHICH IS
R0106 ALREADY IN THE VARIABLE STORAGE, THEN D IS SET TO 0. NEXT THE A BIT IS USED. IF IT IS SET TO 0, THE ADDRESS
R0108 THAT WOULD BE RESTARTED DURING A RESTART IS THE NEXT LOCATION AFTER THE PHASE INFORMATION, THAT IS, EITHER
R0110 (TC PHASCHNG) +2 OR +3, DEPENDING ON WHETHER D HAD BEEN SET OR NOT. IF A IS SET TO 1, THEN THE ADDRESS THAT
R0112 WOULD BE RESTARTED IS THE 2CADR THAT IS READ FROM THE NEXT TWO LOCATIONS. EXAMPLES,

```
A0114                   AD      TC      PHASCHNG        THIS WOULD CAUSE LOCATION AD +3 TO BE
A0115                   AD+1    OCT     05023           RESTARTED BY GROUP THREE WITHA PRIORITY
A0116                   AD+2    OCT     23000           OF 23.  NOTE UPON RETURNING IT WOULD
A0117                   AD+3                            ALSO GO TO AD+3

A0118                   AD      TC      PHASCHNG        GROUP  1 WOULD CAUSE CAUSE CALLCALL TO
A0119                   AD+1    OCT     27441           BE STARTED AS A LONGCALL FROM THE TIME
A0120                   AD+2    -GENADR DELTIME         STORED IN LONGBASE (LONGBASE WAS SET) BY
A0121                   AD+3    2CADR   CALLCALL        A DELTATIME STORED IN DELTIME.  THE
A0122                   AD+4                            BBCON OF THE 2CADR SHOULD CONTAIN THE E
A0123                   AD+5                            BANK OF DELTIME. PHASCHNG RETURNS TO
A0124                                                   LOCATION AD+5
```

R0125 NOTE THAT IF A VARIABLE PRIORITY IS GIVEN FOR A JOB, THE JOB WILL BE RESTARTED AS A NOVAC IF THE PRIORITY IS
R0127 NEGATIVE, AS A FINDVAC IF THE PRIORITY IS POSITIVE.

R0128 TYPE B PHASCHNG IS A COMBINATION OF VARIABLE AND FIXED PHASE CHANGES. IT WILL START UP A JOB AS INDICATED
R0130 BELOW AND ALSO START UP ONE FIXED RESTART, THAT IS EITHER AN G.1 OR A G.ODD OR THE FIRST ENTRY OF G.EVEN
R0132 DOUBLE ENTRY. THE BIT INFORMATION IS AS FOLLOWS,

R0133 TL1 DAP PPP PPP GGG

R0134 WHERE EACH LETTER OR NUMBER STANDS FOR A BIT. THE G:S STAND FOR THE GROUP, OCTAL 1 - 7. THE P:S FOR THE FIXED
R0136 PHASE INFORMATION, OCTAL 0 - 127. I MUST BE 1. AND AGAIN T STANDS FOR THE TBASE AND L FOR LONGBASE. D THIS
R0138 TIME STANDS ONLY FOR PRIORITY SINCE THIS WILL BE CONSIDERED A JOB, AND IT MUST BE GIVEN DIRECTLY IF GIVEN.
R0140 AGAIN A STANDS FOR THE ADDRESS OF THE LOCATION TO BE RESTARTED, 1 IF THE 2CADR IS GIVEN , OR 0 IF IT IS TO BE
R0142 THE NEXT LOCATION.(THE RETURN LOCATION OF PHASCHNG) EXAMPLES,

```
A0143                   AD      TC      PHASCHNG        TBASE IS SET AND ARESTART CAUSE GROUP 3
A0144                   AD+1    OCT     56043           TO START THE JOB AJOBAJOB WITH PRIORITY
A0145                   AD+2    OCT     31000           31 AND THE FIRST ENTRY OF 3.4SPOT(WE CAN
A0146                   AD+3    2CADR   AJOBAJOB        ASSUME IT IS A TASK SINCE WE SET TBASE3)
A0147                   AD+4                            UPON RETURN FROM PHASCHNG CONTROL WOULD
A0148                   AD+5                            GO TO AD+5

A0149                   AD      TC      PHASCHNG        UPON A RESTART THE LAST DISPLAY WOULD BE
A0150                   AD+1    OCT     10015           RESTARTED AND A JOB WITH THE PREVIOUSLY
A0151                   AD+2                            STORED PRIORITY WOULD BE BEGUN AT AD+2
A0152                                                   BY MEANS OF GROUP 5
```

R0153 THE NOVAC-FINDVAC CHOICE FOR JOBS HOLDS HERE ALSO - NEGATIVE PRIORITY CAUSES A NOVAC CALL, POSITIVE A FINDVAC.

R0155 SUMMARY OF BITS

R0156 TYPE A TL0 00P PPP PPP GGG

R0157 TYPE B TL1 DAP PPP PPP GGG

R0158 TYPE C TL0 1AD XXX CJW GGG

L PHASE TABLE MAINTENANCE USER'S PAGE NO. 6 E0 S3

P0159 2PHSCHNG IS USED WHEN ONE WISHES TO START UP A GROUP OR CHANGE A GROUP WHILE UNDER THE CONTROL OF A DIFFERENT
R0161 GROUP. FOR EXAMPLE, CHANGE THE PHASE OF GROUP 3 WHILE THE PORTION OF THE PROGRAM IS UNDER GROUP 5. ALL 2PHSCHNG
R0163 CALLS ARE MADE IN THE FOLLOWING MANNER,

```
A0164                                   TC      2PHSCHNG
A0165                                   OCT     XXXXX
A0166                                   OCT     YYYYY
```

R0167 WHERE OCT XXXXX MUST BE OF TYPE A AND OCT YYYYY MAY BE OF EITHER TYPE A OR TYPE B OR TYPEC. THERE IS ONE
R0169 DIFFERENCE --- NOTE- IF LONGBASE IS TO BE SET THIS INFORMATION IS GIVEN IN THE OCT YYYYY INFORMATION, IT WILL
R0171 BE DISREGARDED IF GIVEN WITH THE OCT XXXXX INFORMATION. A COUPLE OF EXAMPLES MAY HELP,

```
A0173                           AD      TC      2PHSCHNG        SET TBASE3 AND IF A RESTART OCCURS START
A0174                           AD+1    OCT     40083           THE TWO ENTRIES IN 3.8 TABLE LOCATION
A0175                           AD+2    OCT     05025           THIS IS OF TYPE C, SET THE JOB TO BE
A0176                           AD+3    OCT     18000           TO BE LOCATION AD+4, WITH A PRIORITY 18,
A0177                           AD+4                            FOR GROUP 5 PHASE INFORMATION

 0178  REF   3 LAST 1404 TO 1404:    14    34*             COUNT   02/PHASE

 0179                           5372  0 0004 0  2PHSCHNG INHINT
 0180  REF 313  LAST 1404       5373  50 002 0          NDX     Q
 0181                           5374  3 0000 1          CA      0
 0182  REF 314  LAST 1409       5375  24 002 0          INCR    Q
 0183  REF   1                  5376  54 072 0          TS      TEMPP2

 0184  REF   1                  5377  7 5023 1          MASK    OCT7
 0185                           5400  6 0000 1          DOUBLE
 0186  REF   1                  5401  54 071 0          TS      TEMPG2

 0187  REF   2  LAST 1409       5402  3 0072 1          CA      TEMPP2
 0188  REF   1                  5403  7 5072 0          MASK    OCT17770        NEED ONLY 1770, BUT WHY GET A NEW CONST.
 0189                           5404  0 0006 1          EXTEND
 0190  REF  34  LAST 1395       5405  7 5004 1          MP      BIT12
 0191  REF   3  LAST 1409       5406  56 072 1          XCH     TEMPP2

 0192  REF  50  LAST 1395       5407  7 5001 1          MASK    BIT15
 0193  REF   1                  5410  54 066 0          TS      TEMPSW2         INDICATES WHETHER TO SET TBASE OR NOT

 0194  REF 102  LAST 1349       5411  1 5415 0          TCF     PHASCHNG +3


 0195                           5412  0 0004 0  PHASCHNG INHINT
 0196  REF 159  LAST 1370       5413  3 5017 1          CA      ONE             INDICATESWE CAME FROM A PHASCHNG ENTRY
 0197  REF   2  LAST 1409       5414  54 066 0          TS      TEMPSW2

 0198  REF 315  LAST 1409       5415  50 002 0          NDX     Q
 0199                           5416  3 0000 1          CA      0
 0200  REF 316  LAST 1409       5417  24 002 0          INCR    Q
 0201  REF   1                  5420  54 065 0          TS      TEMPSW
```

L PHASE TABLE MAINTENANCE

```
0202                                5421  0 0006 1            EXTEND
0203  REF   1                      5422  3 5425 1            DCA     ADRPCHN2        OFF TO SWITCHED BANK
0204                                5423  52 006 0            DTCB

0205  REF  47  LAST 1396  E3,1400                            EBANK=  LST1
0206  REF   1                      5424   02451 0  ADRPCHN2 2CADR   PHSCHNG2
0206  REF   1                      5425   20063 0

0207  REF   1                      5426  22 073 0  ONEORTWO LXCH    TEMPBBCN
0208  REF  32  LAST 1404           5427  22 006 1            LXCH    BBANK
0209  REF   2  LAST 1410           5430  22 073 0            LXCH    TEMPBBCN

0210  REF   1                      5431  7 5066 0            MASK    OCT14000        SEE WHAT KIND OF PHASE CHANGE IT IS
0211  REF 347  LAST 1401           5432  10 000 0            CCS     A
0212  REF   1                      5433  1 5474 1            TCF     CHECKB          IT IS OF TYPE :B:

0213  REF   1                      5434  3 0062 0            CA      TEMPP
0214  REF  46  LAST 1395           5435  7 5011 0            MASK    BIT7
0215  REF 348  LAST 1410           5436  10 000 0            CCS     A               SHALL WE USE THE OLD PRIORITY
0216  REF   1                      5437  1 5461 0            TCF     GETPRIO         NO GET A NEW PRIORITY (OR DELTA T)

0217  REF   4  LAST  221           5440  50 061 0  OLDPRIO   NDX     TEMPG           USE THE OLD PRIORITY (OR DELTA T)
0218  REF   1                      5441  3 1052 1            CA      PHSPRDT1 -2
0219  REF   1                      5442  54 070 1            TS      TEMPPR

0220  REF   2  LAST 1410           5443  3 0062 0  CON1      CA      TEMPP           SEE IF A 2CADR IS GIVEN
0221  REF  27  LAST 1395           5444  7 5010 1            MASK    BIT8
0222  REF 349  LAST 1410           5445  10 000 0            CCS     A
0223  REF   1                      5446  1 5465 1            TCF     GETNEWNM

0224  REF 317  LAST 1409           5447  3 0002 0            CA      Q
0225  REF   1                      5450  54 063 0            TS      TEMPNM
0226  REF   1                      5451  3 0006 1            CA      BB
0227                                5452  0 0006 1            EXTEND                  PICK UP USERS SUPERBANK
0228  REF  23  LAST 1232           5453  04 007 1            ROR     SUPERBNK
0229  REF   1                      5454  54 064 1            TS      TEMPBB

0230  REF   1                      5455  3 5460 0  TOCON2    CA      CON2ADR         BACK TO SWITCHED BANK
0231  REF   3  LAST 1410           5456  22 073 0            LXCH    TEMPBBCN
0232                                5457  52 006 0            DTCB

0233  REF   1                      5460   02537 1  CON2ADR   GENADR CON2

0234  REF 318  LAST 1410           5461  50 002 0  GETPRIO   NDX     Q               DON:T CARE IF DIRECT OR INDIRECT
0235                                5462  3 0000 1            CA      0               LEAVE THAT DECISION TO RESTARTS
0236  REF 319  LAST 1410           5463  24 002 0            INCR    Q               OBTAIN RETURN ADDRESS
0237  REF   1                      5464  1 5442 1            TCF     CON1 -1

0238                                5465  0 0006 1  GETNEWNM EXTEND
```

L PHASE TABLE MAINTENANCE USER'S PAGE NO. 8 EO S3

```
0239   REF 320  LAST 1410      5466  5 0002 0                INDEX  Q
0240                           5467  3 0001 0                DCA    0
0241   REF   2  LAST 1410      5470  52 064 1                DXCH   TEMPNM
0242   REF  70  LAST 1326      5471  3 5016 0                CA     TWO
0243   REF 321  LAST 1411      5472  26 002 1                ADS    Q       OBTAIN RETURN ADDRESS

0244   REF   1                 5473  1 5455 1                TCF    TOCON2

0245   REF   6  LAST  708      5066                  OCT14000 EQUALS PRIO14
0246   REF  20  LAST 1367      0061                  TEMPG    EQUALS ITEMP1
0247   REF  25  LAST 1367      0062                  TEMPP    EQUALS ITEMP2
0248   REF   4  LAST   68      0063                  TEMPNM   EQUALS ITEMP3
0249   REF   3  LAST   68      0064                  TEMPBB   EQUALS ITEMP4
0250   REF   2  LAST   68      0065                  TEMPSW   EQUALS ITEMP5
0251   REF   3  LAST  158      0066                  TEMPSW2  EQUALS ITEMP6
0252   REF  27  LAST 1404      0070                  TEMPPP   EQUALS RUPTREG1
0253   REF   6  LAST  149      0071                  TEMPG2   EQUALS RUPTREG2
0254   REF   5  LAST 1105      0072                  TEMPP2   EQUALS RUPTREG3

0255   REF   5  LAST 1105      0073                  TEMPBBCN EQUALS RUPTREG4
0256   REF  33  LAST 1410      0006                  BB       EQUALS BBANK


0257                          14,3761                 BANK   14
0258   REF   2  LAST 1404      10,2000                 SETLOC PHASETAB
0259                           10,2451                 BANK

0260   REF   3  LAST  204      E3,1436                 EBANK= PHSNAME1
0261   REF   2 LAST 1404 TO 1409:     9      9*       COUNT  10/PHASE

0262   REF   4  LAST 1410      10,2451  22 073 0  PHSCHNG2 LXCH   TEMPBBCN
0263   REF   2  LAST 1409      10,2452  3 0065 1           CA     TEMPSW
0264   REF   2  LAST 1409      10,2453  7 5023 1           MASK   OCT7
0265                           10,2454  6 0000 1           DOUBLE
0266   REF   5  LAST 1410      10,2455  54 061 1           TS     TEMPG

0267   REF   3  LAST 1411      10,2456  3 0065 1           CA     TEMPSW
0268   REF   2  LAST 1409      10,2457  7 5072 0           MASK   OCT17770
0269                           10,2460  0 0006 1           EXTEND
0270   REF  35  LAST 1409      10,2461  7 5004 1           MP     BIT12
0271   REF   3  LAST 1410      10,2462  54 062 1           TS     TEMPP

0272   REF   4  LAST 1411      10,2463  3 0065 1           CA     TEMPSW
0273   REF  15  LAST  946      10,2464  7 4105 0           MASK   OCT60000
0274   REF   5  LAST 1411      10,2465  56 065 1           XCH    TEMPSW
0275   REF   2  LAST 1410      10,2466  7 5066 0           MASK   OCT14000
0276   REF 350  LAST 1410      10,2467  10 000 0           CCS    A

0277   REF   1                 10,2470  1 5426 0           TCF    ONEORTWO
```

L PHASE TABLE MAINTENANCE USER'S PAGE NO. 9 E3 S3

```
0278   REF   4  LAST 1411   10,2471  3 0062 0           CA     TEMPP          START STORING THE PHASE INFORMATION
0279   REF   6  LAST 1411   10,2472  50 061 0           NDX    TEMPG
0280   REF   3  LAST  204   10,2473  54 751 0           TS     PHASE1 -2

0281   REF   3  LAST 1409   10,2474  10 066 0 BELOW1    CCS    TEMPSW2        IS IT A PHASCHNG OR A 2PHSCHNG
0282   REF   1               10,2475  1 2511 1           TCF    BELOW2         IT:S A PHASCHNG

0283                         10,2476  1 2477 0           TCF    +1             IT:S A 2PHSCHNG
0284   REF   4  LAST 1409   10,2477  4 0072 0           CS     TEMPP2
0285   REF   5  LAST 1412   10,2500  22 072 1           LXCH   TEMPP2
0286   REF   2  LAST 1409   10,2501  50 071 1           NDX    TEMPG2
0287   REF   5  LAST  221   10,2502  52 751 0           DXCH   -PHASE1 -2

0288   REF   4  LAST 1412   10,2503  10 066 0           CCS    TEMPSW2
0289                         10,2504  12 505 1           NOOP           CAN:T GET HERE
0290   REF   2  LAST 1412   10,2505  1 2511 1           TCF    BELOW2

0291   REF  19  LAST 1101   10,2506  4 0025 1           CS     TIME1
0292   REF   3  LAST 1412   10,2507  50 071 1           NDX    TEMPG2
0293   REF   4  LAST  392   10,2510  55'051 0           TS     TBASE1 -2

0294   REF   6  LAST 1411   10,2511  10 065 0 BELOW2    CCS    TEMPSW         SEE IF WE SHOULD SET TBASE OR LONGBASE
0295   REF   1               10,2512  1 2525 0           TCF    BELOW3         SET LONGBASE ONLY
0296   REF   1               10,2513  1 2530 1           TCF    BELOW4         SET NEITHER

0297   REF  20  LAST 1412   10,2514  4 0025 1           CS     TIME1          SET TBASE TO BEGIN WITH
0298   REF   7  LAST 1412   10,2515  50 061 0           NDX    TEMPG
0299   REF   5  LAST 1412   10,2516  55'051 0           TS     TBASE1 -2

0300   REF   7  LAST 1412   10,2517  3 0065 1           CA     TEMPSW          SHALL WE NOW SET LONGBASE
0301   REF   1               10,2520  6 2523 1           AD     BIT14COM
0302   REF 351  LAST 1411   10,2521  10 000 0           CCS    A
0303                         10,2522  12 523 0           NOOP           ***** CANT GET HERE *****
0304                         10,2523   17777 0 BIT14COM  OCT    17777          ***** CANT GET HERE *****
0305   REF   2  LAST 1412   10,2524  1 2530 1           TCF    BELOW4         NO WE NEED ONLY SET TBASE

0306                         10,2525  0 0006 1 BELOW3    EXTEND         SET LONGBASE
0307   REF  29  LAST 1330   10,2526  3 0025 0           DCA    TIME2
0308   REF   1               10,2527  53'136 0           DXCH   LONGBASE

0309   REF   5  LAST 1412   10,2530  4 0062 1 BELOW4    CS     TEMPP          AND STORE THE FINAL PART OF THE PHASE
0310   REF   8  LAST 1412   10,2531  50 061 0           NDX    TEMPG
0311   REF   6  LAST 1412   10,2532  54 750 1           TS     -PHASE1 -2

0312   REF 322  LAST 1411   10,2533  3 0002 0           CA     Q
0313   REF   5  LAST 1411   10,2534  22 073 0           LXCH   TEMPBBCN
0314                         10,2535  0 0003 1           RELINT
0315                         10,2536  52 006 0           DTCB
0316   REF   6  LAST 1412   10,2537  22 073 0 CON2      LXCH   TEMPBBCN
```

L PHASE TABLE MAINTENANCE

```
0317   REF   6  LAST 1412    10,2540  3 0062 0          CA      TEMPP
0318   REF   9  LAST 1412    10,2541  50 061 0          NDX     TEMPG
0319   REF   4  LAST 1412    10,2542  54 751 0          TS      PHASE1 -2

0320   REF   2  LAST 1410    10,2543  3 0070 0          CA      TEMPPR
0321   REF  10  LAST 1413    10,2544  50 061 0          NDX     TEMPG
0322   REF   2  LAST 1410    10,2545  55'052 0          TS      PHSPRDT1 -2

0323                         10,2546  0 0006 1          EXTEND
0324   REF   3  LAST 1411    10,2547  3 0064 0          DCA     TEMPNM
0325   REF  11  LAST 1413    10,2550  50 061 0          NDX     TEMPG
0326   REF   4  LAST 1411    10,2551  53'435 0          DXCH    PHSNAME1 -2

0327   REF   1               10,2552  1 2474 0          TCF     BELOW1

0328                            5474                    BLOCK   02
0329   REF   4  LAST 1405      4000                    SETLOC  FFTAG1
0330                            5474                    BANK

0331   REF   4 LAST 1409 TO 1411:    66   100*          COUNT   02/PHASE

0332   REF  36  LAST 1411      5474  7 5004 1  CHECKB    MASK    BIT12     SINCE THIS IS OF TYPE B, THIS BIT SHOULD
0333   REF 352  LAST 1412      5475  10 000 0           CCS     A          BE HERE IF WE ARE TO GET A NEW PRIORITY
0334   REF   2  LAST 1410      5476  1 5461 0           TCF     GETPRIO   IT IS. SO GET NEW PRIORITY
0335   REF   1                 5477  1 5440 0           TCF     OLDPRIO   IT ISN:T, USE THE OLD PRIORITY
```

L RESTARTS ROUTINE USER'S PAGE NO. 1 EO S3

```
0001                          01,3520                    BANK    01
0002  REF   2  LAST  212      01,2000                    SETLOC  RESTART
0003                          01,3520                    BANK

0004  REF   5  LAST 1413      E3,1436                    EBANK=  PHSNAME1      GOPROG MUST SWITCH TO THIS EBANK

0005  REF   1                                            COUNT   01/RSROU

0006  REF 667  LAST 1370      01,3520  3 0161 1 RESTARTS CA      MPAC +5      GET GROUP NUMBER -1
0007                          01,3521  6 0000 1          DOUBLE                SAVE FOR INDEXING
0008  REF   1                 01,3522  54 155 1          TS      TEMP2G

0009  REF   1                 01,3523  3 3762 1          CA      PHS2CADR     SET UP EXIT IN CASE IT IS AN EVEN
0010  REF   1                 01,3524  54 157 0          TS      TEMPSWCH     TABLE PHASE

0011  REF   1                 01,3525  3 3557 0          CA      RTRNCADR     TO SAVE TIME ASSUME IT WILL GET NEXT
0012  REF   1                 01,3526  54 707 0          TS      GOLOC +2     GROUP AFTER THIS

0013  REF   1                 01,3527  3 0154 1          CA      TEMPPHS
0014  REF  10  LAST 1396      01,3530  7 5051 1          MASK    OCT1400
0015  REF 353  LAST 1413      01,3531  10 000 0          CCS     A            IS IT A VARIABLE OR TABLE RESTART
0016  REF   1                 01,3532  1 3543 1          TCF     ITSAVAR      IT:S A VARIABLE RESTART

0017  REF   2  LAST 1414      01,3533  10 154 0 GETPART2 CCS     TEMPPHS      IS IT AN X.1 RESTART
0018  REF 354  LAST 1414      01,3534  10 000 0          CCS     A
0019  REF   1                 01,3535  1 3643 1          TCF     ITSATBL      NO, ITS A TABLE RESTART

0020  REF   7  LAST 1411      01,3536  3 5066 1          CA      PRIO14       IT IS AN X.1 RESTART, THEREFORE START
0021  REF  30  LAST 1313      01,3537  0 5147 0          TC      FINDVAC      THE DISPLAY RESTART JOB
0022  REF  48  LAST 1410      E3,1400                    EBANK=  LST1
0023  REF   1                 01,3540   03261 1          2CADR   INITDSP
0023  REF   1                 01,3541   20063 0

0024  REF   2  LAST 1414      01,3542  0 3557 0          TC      RTRNCADR     FINISHED WITH THIS GROUP, GET NEXT ONE

0025  REF  11  LAST 1414      01,3543  7 5051 1 ITSAVAR  MASK    OCT1400      IS IT TYPE B ?
0026  REF 355  LAST 1414      01,3544  10 000 0          CCS     A
0027  REF   1                 01,3545  1 3614 0          TCF     ITSLIKEB     YES,IT IS TYPE B

0028                          01,3546  0 0006 1          EXTEND                STORE THE JOB (OR TASK) 2CADR FOR EXIT
0029  REF   2  LAST 1414      01,3547  5 0155 0          NDX     TEMP2G
0030  REF   6  LAST 1414      01,3550  3 1437 0          DCA     PHSNAME1
0031  REF   2  LAST 1414      01,3551  52 706 1          DXCH    GOLOC

0032  REF   3  LAST 1414      01,3552  3 0154 1          CA      TEMPPHS      SEE IF THIS IS A JOB, TASK, OR A LONGCAL
0033  REF   3  LAST 1411      01,3553  7 5023 1          MASK    OCT7
0034  REF   3  LAST 1258      01,3554  6 7715 0          AD      MINUS2
0035  REF 356  LAST 1414      01,3555  10 000 0          CCS     A
0036  REF   1                 01,3556  1 3726 0          TCF     ITSLNGCL     ITS A LONGCALL
```

L RESTARTS ROUTINE USER'S PAGE NO. 2 E3 S3

```
0037   REF   7  LAST  301    01,3557  0 4675 1  RTRNCADR TC     SWRETURN        CANT GET HERE
0038   REF   1               01,3560  1 3562 1           TCF    ITSAWAIT
0039   REF   1               01,3561  1 3627 0           TCF    ITSAJOB         ITS A JOB
0040   REF   1               01,3562  3 3766 0  ITSAWAIT CA     WTLTCADR        SET UP WAITLIST CALL
0041   REF   3  LAST 1414    01,3563  54 704 0           TS     GOLOC -1
0042   REF   3  LAST 1414    01,3564  50 155 0           NDX    TEMP2G          DIRECTLY STORED
0043   REF   3  LAST 1413    01,3565  3 1054 1           CA     PHSPRDT1
0044   REF 357  LAST 1414    01,3566  10 000 0  TIMETEST CCS    A               IS IT AN IMMEDIATE RESTART
0045   REF 358  LAST 1415    01,3567  24 000 1           INCR   A               NO.
0046   REF   1               01,3570  1 3573 1           TCF    FINDTIME        FIND OUT WHEN IT SHOULD BEGIN
0047   REF   1               01,3571  1 5500 0           TCF    ITSINDIR        STORED INDIRECTLY
0048   REF   1               01,3572  1 3612 0           TCF    IMEDIATE        IT WANTS AN IMMEDIATE RESTART

R0049  ***** THIS MUST BE IN FIXED FIXED *****

0050                          5500                      BLOCK  02
0051   REF   2  LAST  632     4000                      SETLOC FFTAG2
0052                          5500                      BANK
0053   REF   1                                          COUNT  02/RSROU
0054   REF   4  LAST 1415     5500  22 706 0  ITSINDIR LXCH   GOLOC +1        GET THE CORRECT E BANK IN CASE THIS IS
0055   REF   2  LAST 1410     5501  22 006 1           LXCH   BB              SWITCHED ERRASIBLE
0056   REF 359  LAST 1415     5502  50 000 1           NDX    A               GET THE TIME INDIRECTLY
0057                          5503  3 0001 0           CA     1
0058   REF   3  LAST 1415     5504  22 006 1           LXCH   BB              RESTORE THE BB AND GOLOC
0059   REF   5  LAST 1415     5505  22 706 0           LXCH   GOLOC +1
0060   REF   2  LAST 1415     5506  1 3573 1           TCF    FINDTIME        FIND OUT WHEN IT SHOULD BEGIN

R0061  ***** YOU  MAY RETURN TO  SWITCHED FIXED *****

0062                    01,3573                         BANK   01
0063   REF   3  LAST 1414 01,2000                      SETLOC RESTART
0064                    01,3573                         BANK

0065   REF   2 LAST 1414 TO 1415:    43    43*         COUNT  01/RSROU

0066                    01,3573  4 0000 0  FINDTIME COM                      MAKE NEGITIVE SINCE IT WILL BE SUBTRACTD
0067   REF 183  LAST 1403 01,3574  54 001 1           TS     L               AND SAVE
0068   REF   4  LAST 1415 01,3575  50 155 0           NDX    TEMP2G
0069   REF   6  LAST 1412 01,3576  4 1053 1           CS     TBASE1
0070                    01,3577  0 0006 1           EXTEND
```

```
0071   REF  21  LAST 1412   01,3600  60 025 0          SU      TIME1
0072   REF 360  LAST 1415   01,3601  10 000 0          CCS     A
0073                        01,3602  4 0000 0          COM
0074   REF   4  LAST  959   01,3603  6 7700 1          AD      OCT37776
0075   REF 160  LAST 1409   01,3604  6 5017 1          AD      ONE
0076   REF 184  LAST 1415   01,3605  6 0001 0          AD      L
0077   REF 361  LAST 1416   01,3606  10 000 0          CCS     A
0078   REF 262  LAST 1395   01,3607  3 5021 1          CA      ZERO
0079                        01,3610  1 3612 0          TCF     +2
0080                        01,3611  1 3612 0          TCF     +1
0081   REF 161  LAST 1416   01,3612  6 5017 1 IMEDIATE AD      ONE
0082   REF   6  LAST 1415   01,3613  0 0704 1          TC      GOLOC -1
0083   REF   3  LAST 1414   01,3614  3 3557 0 ITSLIKEB CA      RTRNCADR      TYPE B,                SO STORE RETURN IN
0084   REF   2  LAST 1414   01,3615  54 157 0          TS      TEMPSWCH      TEMPSWCH IN CASE OF AN EVEN PHASE

0085   REF   1              01,3616  3 3763 0          CA      PRT2CADR      SET UP EXIT TO GET TABLE PART OF THIS
0086   REF   7  LAST 1416   01,3617  54 707 0          TS      GOLOC +2      VARIABLE TYPE OF PHASE

0087   REF   4  LAST 1414   01,3620  3 0154 1          CA      TEMPPHS       MAKE THE PHASE LOOK RIGHT FOR THE TABLE
0088   REF   1              01,3621  7 6043 1          MASK    OCT177        PART OF THIS VARIABLE PHASE
0089   REF   5  LAST 1416   01,3622  54 154 0          TS      TEMPPHS

0090                        01,3623  0 0006 1          EXTEND
0091   REF   5  LAST 1415   01,3624  5 0155 0          NDX     TEMP2G        OBTAIN THE JOB:S 2CADR
0092   REF   7  LAST 1414   01,3625  3 1437 0          DCA     PHSNAME1
0093   REF   8  LAST 1416   01,3626  52 706 1          DXCH    GOLOC

0094   REF   6  LAST 1416   01,3627  50 155 0 ITSAJOB  NDX     TEMP2G        NOW ADD THE PRIORITY AND LET:S GO
0095   REF   4  LAST 1415   01,3630  3 1054 1          CA      PHSPRDT1
0096   REF   9  LAST 1416   01,3631  54 704 0 CHKNOVAC TS      GOLOC -1      SAVE PRIO UNTIL WE SEE IF ITS
0097                        01,3632  0 0006 1          EXTEND                A FINDVAC OR A NOVAC
0098   REF   1              01,3633  6 3637 0          BZMF    ITSNOVAC

0099   REF   1              01,3634  3 3765 0          CAF     FVACCADR      POSITIVE, SET UP FINDVAC CALL.
0100   REF  10  LAST 1416   01,3635  56 704 1          XCH     GOLOC -1      PICK UP PRIO,
0101   REF  11  LAST 1416   01,3636  0 0704 1          TC      GOLOC -1      AND GO

0102   REF   1              01,3637  3 3767 1 ITSNOVAC CAF     NOVACADR      NEGATIVE,
0103   REF  12  LAST 1416   01,3640  56 704 1          XCH     GOLOC -1      SET UP NOVAC CALL,
0104                        01,3641  4 0000 0          COM                   CORRECT PRIO,
0105   REF  13  LAST 1416   01,3642  0 0704 1          TC      GOLOC -1      AND GO

0106   REF  45  LAST 1400   01,3643  54 020 1 ITSATBL  TS      CYR           FIND OUT IF THE PHASE IS ODD OR EVEN
0107   REF  46  LAST 1416   01,3644  10 020 1          CCS     CYR
0108                        01,3645  1 3646 1          TCF     +1            IT:S EVEN
0109   REF   1              01,3646  1 3744 1          TCF     ITSEVEN

0110   REF   4  LAST 1416   01,3647  3 3557 0          CA      RTRNCADR      IN CASE THIS IS THE SECOND PART OF A
0111   REF  14  LAST 1416   01,3650  54 707 0          TS      GOLOC +2      TYPE B RESTART, WE NEED PROPER EXIT
```

L RESTARTS ROUTINE USER'S PAGE NO. 4 E3 S3

```
0112   REF   6  LAST 1416   01,3651  3 0154 1          CA     TEMPPHS      SET UP POINTER FOR FINDING OUR PLACE IN
0113   REF  34  LAST 1403   01,3652  54 021 0          TS     SR           THE RESTART TABLES
0114   REF  35  LAST 1417   01,3653  6 0021 1          AD     SR
0115   REF   7  LAST 1416   01,3654  50 155 0          NDX    TEMP2G
0116   REF   1              01,3655  6 2001 1          AD     SIZETAB +1
0117   REF   1              01,3656  54 156 1          TS     POINTER

0118                        01,3657  0 0006 1  CONTBL2  EXTEND               FIND OUT WHAT:S IN THE TABLE
0119   REF   2  LAST 1417   01,3660  5 0156 0          NDX    POINTER
0120   REF   1              01,3661  3 2002 1          DCA    CADRTAB      GET THE 2CADR

0121   REF  15  LAST 1416   01,3662  22 706 0          LXCH   GOLOC +1     STORE THE BB INFORMATION

0122   REF 362  LAST 1416   01,3663  10 000 0          CCS    A            IS IT A JOB OR IS IT  TIMED
0123   REF 363  LAST 1417   01,3664  24 000 1          INCR   A            POSITIVE, MUST BE A JOB
0124   REF   1              01,3665  1 3740 0          TCF    ITSAJOB2

0125   REF 364  LAST 1417   01,3666  24 000 1          INCR   A            MUST BE EITHER A WAITLIST OR LONGCALL
0126   REF  16  LAST 1417   01,3667  54 705 1          TS     GOLOC        LET-S STORE THE CORRECT CADR

0127   REF   2  LAST 1415   01,3670  3 3766 0          CA     WTLTCADR     SET UP OUR EXIT TO WAITLIST
0128   REF  17  LAST 1417   01,3671  54 704 0          TS     GOLOC -1

0129   REF  18  LAST 1417   01,3672  3 0706 0          CA     GOLOC +1     NOW FIND OUT IF IT IS A WAITLIST CALL
0130   REF  38  LAST 1395   01,3673  7 5006 0          MASK   BIT10        THIS SHOULD BE ONE IF WE HAVE -BB
0131   REF 365  LAST 1417   01,3674  10 000 0          CCS    A            FOR THAT MATTER SO SHOULD BE BITS 9,8,7,
A0132                                                                     6,5, AND LAST BUT NOT LEAST (PERHAPS NOT
A0133                                                                     IN IMPORTANCE ANYWAY. BIT 4
0134   REF   1              01,3675  1 3733 1          TCF    ITSWTLST     IT IS A WAITLIST CALL

0135   REF   3  LAST 1417   01,3676  50 156 0          NDX    POINTER      OBTAIN THE ORIGINAL DELTA T
0136   REF   1              01,3677  3 2000 0          CA     PRDTTAB      ADDRESS FOR THIS LONGCALL

0137   REF   1              01,3700  1 5507 1          TCF    ITSLGCL1     NOW GO GET THE DELTA TIME

R0138  ***** THIS MUST BE IN FIXED FIXED *****

0139                          5507                    BLOCK  02
0140   REF   3  LAST 1415     4000                    SETLOC FFTAG2
0141                          5507                    BANK

0142   REF   2 LAST 1415 TO 1415:    7     7*         COUNT  02/RSROU

0143   REF  19  LAST 1417      5507  22 706 0  ITSLGCL1 LXCH   GOLOC +1     OBTAIN THE CORRECT E BANK
0144   REF   4  LAST 1415      5510  22 006 1           LXCH   BB
0145   REF  20  LAST 1417      5511  22 706 0           LXCH   GOLOC +1     AND PRESERVE OUR E AND F BANKS

0146                            5512  0 0006 1           EXTEND             GET THE DELTA TIME
0147   REF 366  LAST 1417       5513  5 0000 1           NDX    A
0148                            5514  3 0001 0           DCA    0
```

```
0149   REF  21  LAST 1417      5515  22 706 0          LXCH   GOLOC +1        RESTORE OUR E AND F BANK
0150   REF   5  LAST 1417      5516  22 006 1          LXCH   BB              RESTORE THE TASKS E AND F BANKS
0151   REF  22  LAST 1418      5517  22 706 0          LXCH   GOLOC +1        AND PRESERVE OUR L

0152   REF   1                 5520  1 3701 0          TCF    ITSLGCL2        NOW LET:S PROCESS THIS LONGCALL

R0153  ***** YOU  MAY RETURN TO  SWITCHED FIXED *****

0154                           01,3701                 BANK   01
0155   REF   4  LAST 1415      01,2000                 SETLOC RESTART
0156                           01,3701                 BANK

0157   REF   3 LAST 1415 TO 1417:    70   113*        COUNT  01/RSROU

0158   REF   6  LAST 1234      01,3701  53'140 1 ITSLGCL2 DXCH   LONGTIME

0159                           01,3702  0 0006 1        EXTEND                 CALCULATE TIME LEFT
0160   REF  30  LAST 1412      01,3703  4 0025 1        DCS    TIME2
0161   REF   7  LAST 1418      01,3704  21'140 1        DAS    LONGTIME
0162                           01,3705  0 0006 1        EXTEND
0163   REF   2  LAST 1412      01,3706  3 1136 1        DCA    LONGBASE
0164   REF   8  LAST 1418      01,3707  21'140 1        DAS    LONGTIME

0165   REF   9  LAST 1418      01,3710  11'137 1        CCS    LONGTIME        FIND OUT HOW THIS SHOULD BE RESTARTED
0166   REF   1                 01,3711  1 3721 1        TCF    LONGCLCL
0167                           01,3712  1 3714 1        TCF    +2
0168   REF   2  LAST 1415      01,3713  1 3607 1        TCF    IMEDIATE -3
0169   REF  10  LAST 1418      01,3714  11'140 1        CCS    LONGTIME +1
0170   REF   2  LAST 1418      01,3715  1 3721 1        TCF    LONGCLCL
0171                           01,3716  13 717 1        NOOP                   CAN:T GET HERE    *********
0172   REF   3  LAST 1418      01,3717  1 3607 1        TCF    IMEDIATE -3
0173   REF   4  LAST 1418      01,3720  1 3612 0        TCF    IMEDIATE

0174   REF   1                 01,3721  3 3764 1 LONGCLCL CA    LGCLCADR       WE WILL GO TO LONGCALL
0175   REF  23  LAST 1418      01,3722  54 704 0        TS     GOLOC -1

0176                           01,3723  0 0006 1        EXTEND                 PREPARE OUR ENTRY TO LONGCALL
0177   REF  11  LAST 1418      01,3724  3 1140 0        DCA    LONGTIME
0178   REF  24  LAST 1418      01,3725  0 0704 1        TC     GOLOC -1

0179   REF   3  LAST 1417      01,3726  3 3766 0 ITSLNGCL CA    WTLTCADR       ASSUME IT WILL GO TO WAITLIST
0180   REF  25  LAST 1418      01,3727  54 704 0        TS     GOLOC -1

0181   REF   8  LAST 1417      01,3730  50 155 0        NDX    TEMP2G
0182   REF   5  LAST 1416      01,3731  4 1054 0        CS     PHSPRDT1        GET THE DELTA T ADDRESS

0183   REF   2  LAST 1417      01,3732  1 5507 1        TCF    ITSLGCL1        NOW GET THE DELTA TIME

0184   REF  26  LAST 1418      01,3733  4 0706 1 ITSWTLST CS    GOLOC +1       CORRECT THE BBCON INFORMATION
0185   REF  27  LAST 1418      01,3734  54 706 1        TS     GOLOC +1
```

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```
0186   REF   4  LAST 1417   01,3735  50 156 0          NDX     POINTER     GET THE DT AND FIND OUT IF IT WAS STORED
0187   REF   2  LAST 1417   01,3736  3 2000 0          CA      PRDTTAB     DIRECTLY OR INDIRECTLY

0188   REF   1              01,3737  1 3566 0          TCF     TIMETEST    FIND OUT HOW THE TIME IS STORED

0189   REF  28  LAST 1418   01,3740  56 705 0  ITSAJOB2 XCH     GOLOC       STORE THE CADR

0190   REF   5  LAST 1419   01,3741  50 156 0          NDX     POINTER     ADD THE PRIORITY AND LET:S GO
0191   REF   3  LAST 1419   01,3742  3 2000 0          CA      PRDTTAB

0192   REF   1              01,3743  1 3631 1          TCF     CHKNOVAC

0193   REF   3  LAST 1416   01,3744  3 0157 1  ITSEVEN CA      TEMPSWCH    SET UP FOR EITHER THE SECOND PART OF THE
0194   REF  29  LAST 1419   01,3745  54 707 0          TS      GOLOC +2    TABLE, OR A RETURN FOR THE NEXT GROUP

0195   REF   9  LAST 1418   01,3746  50 155 0          NDX     TEMP2G      SET UP POINTER FOR OUR LOCATION WITHIN
0196   REF   2  LAST 1417   01,3747  3 2000 0          CA      SIZETAB     THE TABLE
0197   REF   7  LAST 1417   01,3750  6 0154 1          AD      TEMPPHS     THIS MAY LOOK BAD BUT LET:S SEE YOU DO
0198   REF   8  LAST 1419   01,3751  6 0154 1          AD      TEMPPHS     BETTER IN TIME OR NUMBERR OF LOCATIONS
0199   REF   9  LAST 1419   01,3752  6 0154 1          AD      TEMPPHS
0200   REF   6  LAST 1419   01,3753  54 156 1          TS      POINTER

0201   REF   1              01,3754  1 3657 1          TCF     CONTBL2     NOW PROCESS WHAT IS IN THE TABLE

0202   REF  48  LAST 1395   01,3755  3 6214 0  PHSPART2 CA      THREE       SET THE POINTER FOR THE SECOND HALF OF
0203   REF   7  LAST 1419   01,3756  26 156 1          ADS     POINTER     THE TABLE

0204   REF   5  LAST 1416   01,3757  3 3557 0          CA      RTRNCADR    THIS WILL BE OUR LAST TIME THROUGH THE
0205   REF  30  LAST 1419   01,3760  54 707 0          TS      GOLOC +2    EVEN TABLE , SO AFTER IT  GET THE NEXT
A0206                                                                     GROUP
0207   REF   2  LAST 1419   01,3761  1 3657 1          TCF     CONTBL2     SO LET:S GET THE SECOND ENTRY IN THE TBL

0208   REF 668  LAST 1414       0154                   TEMPPHS EQUALS MPAC
0209   REF 669  LAST 1419       0155                   TEMP2G  EQUALS MPAC +1
0210   REF 670  LAST 1419       0156                   POINTER EQUALS MPAC +2
0211   REF 671  LAST 1419       0157                   TEMPSWCH EQUALS MPAC +3
0212   REF   9  LAST  205       0705                   GOLOC   EQUALS VAC5 +20D
0213   REF   7  LAST 1396       7715                   MINUS2  EQUALS NEG2
0214   REF   9  LAST 1215       6043                   OCT177  EQUALS LOW7

0215   REF   1              01,3762  03755 0  PHS2CADR GENADR PHSPART2
0216   REF   1              01,3763  03533 1  PRT2CADR GENADR GETPART2
0217   REF   4  LAST 1314   01,3764  05342 1  LGCLCADR GENADR LONGCALL
0218   REF  31  LAST 1414   01,3765  05147 0  FVACCADR GENADR FINDVAC
0219   REF  52  LAST 1235   01,3766  05245 1  WTLTCADR GENADR WAITLIST
0220   REF  32  LAST 1404   01,3767  05134 1  NOVACADR GENADR NOVAC
```

L IMU MODE SWITCHING ROUTINES USER'S PAGE NO. 1 E0 S3

```
0001                          5521                    BLOCK  02
0002  REF   1                 4000                    SETLOC FFTAG3
0003                          5521                    BANK

0004  REF   1               E3,1471                   EBANK= COMMAND

R0005          FIXED-FIXED ROUTINES.

0006  REF   1                                         COUNT  02/IMODE

0007  REF 263  LAST 1416      5521  3 5021 1  ZEROICDU CAF    ZERO          ZERO ICDU COUNTERS.
0008  REF  29  LAST 1365      5522  54 032 1           TS     CDUX
0009  REF  17  LAST 1365      5523  54 033 0           TS     CDUY
0010  REF  23  LAST 1366      5524  54 034 1           TS     CDUZ
0011  REF 323  LAST 1412      5525  0 0002 0           TC     Q

0012  REF  33  LAST 1395      5007            SPSCODE  =     BIT9
```

L IMU MODE SWITCHING ROUTINES

P0013 IMU ZEROING ROUTINE.

```
0014                                11,3776                 BANK    11
0015  REF   1                     07,2000                 SETLOC MODESW
0016                                07,2577                 BANK

0017  REF   1                                             COUNT   07/IMODE

0018                                07,2577  0 0004 0  IMUZERO  INHINT                  ROUTINE TO ZERO ICDUS.
0019  REF  41  LAST  389            07,2600  4 1036 1           CS      DSPTAB +11D     DONT ZERO CDUS IF IMU IN GIMBAL LOCK AND
0020  REF   4  LAST  184            07,2601  7 5033 0           MASK    BITS4&6         COARSE ALIGN (GIMBAL RUNAWAY PROTECTION)
0021  REF 367  LAST 1417            07,2602  10 000 0           CCS     A
0022  REF   1                      07,2603  1 2607 0           TCF     IMUZEROA

0023  REF  38  LAST 1360            07,2604  0 5650 1           TC      ALARM           IF SO.
0024                                07,2605   00206 0           OCT     00206

0025  REF   1                      07,2606  1 3542 0           TCF     CAGETSTJ +4     IMMEDIATE FAILURE.

0032  REF   2  LAST 1421            07,2607  0 3536 1  IMUZEROA TC      CAGETSTJ
R0033                                       DO ALL THE WORK.
0034  REF  29  LAST 1063            07,2610  4 1321 1           CS      IMODES33        DISABLE DAP AUTO AND HOLD MODES
0035  REF   2  LAST  535            07,2611  7 5035 0           MASK    SUPER011            BIT5 FOR GROUND
0036  REF  30  LAST 1421            07,2612  27'321 1           ADS     IMODES33

0037  REF  43  LAST  766            07,2613  4 1320 0           CS      IMODES30        INHIBIT ICDUFAIL AND IMUFAIL (IN CASE WE
0038  REF   1                      07,2614  7 5771 1           MASK    BITS3&4         JUST CAME OUT OF COARSE ALIGN).
0039  REF  44  LAST 1421            07,2615  27'320 0           ADS     IMODES30

0040  REF   5  LAST 1421            07,2616  4 5033 0           CS      BITS4&6         SEND ZERO ENCODE WITH COARSE AND ERROR
0041                                07,2617  0 0006 1           EXTEND                  COUNTER DISABLED.
0042  REF  39  LAST 1012            07,2620  03 012 1           WAND    CHAN12

0043  REF   3  LAST  144            07,2621  0 3151 1           TC      NOATTOFF        TURN OFF NO ATT LAMP.

0044  REF  35  LAST 1395            07,2622  3 5013 0           CAF     BIT5
0045                                07,2623  0 0006 1           EXTEND
0046  REF  40  LAST 1421            07,2624  05 012 1           WOR     CHAN12

00461 REF   3  LAST  144            07,2625  0 5521 1           TC      ZEROICDU
0047  REF  43  LAST 1395            07,2626  3 5012 1           CAF     BIT6            WAIT 320 MS TO GIVE AGS ADEQUATE TIME TO
0048  REF  53  LAST 1419            07,2627  0 5245 1           TC      WAITLIST        RECEIVE ITS PULSE TRAIN.
0049  REF   5  LAST  187            E3,1474                    EBANK=  CDUIND
0050  REF   1                      07,2630   02642 0           2CADR   IMUZERO2
0050  REF   1                      07,2631   16063 0

0051  REF  45  LAST 1421            07,2632  4 1320 0           CS      IMODES30        SEE IF IMU OPERATING AND ALARM IF NOT.
0052  REF  34  LAST 1420            07,2633  7 5007 1           MASK    BIT9
0053  REF 368  LAST 1421            07,2634  10 000 0           CCS     A
0054  REF   1                      07,2635  1 2640 0           TCF     MODEEXIT
```

L IMU MODE SWITCHING ROUTINES USER'S PAGE NO. 3 E3 S3

```
0055   REF  39  LAST 1421   07,2636  0 5650 1            TC      ALARM
0056                        07,2637   00210 1            OCT     210

0057                        07,2640  0 0003 1  MODEEXIT  RELINT                GENERAL MODE-SWITCHING EXIT.
0058   REF   8  LAST 1415   07,2641  1 4675 0            TCF     SWRETURN


0059   REF   1              07,2642  0 3524 1  IMUZERO2  TC      CAGETEST
0061   REF   4  LAST 1421   07,2643  0 5521 1            TC      ZERODICDU       ZERO CDUX, CDUY, CDUZ

0062   REF  36  LAST 1421   07,2644  4 5013 1            CS      BIT5            REMOVE ZERO DISCRETE.
0063                        07,2645  0 0006 1            EXTEND
0064   REF  41  LAST 1421   07,2646  03 012 1            WAND    CHAN12

0065   REF  35  LAST 1395   07,2647  3 5005 1            CAF     BIT11           WAIT 10 SECS FOR CTRS TO FIND GIMBALS
0066   REF   4  LAST  163   07,2650  0 5272 0            TC      VARDELAY

0067   REF   2  LAST 1422   07,2651  0 3524 1  IMUZERO3  TC      CAGETEST
0069   REF   2  LAST 1421   07,2652  4 5771 1            CS      BITS3&4         REMOVE IMUFAIL AND ICDUFAIL INHIBIT.
0070   REF  46  LAST 1421   07,2653  7 1320 0            MASK    IMODES30
0071   REF  47  LAST 1422   07,2654  55'320 0            TS      IMODES30

0072   REF   3  LAST 1421   07,2655  4 5035 0            CS      SUPER011        ENABLE DAP AUTO AND HOLD MODES
0073   REF  31  LAST 1421   07,2656  7 1321 1            MASK    IMODES33            BIT5 FOR GROUND
0074   REF  32  LAST 1422   07,2657  55'321 1            TS      IMODES33

0075   REF  40  LAST 1090   07,2660  0 4740 0            TC      IBNKCALL        SET ISS WARNING IF EITHER OF ABOVE ARE
0076   REF   5  LAST  158   07,2661   14665 1            CADR    SETISSW         PRESENT.

0077   REF   1              07,2662  1 3514 0            TCF     ENDIMU
```

L IMU MODE SWITCHING ROUTINES USER'S PAGE NO. 4 E3 S3

```
P0078            IMU COARSE ALIGN MODE.

 0079                                07,2663  0 0004 0  IMUCOARS INHINT
 0080   REF   3  LAST 1421          07,2664  0 3536 1            TC      CAGETSTJ
 0081   REF   3  LAST  187          07,2665  0 3027 1            TC      SETCOARS

 0082   REF  40  LAST 1396          07,2666  3 6211 0            CAF     SIX
 0083   REF  54  LAST 1421          07,2667  0 5245 1            TC      WAITLIST
 0084   REF   6  LAST 1421          E3,1474                     EBANK=  CDUIND
 0085   REF   1                     07,2670   02673 1           2CADR   COARS
 0085   REF   1                     07,2671   16063 0

 0086   REF   2  LAST 1421          07,2672  1 2640 0            TCF     MODEEXIT

 0087   REF   3  LAST 1422          07,2673  0 3524 1  COARS     TC      CAGETEST
 0088   REF  44  LAST 1421          07,2674  3 5012 1            CAF     BIT6          ENABLE ALL THREE ISS CDU ERROR COUNTERS
 0089                               07,2675  0 0006 1            EXTEND
 0090   REF  42  LAST 1422          07,2676  05 012 1            WOR     CHAN12

 0091   REF  71  LAST 1411          07,2677  3 5016 0            CAF     TWO           SET CDU INDICATOR
 0092   REF   7  LAST 1423          07,2700  55'474 0  COARS1    TS      CDUIND

 0093   REF   8  LAST 1423          07,2701  51'474 1            INDEX   CDUIND        COMPUTE THETAD - THETAA IN 1:S
 0094   REF  21  LAST 1360          07,2702  3 1155 1            CA      THETAD          COMPLEMENT FORM
 0095                               07,2703  0 0006 1            EXTEND
 0096   REF   9  LAST 1423          07,2704  5 1474 1            INDEX   CDUIND
 0097   REF  30  LAST 1420          07,2705  20 032 1            MSU     CDUX
 0098                               07,2706  0 0006 1            EXTEND
 0099   REF  49  LAST 1395          07,2707  7 5003 0            MP      BIT13         SHIFT RIGHT 2
 0100   REF 185  LAST 1416          07,2710  56 001 0            XCH     L             ROUND
 0101                               07,2711  6 0000 1            DOUBLE
 0102   REF  21  LAST 1411          07,2712  54 061 1            TS      ITEMP1
 0103                               07,2713  1 2715 1            TCF     +2
 0104   REF 186  LAST 1423          07,2714  26 001 1            ADS     L

 0105   REF  10  LAST 1423          07,2715  51'474 1            INDEX   CDUIND        DIFFERENCE TO BE COMPUTED
 0106   REF   2  LAST 1420          07,2716  23'471 1            LXCH    COMMAND
 0107   REF  11  LAST 1423          07,2717  11'474 0            CCS     CDUIND
 0108   REF   1                     07,2720  0 2700 1            TC      COARS1

 0109   REF  72  LAST 1423          07,2721  3 5016 0            CAF     TWO           MINIMUM OF 4 MS WAIT
 0110   REF   5  LAST 1422          07,2722  0 5272 0            TC      VARDELAY
```

L IMU MODE SWITCHING ROUTINES USER'S PAGE NO. 5 E3 S3

```
0111   REF   4  LAST 1423   07,2723  0 3524 1  COARS2   TC     CAGETEST      DONT CONTINUE IF CAGED.
0112   REF  22  LAST 1423   07,2724  54 061 1           TS     ITEMP1        SETS TO +0.
0113   REF  73  LAST 1423   07,2725  3 5016 0           CAF    TWO           SET CDU INDICATOR
0114   REF  12  LAST 1423   07,2726  55'474 0  +3       TS     CDUIND

0115   REF  13  LAST 1424   07,2727  51'474 1           INDEX  CDUIND
0116   REF   3  LAST 1423   07,2730  11'471 0           CCS    COMMAND       NUMBER OF PULSES REQUIRED
0117   REF   1              07,2731  0 2735 1           TC     COMPOS        GREATER THAN MAX ALLOWED
0118   REF   1              07,2732  0 2744 1           TC     NEXTCDU +1
0119   REF   1              07,2733  0 3002 0           TC     COMNEG
0120   REF   2  LAST 1424   07,2734  0 2744 1           TC     NEXTCDU +1

0121   REF   1              07,2735  6 3624 1  COMPOS   AD     -COMMAX       COMMAX = MAX NUMBER OF PULSES ALLOWED
0122                        07,2736  0 0006 1           EXTEND                 MINUS ONE
0123   REF   1              07,2737  6 3012 1           BZMF   COMZERO
0124   REF  14  LAST 1424   07,2740  51'474 1           INDEX  CDUIND
0125   REF   4  LAST 1424   07,2741  55'471 0           TS     COMMAND       REDUCE COMMAND BY MAX NUMBER OF PULSES
0126   REF   1              07,2742  4 3625 1           CS     -COMMAX-        ALLOWED

0127   REF  23  LAST 1424   07,2743  24 061 0  NEXTCDU  INCR   ITEMP1
0128   REF  16  LAST 1396   07,2744  6 5020 0           AD     NEGO
0129   REF  15  LAST 1424   07,2745  51'474 1           INDEX  CDUIND
0130   REF   4  LAST 1012   07,2746  54 050 0           TS     CDUXCMD       SET UP COMMAND REGISTER.

0131   REF  16  LAST 1424   07,2747  11'474 0           CCS    CDUIND
0132   REF   1              07,2750  0 2726 0           TC     COARS2 +3

0133   REF  24  LAST 1424   07,2751  10 061 1           CCS    ITEMP1        SEE IF ANY PULSES TO GO OUT.
0134   REF   1              07,2752  1 3016 1           TCF    SENDPULS

0135   REF  14  LAST 1225   07,2753  0 5267 1           TC     FIXDELAY      WAIT FOR GIMBALS TO SETTLE.
0136                        07,2754   00226 1           DEC    150

0137   REF  74  LAST 1424   07,2755  3 5016 0           CAF    TWO           AT END OF COMMAND, CHECK TO SEE THAT
0138   REF  25  LAST 1424   07,2756  54 061 1  CHKCORS   TS     ITEMP1        GIMBALS ARE WITHIN 2 DEGREES OF THETAD.
0139   REF 369  LAST 1421   07,2757  50 000 1           INDEX  A
0140   REF  31  LAST 1423   07,2760  3 0032 0           CA     CDUX
0141                        07,2761  0 0006 1           EXTEND
0142   REF  26  LAST 1424   07,2762  5 0061 0           INDEX  ITEMP1
0143   REF  22  LAST 1423   07,2763  21'155 0           MSU    THETAD
0144   REF 370  LAST 1424   07,2764  10 000 0           CCS    A
0145   REF   1              07,2765  1 2773 1           TCF    COARSERR
0146   REF   1              07,2766  1 2770 1           TCF    CORSCHK2
0147   REF   2  LAST 1424   07,2767  1 2773 1           TCF    COARSERR
```

L IMU MODE SWITCHING ROUTINES USER'S PAGE NO. 6 E3 S3

```
0148  REF  27  LAST 1424  07,2770  10 061 1  CORSCHK2 CCS    ITEMP1
0149  REF   1             07,2771  1 2756 0           TCF    CHKCORS
0150  REF   2  LAST 1422  07,2772  1 3514 0           TCF    ENDIMU      END OF COARSE ALIGNMENT.

0151  REF   1             07,2773  6 3001 0  COARSERR AD     COARSTOL    2 DEGREES.
0152                      07,2774  0 0006 1           EXTEND
0153  REF   2  LAST 1424  07,2775  6 2770 0           BZMF   CORSCHK2

0154  REF  40  LAST 1422  07,2776  0 5650 1           TC     ALARM       COARSE ALIGN ERROR.
0155                      07,2777   00211 0           OCT    211

0156  REF   2  LAST  143  07,3000  1 3522 0           TCF    IMUBAD

0157                      07,3001   77511 1  COARSTOL DEC    -.01111     2 DEGREES SCALED AT HALF-REVOLUTIONS

0158  REF   2  LAST 1424  07,3002  6 3624 1  COMNEG   AD     -COMMAX
0159                      07,3003  0 0006 1           EXTEND
0160  REF   2  LAST 1424  07,3004  6 3012 1           BZMF   COMZERO
0161                      07,3005  4 0000 0           COM
0162  REF  17  LAST 1424  07,3006  51'474 1           INDEX  CDUIND
0163  REF   5  LAST 1424  07,3007  55'471 0           TS     COMMAND
0164  REF   2  LAST 1424  07,3010  3 3625 0           CA     -COMMAX-
0165  REF   3  LAST 1424  07,3011  0 2743 0           TC     NEXTCDU

0166  REF 264  LAST 1420  07,3012  3 5021 1  COMZERO   CAF    ZERO
0167  REF  18  LAST 1425  07,3013  51'474 1           INDEX  CDUIND
0168  REF   6  LAST 1425  07,3014  57'471 1           XCH    COMMAND
0169  REF   4  LAST 1425  07,3015  0 2743 0           TC     NEXTCDU

0170  REF   7  LAST 1066  07,3016  3 7707 0  SENDPULS CAF    13,14,15
0171                      07,3017  0 0006 1           EXTEND
0172  REF  12  LAST 1012  07,3020  05 014 1           WOR    CHAN14
0173  REF   1             07,3021  3 3626 0           CAF    600MS
0174  REF   2  LAST 1424  07,3022  1 2722 0           TCF    COARS2 -1   THEN TO VARDELAY

0175  REF  45  LAST 1423  07,3023  3 5012 1  CA+ECE    CAF    BIT6        ENABLE ALL THREE ISS CDU ERROR COUNTERS
0176                      07,3024  0 0006 1           EXTEND
0177  REF  43  LAST 1423  07,3025  05 012 1           WOR    CHAN12
0178  REF  63  LAST 1313  07,3026  0 5324 1           TC     TASKOVER
```

```
0179   REF  38  LAST 1395   07,3027  3 5014 1  SETCOARS CAF    BIT4      BYPASS IF ALREADY IN COARSE ALIGN
0180                        07,3030  0 0006 1           EXTEND
0181   REF  44  LAST 1425   07,3031  02 012 0           RAND   CHAN12
0182   REF 371  LAST 1424   07,3032  10 000 0           CCS    A
0183   REF 324  LAST 1420   07,3033  0 0002 0           TC     Q

0184   REF  46  LAST 1425   07,3034  4 5012 0           CS     BIT6      CLEAR ISS ERROR COUNTERS
0185                        07,3035  0 0006 1           EXTEND
0186   REF  45  LAST 1426   07,3036  03 012 1           WAND   CHAN12

0187   REF  39  LAST 1417   07,3037  4 5006 0           CS     BIT10     KNOCK DOWN GYRO ACTIVITY
0188                        07,3040  0 0006 1           EXTEND
0189   REF  13  LAST 1425   07,3041  03 014 1           WAND   CHAN14
0190   REF 265  LAST 1425   07,3042  4 5021 0           CS     ZERO
0191   REF   2  LAST  152   07,3043  54 047 0           TS     GYROCMD

0192   REF  39  LAST 1426   07,3044  3 5014 1           CAF    BIT4      PUT ISS IN COARSE ALIGN
0193                        07,3045  0 0006 1           EXTEND
0194   REF  46  LAST 1426   07,3046  05 012 1           WOR    CHAN12

0195   REF  42  LAST 1421   07,3047  4 1036 1           CS     DSPTAB +11D   TURN ON NO ATT LAMP
0196   REF   1              07,3050  7 3072 0           MASK   OCT40010
0197   REF  43  LAST 1426   07,3051  27'036 1           ADS    DSPTAB +11D

0198   REF  33  LAST 1422   07,3052  4 1321 1           CS     IMODES33  DISABLE DAP AUTO AND HOLD MODES
0199   REF  47  LAST 1426   07,3053  7 5012 0           MASK   BIT6
0200   REF  34  LAST 1426   07,3054  27'321 1           ADS    IMODES33

0201   REF  48  LAST 1422   07,3055  4 1320 0           CS     IMODES30  DISABLE IMUFAIL
0202   REF  40  LAST 1426   07,3056  7 5014 0           MASK   BIT4
0203   REF  49  LAST 1426   07,3057  27'320 0           ADS    IMODES30

0204   REF  37  LAST 1422   07,3060  4 5013 1  RNDREFDR CS     BIT5      KNOCK DOWN TRACK FLAG
0205   REF  28  LAST 1018   07,3061  7 0075 1           MASK   FLAGWRD1
0206   REF  29  LAST 1426   07,3062  54 075 1           TS     FLAGWRD1

0207   REF  51  LAST 1409   07,3063  4 5001 1           CS     BIT15     KNOCK DOWN DRIFT FLAG
0208   REF  19  LAST 1225   07,3064  7 0076 1           MASK   FLAGWRD2
0209   REF  20  LAST 1426   07,3065  54 076 1           TS     FLAGWRD2

0210   REF  50  LAST 1423   07,3066  4 5003 0           CS     BIT13     KNOCK DOWN REFSMMAT FLAG
0211   REF   4  LAST  424   07,3067  7 0077 0           MASK   FLAGWRD3
0212   REF   5  LAST 1426   07,3070  54 077 0           TS     FLAGWRD3

0213   REF 325  LAST 1426   07,3071  0 0002 0           TC     Q

0214                        07,3072   40010 1  OCT40010 OCT    40010
```

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```
P0215           IMU FINE ALIGN MODE SWITCH.

0216                                07,3073  0 0004 0  IMUFINE  INHINT
0217   REF   4  LAST 1423          07,3074  0 3536 1           TC      CAGETSTJ        SEE IF IMU BEING CAGED.

0218   REF   1                     07,3075  4 5027 0           CS      BITS4-5         RESET ZERO AND COARSE
0219                               07,3076  0 0006 1           EXTEND
0220   REF  47  LAST 1426          07,3077  03 012 1           WAND    CHAN12

0221   REF  48  LAST 1426          07,3100  4 5012 0           CS      BIT6            INSURE DAP AUTO AND HOLD MODES ENABLED
0222   REF  35  LAST 1426          07,3101  7 1321 1           MASK    IMODES33
0223   REF  36  LAST 1427          07,3102  55'321 1           TS      IMODES33

0224   REF   4  LAST 1421          07,3103  0 3151 1           TC      NOATTOFF

0225   REF  40  LAST 1426          07,3104  3 5006 1           CAF     BIT10           IMU FAIL WAS INHIBITED DURING THE
0226   REF  55  LAST 1423          07,3105  0 5245 1           TC      WAITLIST        PRESUMABLY PRECEDING COARSE ALIGN. LEAVE
0227   REF  19  LAST 1425          E3,1474                     EBANK=  CDUIND
0228   REF   1                     07,3106   03117 0           2CADR   IFAILOK         IT ON FOR THE FIRST 5 SECS OF FINE ALIGN
0228   REF   1                     07,3107   16063 0

0229   REF   5  LAST  825          07,3110  3 5042 1           CAF     2SECS
0230   REF  56  LAST 1427          07,3111  0 5245 1           TC      WAITLIST
0231   REF  20  LAST 1427          E3,1474                     EBANK=  CDUIND
0232   REF   1                     07,3112   03115 1           2CADR   IMUFINED
0232   REF   1                     07,3113   16063 0

0233   REF   3  LAST 1423          07,3114  1 2640 0           TCF     MODEEXIT

0234   REF   5  LAST 1424          07,3115  0 3524 1  IMUFINED TC      CAGETEST        SEE THAT NO ONE HAS CAGED THE IMU.
0235   REF   3  LAST 1425          07,3116  1 3514 0           TCF     ENDIMU
```

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0236   REF   1              07,3117  0 3531 0  IFAILOK  TC     CAGETSTQ       ENABLE IMU FIAL UNLESS IMU BEING CAGED.
0237   REF  64  LAST 1425   07,3120  1 5324 0           TCF    TASKOVER       IT IS.

0238   REF  41  LAST 1426   07,3121  3 5014 1           CAF    BIT4           DONT RESET IMU FAIL INHIBIT IF SOMEONE
0239                        07,3122  0 0006 1           EXTEND                HAS GONE INTO COARSE ALIGN.
0240   REF  48  LAST 1427   07,3123  02 012 0           RAND   CHAN12
0241   REF 372  LAST 1426   07,3124  10 000 0           CCS    A
0242   REF  65  LAST 1428   07,3125  1 5324 0           TCF    TASKOVER

0243   REF  50  LAST 1426   07,3126  4 1320 0           CS     IMODES30       RESET IMUFAIL.
0244   REF  51  LAST 1426   07,3127  7 5003 0           MASK   BIT13
0245   REF  51  LAST 1428   07,3130  27'320 0           ADS    IMODES30
0246   REF  42  LAST 1428   07,3131  4 5014 0           CS     BIT4
0247   REF  52  LAST 1428   07,3132  7 1320 0  PFAILOK2 MASK   IMODES30
0248   REF  53  LAST 1428   07,3133  55'320 0           TS     IMODES30
0249   REF  41  LAST 1422   07,3134  0 4740 0           TC     IBNKCALL       THE ISS WARNING LIGHT MAY COME ON NOW
0250   REF   6  LAST 1422   07,3135   14665 1           CADR   SETISSW        THAT THE INHIBIT HAS BEEN REMOVED.
0251   REF  66  LAST 1428   07,3136  1 5324 0           TCF    TASKOVER

0252   REF   2  LAST 1428   07,3137  0 3531 0  PFAILOK  TC     CAGETSTQ       ENABLE PIP FAIL PROG ALARM.
0253   REF  67  LAST 1428   07,3140  1 5324 0           TCF    TASKOVER

0254   REF  54  LAST 1428   07,3141  4 1320 0           CS     IMODES30       RESET IMU AND PIPA FAIL BITS.
0255   REF  41  LAST 1427   07,3142  7 5006 0           MASK   BIT10
0256   REF  55  LAST 1428   07,3143  27'320 0           ADS    IMODES30

0257   REF  37  LAST 1427   07,3144  4 1321 1           CS     IMODES33
0258   REF  52  LAST 1428   07,3145  7 5003 0           MASK   BIT13
0259   REF  38  LAST 1428   07,3146  27'321 1           ADS    IMODES33

0260   REF  38  LAST 1426   07,3147  4 5013 1           CS     BIT5
0261   REF   1              07,3150  1 3132 0           TCF    PFAILOK2

0262   REF   2  LAST 1426   07,3151  4 3072 0  NOATTOFF CS     OCT40010       SUBROUTINE TO TURN OFF NO ATT LAMP.
0263   REF  44  LAST 1426   07,3152  7 1036 1           MASK   DSPTAB +11D
0264   REF  52  LAST 1426   07,3153  6 5001 0           AD     BIT15
0265   REF  45  LAST 1428   07,3154  55'036 1           TS     DSPTAB +11D
0266   REF 326  LAST 1426   07,3155  0 0002 0           TC     Q
```

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P0267 ROUITNES TO INITIATE AND TERMINATE PROGRAM USE OF THE PIPAS. NO IMUSTALL REQUIRED IN EITHER CASE.

```
0272   REF 266  LAST 1426   07,3156  4 5021 0  PIPUSE   CS     ZERO
0273   REF  12  LAST  834   07,3157  54 037 1           TS     PIPAX
0274   REF   3  LAST  437   07,3160  54 040 1           TS     PIPAY
0275   REF   6  LAST  834   07,3161  54 041 0           TS     PIPAZ

02752  REF   3  LAST 1428   07,3162  0 3531 0  PIPUSE1  TC     CAGETSTQ      DO NOT ENABLE PIPA FAIL IF IMU IS CAGED
02754  REF   9  LAST 1422   07,3163  1 4675 0           TCF    SWRETURN

02756                       07,3164  0 0004 0           INHINT
0276   REF  78  LAST 1395   07,3165  4 5017 0           CS     BIT1          IF PIPA FAILS FROM NOW ON (UNTIL
0277   REF  56  LAST 1428   07,3166  7 1320 0           MASK   IMODES30      PIPFREE), LIGHT ISS WARNING.
0278   REF  57  LAST 1429   07,3167  55'320 0           TS     IMODES30

0279   REF  42  LAST 1428   07,3170  0 4740 0  PIPFREE2 TC     IBNKCALL      ISS WARNING MIGHT COME ON NOW.
0280   REF   7  LAST 1428   07,3171   14665 1           CADR   SETISSW       (OR GO OFF ON PIPFREE).

0281   REF   4  LAST 1427   07,3172  1 2640 0           TCF    MODEEXIT

0282                       07,3173  0 0004 0  PIPFREE   INHINT               PROGRAM DONE WITH PIPAS. DONT LIGHT
0283   REF  58  LAST 1429   07,3174  4 1320 0           CS     IMODES30      ISS WARNING.
0284   REF  79  LAST 1429   07,3175  7 5017 0           MASK   BIT1
0285   REF  59  LAST 1429   07,3176  27'320 0           ADS    IMODES30

0286   REF  42  LAST 1428   07,3177  7 5006 0           MASK   BIT10         IF PIP FAIL ON, DO PROG ALSRM AND RESET
0287   REF 373  LAST 1428   07,3200  10 000 0           CCS    A             ISS WARNING.
0288   REF   5  LAST 1429   07,3201  1 2640 0           TCF    MODEEXIT

0289   REF  41  LAST 1425   07,3202  0 5650 1           TC     ALARM
0290                       07,3203   00212 0           OCT    212

0291                       07,3204  0 0004 0           INHINT

0292   REF   1              07,3205  1 3170 0           TCF    PIPFREE2
```

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```
P0293           THE FOLLOWING ROUTINE TORQUES THE IRIGS ACCORDING TO DOUBLE PRECISION INPUTS IN THE SIX REGISTERS
R0295   BEGINNING AT THE ECADR ARRIVING IN A. THE MINIMUM SIZE OF ANY PULSE TRAIN IS 16 PULSES (.25 CDU COUNTS). THE
R0297   UNSENT PORTION OF THE COMMAND IS LEFT INTACT IN THE INPUT COMMAND REGISTERS.

 0299                           E3,1400                          EBANK= 1400             VARIABLE, ACTUALLY.

 0300   REF 672  LAST 1419      07,3206  54 161 0  IMUPULSE TS     MPAC +5                SAVE ARRIVING ECADR.
 0301   REF   5  LAST 1427      07,3207  0 3536 1           TC     CAGETSTJ               DONT PROCEED IF IMU BEING CAGED.

 0302   REF   3  LAST  445      07,3210  11'304 0           CCS    LGYRO                  SEE IF GYROS BUSY.
 0303   REF   1                 07,3211  0 3252 1           TC     GYROBUSY               SLEEP.

 0304   REF 673  LAST 1430      07,3212  54 156 1           TS     MPAC +2
 0305   REF  49  LAST 1427      07,3213  3 5012 1           CAF    BIT6                   ENABLE THE POWER SUPPLY.
 0306                           07,3214  0 0006 1           EXTEND
 0307   REF  14  LAST 1426      07,3215  05 014 1           WOR    CHAN14

 0308   REF  20  LAST 1395      07,3216  3 5015 0           CAF    FOUR
 0310   REF  57  LAST 1427      07,3217  0 5245 1  GWAKE2   TC     WAITLIST               (IF A JOB WAS PUT TO SLEEP, THE POWER
 0311   REF  21  LAST 1427      E3,1474                    EBANK= CDUIND                 SUPPLY IS LEFT ON BY THE WAKING JOB).
 0312   REF   1                 07,3220   03270 1          2CADR  STRTGYRO
 0312   REF   1                 07,3221   16063 0

 0313   REF 674  LAST 1430      07,3222  3 0161 1           CA     MPAC +5                SET UP EBANK, SAVING CALLER'S EBANK FOR
 0314   REF  59  LAST 1399      07,3223  56 003 1           XCH    EBANK                  RESTORATION ON RETURN.
 0315   REF 675  LAST 1430      07,3224  56 161 1           XCH    MPAC +5
 0316   REF   4  LAST 1430      07,3225  55'304 0           TS     LGYRO                  RESERVES GYROS.
 0317   REF  14  LAST 1396      07,3226  7 4373 0           MASK   LOW8
 0318   REF  28  LAST 1425      07,3227  54 061 1           TS     ITEMP1

 0319   REF  75  LAST 1424      07,3230  3 5016 0           CAF    TWO                    FORCE SIGN AGREEMENT ON INPUTS.
 0320   REF 676  LAST 1430      07,3231  54 157 0  GYROAGRE TS     MPAC +3
 0321                           07,3232  6 0000 1           DOUBLE
 0322   REF  29  LAST 1430      07,3233  6 0061 0           AD     ITEMP1
 0323   REF 677  LAST 1430      07,3234  54 160 1           TS     MPAC +4
 0324                           07,3235  0 0006 1           EXTEND
 0325   REF 374  LAST 1429      07,3236  5 0000 1           INDEX  A
 0326                           07,3237  3 1401 0           DCA    1400
 0327   REF 678  LAST 1430      07,3240  52 155 1           DXCH   MPAC
 0328   REF  11  LAST 1330      07,3241  0 7226 0           TC     TPAGREE
 0329   REF 679  LAST 1430      07,3242  52 155 1           DXCH   MPAC
 0330   REF 680  LAST 1430      07,3243  50 160 0           INDEX  MPAC +4
 0331                           07,3244  53'401 1           DXCH   1400

 0332   REF 681  LAST 1430      07,3245  10 157 0           CCS    MPAC +3
 0333   REF   1                 07,3246  1 3231 0           TCF    GYROAGRE

 0334   REF 682  LAST 1430      07,3247  3 0161 1           CA     MPAC +5                RESTORE CALLER'S EBANK.
 0335   REF  60  LAST 1430      07,3250  54 003 0           TS     EBANK
 0336   REF   6  LAST 1429      07,3251  1 2640 0           TCF    MODEEXIT
```

```
P0337                ROUTINES TO ALLOW TORQUING BY ONLY ONE JOB AT A TIME.

 0338                                07,3252  0 0006 1  GYROBUSY EXTEND                SAVE RETURN 2FCADR.
 0339  REF  20  LAST 1190           07,3253  3 0134 1            DCA    BUF2
 0340  REF 683  LAST 1430           07,3254  52 155 1            DXCH   MPAC
 0341  REF   1                      07,3255  3 3267 1  REGSLEEP CAF    LGWAKE
 0342  REF   5  LAST 1325           07,3256  1 5175 0            TCF    JOBSLEEP

 0343  REF   5  LAST 1430           07,3257  11'304 0  GWAKE    CCS    LGYRO          WHEN AWAKENED, SEE IF GYROS STILL BUSY.
 0344  REF   1                      07,3260  1 3255 1            TCF    REGSLEEP       IF SO, SLEEP SOME MORE.

 0345  REF 684  LAST 1431           07,3261  54 156 1            TS     MPAC +2
 0346                                07,3262  0 0006 1            EXTEND
 0347  REF 685  LAST 1431           07,3263  3 0155 0            DCA    MPAC
 0348  REF  21  LAST 1431           07,3264  52 134 0            DXCH   BUF2           RESTORE SWRETURN INFO.
 0349  REF 162  LAST 1416           07,3265  3 5017 1            CAF    ONE
 0350  REF   1                      07,3266  1 3217 1            TCF    GWAKE2

 0351  REF   1                      07,3267   17257 1  LGWAKE   CADR   GWAKE
```

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```
P0352            GYRO-TORQUING WAITLIST TASKS.

0353  REF   1              07,3270  4 3511 0  STRTGYRO CS     GDESELCT       DE-SELECT LAST GYRO.
0354                       07,3271  0 0006 1           EXTEND
0355  REF  15  LAST 1430  07,3272  03 014 1           WAND   CHAN14

0356  REF   6  LAST 1427  07,3273  0 3524 1           TC     CAGETEST

0357  REF   6  LAST 1431  07,3274  3 1304 1  STRTGYR2 CA     LGYRO          JUMP ON PHASE COUNTER IN BITS 13-14.
0358                       07,3275  0 0006 1           EXTEND
0359  REF  43  LAST 1428  07,3276  7 5014 0           MP     BIT4
0360  REF 375  LAST 1430  07,3277  50 000 1           INDEX  A
0361                       07,3300  1 3301 1           TCF    +1
0362  REF   1              07,3301  0 3316 0           TC     GSELECT        =0. DO Y GYRO.
0363                       07,3302   00202 1           OCT    00202

0364  REF   2  LAST 1432  07,3303  0 3316 0           TC     GSELECT        =1. DO Z GYRO.
0365                       07,3304   00302 0           OCT    00302

0366  REF   3  LAST 1432  07,3305  0 3314 1           TC     GSELECT -2     =2. DO X GYRO.
0367                       07,3306   00100 0           OCT    00100

0368  REF 267  LAST 1429  07,3307  3 5021 1           CAF    ZERO           =3. DONE
0369  REF   7  LAST 1432  07,3310  55'304 0           TS     LGYRO
0370  REF   2  LAST 1431  07,3311  3 3267 1           CAF    LGWAKE         WAKE A POSSIBLE SLEEPING JOB.
0371  REF   6  LAST 1325  07,3312  0 5201 1           TC     JOBWAKE

0372  REF   2  LAST 1427  07,3313  1 3115 0  NORESET  TCF    IMUFINED       DO NOT RESET POWER SUPPLY
```

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```
0373  REF  21  LAST 1430   07,3314  4 5015 1   -2       CS     FOUR      SPECIAL ENTRY TO REGRESS LGYRO FOR X.
0374  REF   8  LAST 1432   07,3315  27'304 0             ADS    LGYRO

0375  REF 327  LAST 1428   07,3316  50 002 0   GSELECT   INDEX  Q         SELECT GYRO.
0376                       07,3317  3 0000 1             CAF    0         PACKED WORD CONTAINS GYRO SELECT BITS
0377  REF   4  LAST 1411   07,3320  54 064 1             TS     ITEMP4    AND INCREMENT TO LGYRO.
0378  REF  20  LAST 1403   07,3321  7 5023 1             MASK   SEVEN
0379  REF  53  LAST 1428   07,3322  6 5003 1             AD     BIT13
0380  REF   9  LAST 1433   07,3323  27'304 0             ADS    LGYRO
0381  REF  61  LAST 1430   07,3324  54 003 0             TS     EBANK
0382  REF  15  LAST 1430   07,3325  7 4373 0             MASK   LOW8
0383  REF  30  LAST 1430   07,3326  54 061 1             TS     ITEMP1

0384  REF  21  LAST 1433   07,3327  4 5023 1             CS     SEVEN
0385  REF   5  LAST 1433   07,3330  7 0064 1             MASK   ITEMP4
0386  REF   6  LAST 1433   07,3331  54 064 1             TS     ITEMP4

0387                       07,3332  0 0006 1             EXTEND            MOVE DP COMMAND TO RUPTREGS FOR TESTING.
0388  REF  31  LAST 1433   07,3333  5 0061 0             INDEX  ITEMP1
0389                       07,3334  3 1401 0             DCA    1400
0390  REF  28  LAST 1411   07,3335  52 071 0             DXCH   RUPTREG1

0391  REF  29  LAST 1433   07,3336  10 070 1             CCS    RUPTREG1
0392  REF   1               07,3337  1 3352 1             TCF    MAJ+
0393                       07,3340  1 3342 0             TCF    +2
0394  REF   1               07,3341  1 3472 1             TCF    MAJ-

0395  REF   7  LAST 1411   07,3342  10 071 0             CCS    RUPTREG2
0396  REF   1               07,3343  1 3347 0             TCF    MIN+
0397  REF   1               07,3344  1 3274 1             TCF    STRTGYR2
0398  REF   1               07,3345  1 3467 0             TCF    MIN-
0399  REF   2  LAST 1433   07,3346  1 3274 1             TCF    STRTGYR2
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```
0400  REF   1              07,3347  6 3403 0  MIN+      AD      -GYROMIN      SMALL POSITIVE COMMAND. SEE IF AT LEAST
0401                       07,3350  0 0006 1           EXTEND                16 GYRO PULSES.
0402  REF   3  LAST 1433   07,3351  6 3274 0           BZMF    STRTGYR2

0403                       07,3352  0 0006 1  MAJ+     EXTEND                DEFINITE POSITIVE OUTPUT.
0404  REF   1              07,3353  3 3513 0           DCA     GYROFRAC
0405  REF  30  LAST 1433   07,3354  20 071 0           DAS     RUPTREG1

0406  REF   7  LAST 1433   07,3355  3 0064 0           CA      ITEMP4        SELECT POSITIVE TORQUING FOR THIS GYRO.
0407                       07,3356  0 0006 1           EXTEND
0408  REF  16  LAST 1432   07,3357  05 014 1           WOR     CHAN14

0409  REF  10  LAST 1419   07,3360  3 6043 0           CAF     LOW7          LEAVE NUMBER OF POSSIBLE 8192 AUGMENTS
0410  REF   8  LAST 1433   07,3361  7 0071 0           MASK    RUPTREG2      TO INITIAL COMMAND IN MAJOR PART OF LONG
0411  REF   9  LAST 1434   07,3362  56 071 1           XCH     RUPTREG2      TERM STORAGE AND TRUNCATED FRACTION
0412                       07,3363  0 0006 1  GMERGE   EXTEND                IN MINOR PART. THE MAJOR PART WILL BE
0413  REF  28  LAST 1410   07,3364  7 5010 1           MP      BIT8          COUNTED DOWN TO ZERO IN THE COURSE OF
0414  REF  26  LAST 1411   07,3365  54 062 1           TS      ITEMP2        PUTTING OUT THE ENTIRE COMMAND.
0415  REF  31  LAST 1434   07,3366  3 0070 0           CA      RUPTREG1
0416                       07,3367  0 0006 1           EXTEND
0417  REF  35  LAST 1421   07,3370  7 5007 1           MP      BIT9
0418  REF  32  LAST 1434   07,3371  54 070 1           TS      RUPTREG1
0419  REF 187  LAST 1423   07,3372  3 0001 0           CA      L
0420                       07,3373  0 0006 1           EXTEND
0421  REF  74  LAST 1395   07,3374  7 5002 1           MP      BIT14
0422  REF  27  LAST 1434   07,3375  26 062 1           ADS     ITEMP2        INITIAL COMMAND.

0423                       07,3376  0 0006 1           EXTEND                SEE IF MORE THAN ONE PULSE TRAIN NEEDED
0424  REF  33  LAST 1434   07,3377  3 0071 1           DCA     RUPTREG1      (MORE THAN 16383 PULSES).
0425  REF   1              07,3400  6 7716 0           AD      MINUS1
0426  REF 376  LAST 1432   07,3401  10 000 0           CCS     A
0427  REF   1              07,3402  1 3426 0           TCF     LONGGYRO
0428                       07,3403   77601 0 -GYROMIN  OCT     -176          MAY BE ADJUSTED TO SPECIFY MINIMUM CMD
0429                       07,3404  1 3410 0           TCF     +4

0430  REF  75  LAST 1434   07,3405  3 5002 0           CAF     BIT14
0431  REF  28  LAST 1434   07,3406  26 062 1           ADS     ITEMP2
0432  REF 268  LAST 1432   07,3407  3 5021 1           CAF     ZERO

0433  REF  32  LAST 1433   07,3410  50 061 0  +4       INDEX   ITEMP1
0434                       07,3411  53'401 1           DXCH    1400
```

L IMU MODE SWITCHING ROUTINES USER'S PAGE NO. 16 E3 S3

```
0435   REF  29  LAST 1434   07,3412  3 0062 0           CA      ITEMP2          ENTIRE COMMAND.
0436   REF   3  LAST 1426   07,3413  54 047 0  LASTSEG  TS      GYROCMD
0437                        07,3414  0 0006 1           EXTEND
0438   REF  43  LAST 1429   07,3415  7 5006 0           MP      BIT10           WAITLIST DT
0439   REF  49  LAST 1419   07,3416  6 6214 0           AD      THREE           TRUNCATION AND PHASE UNCERTAINTIES.
0440   REF  58  LAST 1430   07,3417  0 5245 1           TC      WAITLIST
0441   REF  22  LAST 1430   E3,1474                     EBANK=  CDUIND
0442   REF   2  LAST 1430   07,3420   03270 1           2CADR   STRTGYRO
0442                        07,3421   16063 0

0448   REF  44  LAST 1435   07,3422  3 5006 1  GYROEXIT CAF     BIT10
0449                        07,3423  0 0006 1           EXTEND
0450   REF  17  LAST 1434   07,3424  05 014 1           WOR     CHAN14
0451   REF  68  LAST 1428   07,3425  1 5324 0           TCF     TASKOVER

0452   REF  33  LAST 1434   07,3426  50 061 0  LONGGYRO INDEX   ITEMP1
0453                        07,3427  53'401 1           DXCH    1400            INITIAL COMMAND OUT PLUS N AUGMENTS OF
0454   REF  76  LAST 1434   07,3430  3 5002 0           CAF     BIT14           8192. INITIAL COMMAND IS AT LEAST 8192.
0455   REF  30  LAST 1435   07,3431  6 0062 0           AD      ITEMP2
0456   REF   4  LAST 1435   07,3432  54 047 0           TS      GYROCMD

0457                        07,3433  0 0006 1  AUG3     EXTEND                  GET WAITLIST DT TO TIME WHEN TRAIN IS
0458   REF  45  LAST 1435   07,3434  7 5006 0           MP      BIT10           ALMOST OUT.
0459   REF   4  LAST 1396   07,3435  6 7714 1           AD      NEG3
0460   REF  59  LAST 1435   07,3436  0 5245 1           TC      WAITLIST
0461   REF  23  LAST 1435   E3,1474                     EBANK=  CDUIND
0462   REF   1              07,3437   03442 0           2CADR   8192AUG
0462   REF   1              07,3440   16063 0
0463   REF   1              07,3441  1 3422 1           TCF     GYROEXIT

0464   REF   7  LAST 1432   07,3442  0 3524 1  8192AUG  TC      CAGETEST

04641  REF  44  LAST 1432   07,3443  3 5014 1           CAF     BIT4
04642                       07,3444  0 0006 1           EXTEND
04643  REF  49  LAST 1428   07,3445  02 012 0           RAND    CHAN12
04644  REF 377  LAST 1434   07,3446  10 000 0           CCS     A
04645  REF   3  LAST 1425   07,3447  1 3522 0           TCF     IMUBAD
0465   REF  10  LAST 1433   07,3450  3 1304 1           CA      LGYRO           ADD 8192 PULSES TO GYROCMD
0466   REF  62  LAST 1433   07,3451  54 003 0           TS      EBANK
0467   REF  16  LAST 1433   07,3452  7 4373 0           MASK    LOW8
0468   REF  34  LAST 1435   07,3453  54 061 1           TS      ITEMP1

0469   REF  35  LAST 1435   07,3454  50 061 0           INDEX   ITEMP1          SEE IF THIS IS THE LAST AUG.
0470                        07,3455  11'400 0           CCS     1400
0471   REF   1              07,3456  1 3462 0           TCF     AUG2            MORE TO COME.

0472   REF  77  LAST 1435   07,3457  3 5002 0           CAF     BIT14
0473   REF   5  LAST 1435   07,3460  26 047 0           ADS     GYROCMD
0474   REF   1              07,3461  1 3414 1           TCF     LASTSEG +1
```

L IMU MODE SWITCHING ROUTINES USER'S PAGE NO. 17 E3 S3

```
0475   REF  36  LAST 1435   07,3462  50 061 0  AUG2    INDEX  ITEMP1
0476                        07,3463  55'400 0           TS     1400
0477   REF  78  LAST 1435   07,3464  3 5002 0           CAF    BIT14
0478   REF   6  LAST 1435   07,3465  26 047 0           ADS    GYROCMD
0479   REF   1              07,3466  1 3433 1           TCF    AUG3        COMPUTE DT.
```

L IMU MODE SWITCHING ROUTINES USER'S PAGE NO. 18 E3 S3

```
0480   REF   2  LAST 1434   07,3467  6 3403 0  MIN-     AD      -GYROMIN        POSSIBLE NEGATIVE OUTPUT.
0481                        07,3470  0 0006 1           EXTEND
0482   REF   4  LAST 1434   07,3471  6 3274 0           BZMF    STRTGYR2

0483                        07,3472  0 0006 1  MAJ-     EXTEND                  DEFINITE NEGATIVE OUTPUT.
0484   REF   2  LAST 1434   07,3473  4 3513 1           DCS     GYROFRAC
0485   REF  34  LAST 1434   07,3474  20 071 0           DAS     RUPTREG1

0486   REF   8  LAST 1434   07,3475  3 0064 0           CA      ITEMP4          SELECT NEGATIVE TORQUING FOR THIS GYRO.
0487   REF  36  LAST 1434   07,3476  6 5007 0           AD      BIT9
0488                        07,3477  0 0006 1           EXTEND
0489   REF  18  LAST 1435   07,3500  05 014 1           WOR     CHAN14

0490   REF  35  LAST 1437   07,3501  4 0070 1           CS      RUPTREG1        SET UP RUPTREGS TO FALL INTO GMERGE.
0491   REF  36  LAST 1437   07,3502  54 070 1           TS      RUPTREG1        ALL NUMBERS PUT INTO GYROCMD ARE
0492   REF  10  LAST 1434   07,3503  4 0071 0           CS      RUPTREG2        POSITIVE - BIT9 OF CHAN 14 DETERMINES
0493   REF  11  LAST 1434   07,3504  7 6043 1           MASK    LOW7            THE SIGN OF THE COMMAND.
0494                        07,3505  4 0000 0           COM
0495   REF  11  LAST 1437   07,3506  56 071 1           XCH     RUPTREG2
0496                        07,3507  4 0000 0           COM
0497   REF   1              07,3510  1 3363 0           TCF     GMERGE

0498                        07,3511   01700 1  GDESELCT OCT     1700            TURN OFF SELECT AND ACTIVITY BITS.
0499                        07,3512   00000 1  GYROFRAC 2DEC   .215 B -21
0499                        07,3513   00034 0
```

L IMU MODE SWITCHING ROUTINES USER'S PAGE NO. 19 E3 S3

P0500 IMU MODE SWITCHING ROUTINES COME HERE WHEN ACTION COMPLETE.

```
0501                              07,3514  0 0006 1  ENDIMU   EXTEND            MODE IS BAD IF CAGE HAS OCCURED OR IF
0502  REF  33  LAST 1220         07,3515  00 011 1            READ    DSALMOUT  ISS WARNING IS ON.
0503  REF  80  LAST 1429         07,3516  7 5017 0            MASK    BIT1
0504  REF 378  LAST 1435         07,3517  10 000 0            CCS     A
0505  REF   4  LAST 1435         07,3520  1 3522 0            TCF     IMUBAD

0506  REF   3  LAST  588         07,3521  1 3550 0  IMUGOOD   TCF     GOODEND   WITH C(A) = 0.

0507  REF 269  LAST 1434         07,3522  3 5021 1  IMUBAD    CAF     ZERO
0508  REF   2  LAST  588         07,3523  1 3545 1            TCF     BADEND

0509  REF  50  LAST 1430         07,3524  3 5012 1  CAGETEST  CAF     BIT6      SUBROUTINE TO TERMINATE IMU MODE
0510  REF  60  LAST 1429         07,3525  7 1320 0            MASK    IMODES30  SWITCH IF IMU HAS BEEN CAGED.
0511  REF 379  LAST 1438         07,3526  10 000 0            CCS     A
0512  REF   5  LAST 1438         07,3527  1 3522 0            TCF     IMUBAD    DIRECTLY.
0513  REF 328  LAST 1433         07,3530  0 0002 0            TC      Q         WITH C(A) = +0.

0514  REF  61  LAST 1438         07,3531  4 1320 0  CAGETSTQ  CS      IMODES30  SKIP IF IMU NOT BEING CAGED.
0515  REF  51  LAST 1438         07,3532  7 5012 0            MASK    BIT6
0516  REF 380  LAST 1438         07,3533  10 000 0            CCS     A
0517  REF 329  LAST 1438         07,3534  24 002 0            INCR    Q
0518  REF 330  LAST 1438         07,3535  0 0002 0            TC      Q

0519  REF  62  LAST 1438         07,3536  4 1320 0  CAGETSTJ  CS      IMODES30  IF DURING MODE SWITCH INITIALIZATION
0520  REF  52  LAST 1438         07,3537  7 5012 0            MASK    BIT6      IT IS FOUND THAT THE IMU IS BEING CAGED,
0521  REF 381  LAST 1438         07,3540  10 000 0            CCS     A         SET IMUCADR TO -0 TO INDICATE OPERATION
0522  REF 331  LAST 1438         07,3541  0 0002 0            TC      Q         COMPLETE BUT FAILED. RETURN IMMEDIATELY

0523  REF 270  LAST 1438         07,3542  4 5021 0            CS      ZERO      TO SWRETURN.
0524  REF   3  LAST 1225         07,3543  55'322 1            TS      IMUCADR
0525  REF   7  LAST 1430         07,3544  1 2640 0            TCF     MODEEXIT
```

L IMU MODE SWITCHING ROUTINES USER'S PAGE NO. 20 E3 S3

P0526 GENERALIZED MODE SWITCHING TERMINATION. ENTER AT GOODEND FOR SUCCESSFUL COMPLETION OF AN I/O OPERATION
R0528 OR AT BADEND FOR A N UNSUCCESSFUL ONE. C(A) OR ARRIVAL =0 FOR IMU, 1 FOR OPTICS.

```
0530   REF  12  LAST 1437   07,3545  54 071 0  BADEND   TS     RUPTREG2      DEVICE INDEX.
0531   REF 271  LAST 1438   07,3546  4 5021 0           CS     ZERO          FOR FAILURE.
0532   REF   4  LAST 1438   07,3547  1 3552 1           TCF    GOODEND +2

0533   REF  13  LAST 1439   07,3550  54 071 0  GOODEND  TS     RUPTREG2
0534   REF 163  LAST 1431   07,3551  4 5017 0           CS     ONE           FOR SUCCESS.

0535   REF   6  LAST 1411   07,3552  54 072 0           TS     RUPTREG3
0536   REF  14  LAST 1439   07,3553  50 071 1           INDEX  RUPTREG2      SEE IF USING PROGRAM ASLEEP.
0537   REF   5  LAST  243   07,3554  11'322 1           CCS    MODECADR
0538                        07,3555  1 3557 1           TCF    +2            YES - WAKE IT UP.
0539   REF   1              07,3556  1 3567 1           TCF    ENDMODE       IF 0, PROGRAM NOT IN YET.

0540   REF 272  LAST 1439   07,3557  3 5021 1           CAF    ZERO          WAKE SLEEPING PROGRAM.
0541   REF  15  LAST 1439   07,3560  50 071 1           INDEX  RUPTREG2
0542   REF   6  LAST 1439   07,3561  57'322 0           XCH    MODECADR
0543   REF   7  LAST 1432   07,3562  0 5201 1           TC     JOBWAKE

0544   REF   7  LAST 1439   07,3563  4 0072 0           CS     RUPTREG3      ADVANCE LOC IF SUCCESSFUL.
0545   REF  23  LAST 1325   07,3564  50 064 0           INDEX  LOCCTR
0546   REF  42  LAST 1220   07,3565  26 164 0           ADS    LOC

0547   REF  69  LAST 1435   07,3566  1 5324 0           TCF    TASKOVER

0548   REF   8  LAST 1439   07,3567  3 0072 1  ENDMODE  CA     RUPTREG3      -0 INDICATES OPERATION COMPLETE BUT
0549   REF  16  LAST 1439   07,3570  50 071 1           INDEX  RUPTREG2      UNSUCCESSFUL - -1 INDICATES COMPLETE AND
0550   REF   7  LAST 1439   07,3571  55'322 1           TS     MODECADR      SUCCESSFUL.
0551   REF  70  LAST 1439   07,3572  1 5324 0           TCF    TASKOVER
```

L IMU MODE SWITCHING ROUTINES USER'S PAGE NO. 21 E3 S3

```
P0552           GENERAL STALLING ROUTINE. USING PROGRAMS COME HERE TO WAIT FOR I/O COMPLETION.

R0554   PROGRAM DESCRIPTION                                  DATE- 21 FEB 1967
R0555                                              LOG SECTION IMU MODE SWITCHING
R0556   MOD BY- R.MELANSON TO ADD DOCUMENTATION      ASSEMBLY SUNDISK  REV.  82

R0557   FUNCTIONAL DESCRIPTION-
R0558     TO DELAY FURTHER EXECUTION OF THE CALLING ROUTINE UNTIL ITS SELECTED
R0559     I/O FUNCTION IS COMPLETE.THE FOLLOWING CHECKS ON THE CALLING ROUTINE:S
R0560     MODECADR ARE MADE AND ACTED UPON.
R0561       1) +0 INDICATES INCOMPLETE I/O OPERATION.CALLING ROUTINE IS PUT TO
R0562          SLEEP.
R0563       2) -1 INDICATES COMPLETED I/O OPERATION. STALL BYPASSES JOBSLEEP
R0564          CALL AND RETURNS TO CALLING ROUTINE AT L+3
R0565       3) -0 INDICATES COMPLETED I/O WITH FAILURE. STALL CLEARS MODECADR
R0566          AND RETURNS TO CALLING ROUTINE AT L+2.
R0567       4) VALUE GREATER THAN 0 INDICATES TWO ROUTINES CALLING FOR USE OF
R0568          SAME DEVICE. STALL EXITS TO ABORT WHICH EXECUTES A PROGRAM
R0569          RESTART WHICH IN TURN CLEARS ALL MODECADR REGISTERS.

R0570    CALLING SEQUENCE-
R0571     L   TC   BANKCALL
R0572     L+1 CADR (ONE OF 5 STALL ADDRESSES I.E. IMUSTALL,OPTSTALL,RADSTALL,
R0573                 AOTSTALL,OR ATTSTALL)

R0574    NORMAL-EXIT MODE-
R0575     TCF   JOBSLEEP OR TCF  MODEXIT

R0576   ALARM OR ABORT EXIT MODE-
R0577     TC   ABORT

R0578   OUTPUT-
R0579     MODECADR= CADR IF JOBSLEEP
R0580     MODECADR=+0    IF I/O COMPLETE
R0581     BUF2=L+3       IF I/O COMPLETE AND GOOD.
R0582     BUF2=L+2 IF I/O COMPLETE BUT FAILED.

R0583   ERASABLE INITIALIZATION-
R0584     BUF2 CONTAINS RETURN ADDRESS PLUS 1,(L+2)
R0585     BUF2+1 CONTAINS FBANK VALUE OF CALLING ROUTINE.
R0586     MODECADR OF CALLING ROUTINE CONTAINS +0,-1,-0 OR  CADR RETURN ADDRESS.

R0587   DEBRIS-
R0588     RUPTREG2 AND CALLING ROUTINE MODECADR.

 0589   REF 164  LAST 1439   07,3573  3 5017 1  AOTSTALL CAF    ONE             AOT.
 0590   REF   1              07,3574  0 3600 1           TC     STALL

 0591   REF  76  LAST 1430   07,3575  3 5016 0  RADSTALL CAF    TWO
 0592   REF   2  LAST 1440   07,3576  1 3600 0           TCF    STALL
```

L IMU MODE SWITCHING ROUTINES USER'S PAGE NO. 22 E3 S3

```
0593   REF   1                07,3573                OPTSTALL EQUALS ADTSTALL

0594   REF 273  LAST 1439     07,3577   3 5021 1  IMUSTALL CAF     ZERO        IMU.

0595                          07,3600   0 0004 0  STALL    INHINT
0596   REF  17  LAST 1439     07,3601   54 071 0           TS      RUPTREG2    SAVE DEVICE INDEX.
0597   REF 382  LAST 1438     07,3602   50 000 1           INDEX   A           SEE IF OPERATION COMPLETE.
0598   REF   8  LAST 1439     07,3603   11'322 1           CCS     MODECADR
0599   REF   1                07,3604   1 3622 0           TCF     MODABORT    ALLOWABLE STATES ARE +0, -1, AND -0.
0600   REF   1                07,3605   1 3616 1           TCF     MODESLP     OPERATION INCOMPLETE.
0601   REF   1                07,3606   1 3612 0           TCF     MODEGOOD    COMPLETE AND GOOD IF = -1.

0602   REF  18  LAST 1441     07,3607   50 071 1  MG2      INDEX   RUPTREG2    COMPLETE AND FAILED IF -0. RESET TO +0.
0603   REF   9  LAST 1441     07,3610   55'322 1           TS      MODECADR    RETURN TO CALLER.
0604   REF   8  LAST 1438     07,3611   1 2640 0           TCF     MODEEXIT

0605   REF 383  LAST 1441     07,3612   10 000 0  MODEGOOD CCS     A           MAKE SURE INITIAL STATE -1.
0606   REF   2  LAST 1441     07,3613   1 3622 0           TCF     MODABORT

0607   REF  22  LAST 1431     07,3614   24 133 0           INCR    BUF2        IF SO, INCREMENT RETURN ADDRESS AND
0608   REF   1                07,3615   1 3607 1           TCF     MG2         RETURN IMMEDIATELY, SETTING CADR = +0.

0609   REF   5  LAST  776     07,3616   0 4711 1  MODESLP  TC      MAKECADR    CALL FROM SWITCHABLE FIXED ONLY.
0610   REF  19  LAST 1441     07,3617   50 071 1           INDEX   RUPTREG2
0611   REF  10  LAST 1441     07,3620   55'322 1           TS      MODECADR
0612   REF   6  LAST 1431     07,3621   1 5175 0           TCF     JOBSLEEP

0613   REF  10  LAST 1340     07,3622   0 5721 0  MODABORT TC      PODOOO      TWO PROGRAMS USING SAME DEVICE.
0614                          07,3623    01210 0           OCT     1210
```

P0615 CONSTANTS FOR MODE SWITCHING ROUTINES

```
0616   REF   4  LAST 1040      5771                BITS3&4   =       OCT14
0617   REF   7  LAST 1396      5033                BITS4&6   =       OCT50
0618   REF   4  LAST  165      5027                BITS4-5   EQUALS  BITS4&5
0619   REF  29  LAST 1434      5010                IMUSEFLG  EQUALS  BIT8          INTERPRETER SWITCH 7.
0620                       07,3624   77500 1  -COMMAX   DEC     -191
0621                       07,3625   77477 0  -COMMAX-  DEC     -192
0622                       07,3626   00074 1  600MS     DEC     60
0623   REF   3  LAST  424  07,3073                IMUFIN20  =       IMUFINE
0624   REF   4  LAST  418  07,3627   3 1325 1  GOMANUR   CA      ATTCADR       IS KALCMANU FREE
0625                       07,3630   0 0006 1             EXTEND
0626                       07,3631   1 3634 1             BZF     +3

0627   REF  11  LAST 1441  07,3632   0 5721 0             TC      POODOO        NO
0628                       07,3633    01210 0             OCT     1210          2 TRYING TO USE SAME DEVICE

0629                       07,3634   0 0006 1  +3         EXTEND
0630   REF  23  LAST 1441  07,3635   3 0134 1             DCA     BUF2
0632   REF   5  LAST 1442  07,3636   53'326 0             DXCH    ATTCADR       SAVE FINAL RETURN FOR KALCMAN3

0633   REF  34  LAST 1411  07,3637   3 0006 1             CA      BBANK
0634   REF  22  LAST 1433  07,3640   7 5023 1             MASK    SEVEN
0635   REF   6  LAST 1442  07,3641   27'326 0             ADS     ATTCADR +1

0642   REF  28  LAST 1218  07,3642   3 0167 1             CA      PRIORITY
0643   REF   2  LAST  202  07,3643   7 7674 1             MASK    PRIO37
0644   REF   2  LAST  418  07,3644   55'327 1             TS      ATTPRIO       SAVE USERS PRIO

06452  REF   1            07,3645   3 3651 0             CAF     KALEBCON      SET EBANK FOR KALCMAN3
06453  REF  63  LAST 1435  07,3646   54 003 0             TS      EBANK
06454  REF  59  LAST 1397  07,3647   0 4701 0             TC      POSTJUMP
06455  REF   1            07,3650    44000 1             CADR    KALCMAN3
06456  REF  16  LAST  417  07,3651    03261 1  KALEBCON  ECADR   BCDU
```

L IMU MODE SWITCHING ROUTINES USER'S PAGE NO. 24 E3 S3

```
R0646   PROGRAM DESCRIPTION
R0647   IMU STATUS CHECK ROUTINE R02  (SUBROUTINE UTILITY)
R0648   MOD NO - 1
R0649   MOD BY - N.BRODEUR
R0650   FUNCTIONAL DESCRIPTION
R0651
R0652   TO CHECK WHETHER IMU IS ON AND IF ON WHETHER IT IS ALIGNED TO AN
R0653   ORIENTATION KNOWN BY THE CMC. TO REQUEST SELECTION OF THE APPROPRIATE
R0654   PROGRAM IF THE IMU IS OFF OR NOT ALIGNED TO AN ORIENTATION KNOWN BY THE
R0655   CMC. CALLED THROUGH BANKCALL
R0656   CALLING SEQUENCE-
R0657
R0658   L       TC      BANKCALL
R0659   L+1     CADR    R02BOTH
R0660   SUBROUTINES CALLED
R0661
R0662           VARALARM
R0663           FLAGUP
R0664   NORMAL EXIT MODES
R0665
R0666   AT L+2 OF CALLING SEQUENCE
R0667   ALARM OR ABORT EXIT MODES
R0668           GOTOPOOH, WITH ALARM
R0673   ERASABLE INITIALIZATION REQUIRED
R0674
R0675   NONE
R0676   DEBRIS
R0677
R0678   CENTRALS-A,Q,L
 0679                           34,3763                         BANK    34
 0680   REF   1                 07,2000                         SETLOC  R02
 0681                           07,3652                         BANK
 0682   REF   1                                                 COUNT   04/R02          COUNT*

 0683                           07,3652   00063 1  DEC51        DEC     51
 0684   REF  54  LAST 1433      07,3653  3 5003 1  R02BOTH      CAF     BIT13
 0685   REF  53  LAST 1198      07,3654  7 0077 0               MASK    STATE +3        REFSMFLG
 0686   REF 384  LAST 1441      07,3655  10 000 0               CCS     A
 0687   REF   2  LAST  787      07,3656  0 3667 0               TC      R02ZERO         ZERO IMUS

 0688   REF  63  LAST 1438      07,3657  3 1320 1               CA      IMODES30
 0689   REF  37  LAST 1437      07,3660  7 5007 1               MASK    BIT9            IS ISS INITIALIZED
 0690                           07,3661  0 0006 1               EXTEND
 0691                           07,3662  1 3664 1               BZF     +2
 0692   REF  45  LAST 1435      07,3663  4 5014 0               CS      BIT4            SEND IMU ALARM CODE 210
 0693   REF   1                 07,3664  6 3672 1               AD      OCT220          SEND REFSMM ALARM
 0694   REF   4  LAST  900      07,3665  0 5764 1               TC      VARALARM

 0695   REF  73  LAST  900      07,3666  0 4106 1               TC      GOTOPOOH
```

L IMU MODE SWITCHING ROUTINES USER'S PAGE NO. 25 E3 S3

```
0700   REF  55  LAST 1360   07,3667  0 5546 0  ROZZERO  TC      UPFLAG
0701   REF   4  LAST  427   07,3670   00007 0            ADRES   IMUSE
0702   REF  10  LAST 1429   07,3671  1 4675 0           TCF     SWRETURN
07025                       07,3672   00220 1  OCT220    OCT     220
```

P0703 PROGRAM DESCRIPTION P06 10FEB67

R0704 TRANSFER THE ISS/CMC FROM THE OPERATE TO THE STANDBY CONDITION.

R0705 THE NORMAL CONDITION OF READINESS OF THE GNCS WHEN NOT IN USE IS STANDBY. IN THIS CONDITION THE IMU
R0707 HEATER POWER IS ON. THE IMU OPERATE POWER IS OFF. THE COMPUTER POWER IS ON. THE OPTICS POWER IS OFF. THE
R0709 CMC STANDBY ON THE MAIN AND LEB DISKYS IS ON.

R0710 CALLING SEQUENCE:
R0711 ASTRONAUT REQUEST THROUGH DSKY V37E 06E.

R0712 SUBROUTINES CALLED:
R0713 GOPERF1
R0716 BANKCALL
R0719 FLAGDOWN

L IMU MODE SWITCHING ROUTINES USER'S PAGE NO. 27 E3 S3

P0810 PRESTAND PREPARES FOR STANDBY BY SNAPSHOTTING THE SCALER AND TIME1 TIME2
R0811 THE LOW 5 BITS OF THE SCALER ARE INSPECTED TO INSURE COMPATABILITY
R0812 BETWEEN THE SCALER READING AND THE TIME1 TIME2 READING.

```
08125  REF   1                26,2000                          SETLOC P05P06
08126                         26,3660                          BANK

0813   REF   3  LAST  208       1150                          EBANK= TIME2SAV
0814   REF   1                                                 COUNT* $$/P06

08145  REF  56  LAST 1444    26,3660  0 5546 0  P06     TC     UPFLAG        SET NODOV37 BIT
08146  REF   3  LAST 1314    26,3661   00054 0          ADRES  NODOFLAG

0815                          26,3662  0 0004 0  PRESTAND INHINT
0816                          26,3663  0 0006 1           EXTEND
0817   REF  31  LAST 1418    26,3664  3 0025 0           DCA    TIME2         SNAPSHOT TIME1TIME2
0818   REF   4  LAST 1446    26,3665  53'151 1           DXCH   TIME2SAV
0819   REF   1                26,3666  0 3717 0           TC     SCALPREP
0820   REF   1                26,3667  0 3662 0           TC     PRESTAND      T1,T2,SCALER NOT COMPATIBLE
0821   REF 686  LAST 1431     26,3670  52 155 1           DXCH   MPAC          T1,T2 AND SCALER OK
0822   REF   1                26,3671  53'153 0           DXCH   SCALSAVE      STORE SCALER
0823                          26,3672  0 0004 0           INHINT
0824   REF 244  LAST 1066     26,3673  0 4662 1           TC     BANKCALL
0825   REF   3  LAST  154     26,3674   17060 1           CADR   RNDREFDR      REFSMM, DRIFT, TRACK FLAGS DOWN

0826   REF  60  LAST 1314     26,3675  0 5560 1           TC     DOWNFLAG
0827   REF   5  LAST 1444     26,3676   00007 0          ADRES  IMUSE         IMUSE DOWN
08271  REF  61  LAST 1446     26,3677  0 5560 1           TC     DOWNFLAG
08272  REF   5  LAST  619     26,3700   00010 0          ADRES  RNDVZFLG      RNDVZFLG DOWN

0828   REF  36  LAST 1422     26,3701  3 5005 1           CAF    BIT11
0829                          26,3702  0 0006 1           EXTEND
0830   REF  14  LAST 1098     26,3703  05 013 0           WOR    CHAN13        SET STANDBY ENABLE BIT

0831   REF 103  LAST 1409     26,3704  0 5412 0           TC     PHASCHNG      SET RESTART TO POSTAND WHEN STANDBY
0832                          26,3705   07024 0           OCT    07024           RECOVERS
0833                          26,3706   20000 0           OCT    20000
08335  REF   2  LAST 1446       1152                      EBANK= SCALSAVE
0834   REF   1                26,3707   03737 1          2CADR  POSTAND
0834   REF   1                26,3710   54062 1
0835   REF   1                26,3711  3 5036 1           CAF    OCT62
0836   REF 245  LAST 1446     26,3712  0 4662 1           TC     BANKCALL
0837   REF   8  LAST  782     26,3713   21045 0          CADR   GOPERF1
0838                          26,3714  1 3711 1           TCF    -3
0839                          26,3715  1 3711 1           TCF    -4
0840                          26,3716  1 3711 1           TCF    -5

08405  REF   9  LAST 1066       5036              OCT62  EQUALS .5SEC         DEC 50 = OCT 62
```

R0841 THE LOW 5 BITS OF THE SCALER READS 10000 FOR THE FIRST INTERVAL AFTER A

R0842 T1 INCREMENT. IF SCALPREP DETECTS THIS INTERVAL THE T1,T2 AND SCALER
R0843 DATA ARE NOT COMPATABLE AND RETURN IS TO L+1 FOR ANOTHER READING OF THE
R0844 DATA. OTHERWISE, THE RETURN IS TO L+2 TO PROCEED. ROUTINE ALSO PREPARES
R0845 THE SCALER READING FOR COMPUTATION OF THE INCREMENT TO UPDATE T1T2. (THE
R0846 10 MS BIT (BIT 6) OF THE SCALER IS INCREMENTED 5 MS OUT OF PHASE FROM
R0847 T1.) ADDITION OF 5 MS (BIT 5) TO THE SCALER READING HAS THE EFFECT OF
R0848 ADJUSTING BIT 6 IN THE SCALER TO BE IN PHASE WITH BIT 1 OF T1. THE LOW 5
R0849 BITS OF THE SCALER READING ARE THEN SET TO ZERO. TO TRUNCATE THE SCALER
R0850 DATA TO 10 MS. RESULTS ARE STORED IN MPAC, +1.

```
 0851                          26,3717  0 0006 1  SCALPREP EXTEND
 0852  REF 687  LAST 1446     26,3720  22 156 0           QXCH   MPAC     +2
 0853  REF   3  LAST  431     26,3721  0 4554 1           TC     FINETIME +1
 0854                          26,3722  0 0003 1           RELINT
 0855  REF 688  LAST 1447     26,3723  52 155 1           DXCH   MPAC
 0856  REF  39  LAST 1428     26,3724  3 5013 0           CA     BIT5          ADD 5 MS TO THE SCALER READING.
 0857  REF 188  LAST 1434     26,3725  54 001 1           TS     L
 0858  REF 274  LAST 1441     26,3726  3 5021 1           CA     ZERO
 0859  REF 689  LAST 1447     26,3727  20 155 1           DAS    MPAC
 0860  REF   9  LAST  362     26,3730  4 4362 0           CS     LOW5          SET LOW 5 BITS OF (SCALER+5MS) TO ZERO
 0861  REF 690  LAST 1447     26,3731  7 0155 1           MASK   MPAC     +1   AND STORE RESULTS IN MPAC,+1.
 0862  REF 691  LAST 1447     26,3732  56 155 0           XCH    MPAC     +1
 0863  REF  10  LAST 1447     26,3733  7 4362 0           MASK   LOW5          TEST LOW 5 BITS OF SCALER FOR THE FIRST
A0864                                                                        INTERVAL AFTER THE T1 INCREMENT
A0865                                                                        (NOW = 00000, SINCE BIT 5 ADDED).
 0866  REF 385  LAST 1443     26,3734  10 000 0           CCS    A             IS IT 1ST INTERVAL AFTER T1 INCREMENT
 0867  REF 692  LAST 1447     26,3735  24 156 0           INCR   MPAC +2       NO
 0868  REF 693  LAST 1447     26,3736  0 0156 0           TC     MPAC +2       YES
```

R0869 POSTAND RECOVERS TIME AFTER STANDBY.THE SCALER IS SNAPSHOTTED AND THE
R0870 TIME1 TIME2 COUNTER IS SET TO ZERO. THE LOW 5 BITS OF THE SCALER ARE
R0871 INSPECTED TO INSURE COMPATABILITY BETWEEN THE SCALER READING AND THE
R0872 CLEARING OF THE TIME COUNTER. IT THEN COMPUTES THE DIFFERENCE IN SCALER
R0873 VALUES (IN DP) AND ADDS THIS TO THE PREVIOUSLY SNAPSHOTTED VALUES OF
R0874 TIME1 TIME2 AND PLACES THIS NEW TIME INTO THE TIME1 TIME2 COUNTER.

```
 0875  REF   1                                          COUNT* $$/P05

 0876  REF  37  LAST 1446     26,3737  4 5005 0  POSTAND CS     BIT11         RECOVER TIME AFTER STANDBY.
 0877                          26,3740  0 0006 1           EXTEND
 0878  REF  15  LAST 1446     26,3741  03 013 0           WAND   CHAN13        CLEAR STANDBY ENABLE BIT
 0879                          26,3742  0 0004 0           INHINT
 0880  REF 275  LAST 1447     26,3743  3 5021 1           CA     ZERO
 0881  REF 189  LAST 1447     26,3744  54 001 1           TS     L
 0882  REF  32  LAST 1446     26,3745  52 025 1           DXCH   TIME2         CLEAR TIME1TIME2
 0883  REF   2  LAST 1446     26,3746  0 3717 0           TC     SCALPREP      STORE SCALER IN MPAC, MPAC+1
 0884  REF   2  LAST 1446     26,3747  0 3742 0           TC     POSTAND +3    T1,T2,SCALER NOT COMPATIBLE
 0885                          26,3750  0 0006 1           EXTEND               T1,T2 AND SCALER OK
 0886  REF   3  LAST 1446     26,3751  4 1153 0           DCS    SCALSAVE
 0887  REF 694  LAST 1447     26,3752  20 155 1           DAS    MPAC          FORM DP DIFFERENCE OF POSTSTANDBY SCALER
```

L IMU MODE SWITCHING ROUTINES USER'S PAGE NO. 29 E2 S3

```
0888  REF  46  LAST 1435   26,3753  3 5006 1          CAF     BIT10          MINUS PRESTANDBY SCALER AND SHIFT RIGHT
0889  REF   9  LAST  380   26,3754  0 7256 1          TC      SHORTMP        5 TO ALIGN BITS WITH TIME1TIME2.
0890  REF 276  LAST 1447   26,3755  3 5021 1          CAF     ZERO
0891  REF 695  LAST 1447   26,3756  54 156 1          TS      MPAC    +2     NEEDED FOR TP AGREE
0892  REF  12  LAST 1430   26,3757  0 7226 0          TC      TPAGREE        MAKE DP DIFF AGREE
0893  REF 696  LAST 1448   26,3760  10 154 0          CCS     MPAC
0894  REF   1              26,3761  0 3766 0          TC      POSTCOM        IF DP DIFF NET +, NO SCALER OVERFLOW
0895  REF   2  LAST 1448   26,3762  0 3766 0          TC      POSTCOM        BETWEEN PRE AND POST STANDBY.
0896                       26,3763  0 3764 1          TC      +1             IF DP DIFF NET -, SCALER OVERFLOWED. ADD
0897  REF  47  LAST 1448   26,3764  3 5006 1          CAF     BIT10          BIT 10 TO HIGH DIFF TO CORRECT.
0898  REF 697  LAST 1448   26,3765  26 154 0          ADS     MPAC
0899                       26,3766  0 0006 1 POSTCOM  EXTEND
0900  REF   5  LAST 1446   26,3767  3 1151 0          DCA     TIME2SAV       C(MPAC,+1) IS MAGNITUDE OF DELTA SCALER.
0901  REF 698  LAST 1448   26,3770  20 155 1          DAS     MPAC           PRESTANDBY TIME1TIME2
0902  REF  13  LAST 1448   26,3771  0 7226 0          TC      TPAGREE        FORCE SIGN AGREEMENT
0903  REF 699  LAST 1448   26,3772  52 155 1          DXCH    MPAC           UPDATED VALUE FOR T1,T2.
0904  REF  33  LAST 1447   26,3773  20 025 1          DAS     TIME2          LOAD UPDATED VALUE INTO T1,T2. WITH
09045 REF  62  LAST 1446   26,3774  0 5560 1          TC      DOWNFLAG       CLEAR NODOFLAG
09046 REF   4  LAST 1446   26,3775   00054 0          ADRES   NODOFLAG

0905  REF  74  LAST 1443   26,3776  0 4106 1          TC      GOTOPOOH
```

L KEYRUPT, UPRUPT USER'S PAGE NO. 1 EO S3

```
0001                                14,3761                         BANK    14
0002  REF   1                       07,2000                         SETLOC  KEYRUPT
0003                                07,3673                         BANK
0004  REF   1                                                       COUNT*  $$/KEYUP

0005  REF  25  LAST 1232           07,3673  54 016 1  KEYRUPT1 TS     BANKRUPT
0006  REF 332  LAST 1438           07,3674  56 002 0           XCH    Q
0007  REF  20  LAST 1232           07,3675  54 012 0           TS     QRUPT
0008  REF   2  LAST  356           07,3676  0 4414 1           TC     LODSAMPT     TIME IS SNATCHED IN RUPT FOR NOUN 65.
0009  REF  11  LAST 1447           07,3677  3 4362 1           CAF    LOW5
0010                                07,3700  0 0006 1           EXTEND
0011  REF   2  LAST  190           07,3701  02 015 1           RAND   MNKEYIN      CHECK IF KEYS 5M-1M ON
0012  REF   6  LAST 1411           07,3702  54 073 1  KEYCOM   TS     RUPTREG4
0013  REF  11  LAST  698           07,3703  4 0101 0           CS     FLAGWRD5
0014  REF  53  LAST 1428           07,3704  7 5001 1           MASK   BIT15
0015  REF  12  LAST 1449           07,3705  26 101 0           ADS    FLAGWRD5

0016  REF   6  LAST 1204           07,3706  3 4371 0  ACCEPTUP CAF    CHRPRIO      (NOTE: RUPTREG4 = KEYTEMP1)
0017  REF  33  LAST 1419           07,3707  0 5134 1           TC     NOVAC
0018  REF  66  LAST  376              0777                     EBANK=  DSPCOUNT
0019  REF   1                     07,3710   02000 0           2CADR  CHARIN
0019  REF   1                     07,3711   60101 1
0020  REF   7  LAST 1449           07,3712  3 0073 0           CA     RUPTREG4
0021  REF  24  LAST 1439           07,3713  50 064 0           INDEX  LOCCTR
0022  REF 700  LAST 1448           07,3714  54 154 0           TS     MPAC         LEAVE 5 BIT KEY CDE IN MPAC FOR CHARIN
0023  REF  48  LAST 1099           07,3715  0 5333 1           TC     RESUME
```

P0024 UPRUPT PROGRAM

```
0025  REF  26  LAST 1449  07,3716  54 016 1  UPRUPT  TS    BANKRUPT
0026  REF 333  LAST 1449  07,3717  56 002 0           XCH   Q
0027  REF  21  LAST 1449  07,3720  54 012 0           TS    QRUPT
0028  REF   3  LAST 1449  07,3721  0 4414 1           TC    LODSAMPT     TIME IS SNATCHED IN RUPT FOR NOUN 65.
0029  REF 277  LAST 1448  07,3722  3 5021 1           CAF   ZERO
0030  REF   2  LAST  192  07,3723  56 045 0           XCH   INLINK
0031  REF   2  LAST  132  07,3724  54 073 1           TS    KEYTEMP1
0032  REF  34  LAST 1395  07,3725  3 5015 0           CAF   BIT3         TURN ON UPACT LIGHT
0033                       07,3726  0 0006 1           EXTEND             (BIT 3 OF CHANNEL 11)
0034  REF  34  LAST 1438  07,3727  05 011 1           WOR   DSALMOUT
0035  REF  12  LAST 1449  07,3730  3 4362 1  UPRPT1   CAF   LOW5         TEST FOR TRIPLE CHAR REDUNDANCY
0036  REF   3  LAST 1450  07,3731  7 0073 1           MASK  KEYTEMP1     LOW5 OF WORD
0037  REF   4  LAST 1450  07,3732  56 073 0           XCH   KEYTEMP1     LOW5 INTO KEYTEMP1
0038                       07,3733  0 0006 1           EXTEND
0039  REF  48  LAST 1448  07,3734  7 5006 0           MP    BIT10        SHIFT RIGHT 5
0040  REF   1             07,3735  54 734 0           TS    KEYTEMP2
0041  REF  13  LAST 1450  07,3736  7 4362 0           MASK  LOW5         MID 5
0042  REF   1             07,3737  6 3773 1           AD    HI10
0043  REF   1             07,3740  0 3770 1           TC    UPTEST
0044  REF  49  LAST 1450  07,3741  3 5006 1           CAF   BIT10
0045                       07,3742  0 0006 1           EXTEND
0046  REF   2  LAST 1450  07,3743  7 0734 0           MP    KEYTEMP2     SHIFT RIGHT 5
0047  REF  14  LAST 1450  07,3744  7 4362 0           MASK  LOW5         HIGH 5
0048                       07,3745  4 0000 0           COM
0049  REF   2  LAST 1450  07,3746  0 3770 1           TC    UPTEST

0050  REF   1             07,3747  4 3776 0  UPOK     CS    ELRCODE      CODE IS GOOD. IF CODE = 'ERROR RESET',
0051  REF   5  LAST 1450  07,3750  6 0073 0           AD    KEYTEMP1     CLEAR UPLOCKFL(SET BIT4 OF FLAGWRD7 = 0)
0052                       07,3751  0 0006 1           EXTEND             IF CODE DOES NOT = 'ERROR RESET', ACCEPT
0053  REF   1             07,3752  1 3760 1           BZF   CLUPLOCK     CODE ONLY IF UPLOCKFL IS CLEAR (=0).

0054  REF  46  LAST 1443  07,3753  3 5014 1           CAF   BIT4         TEST UPLOCKFL FOR 0 OR 1.
0055  REF  19  LAST  823  07,3754  7 0103 1           MASK  FLAGWRD7
0056  REF 386  LAST 1447  07,3755  10 000 0           CCS   A
0057  REF  49  LAST 1449  07,3756  0 5333 1           TC    RESUME       UPLOCKFL = 1
0058  REF   1             07,3757  0 3706 0           TC    ACCEPTUP     UPLOCKFL = 0

0059  REF  47  LAST 1450  07,3760  4 5014 0  CLUPLOCK CS    BIT4         CLEAR UPLOCKFL (I.E., SET BIT4 OF
0060  REF  20  LAST 1450  07,3761  7 0103 1           MASK  FLAGWRD7     FLAGWRD7 = 0)
0061  REF  21  LAST 1450  07,3762  54 103 1           TS    FLAGWRD7
0062  REF   2  LAST 1450  07,3763  0 3706 0           TC    ACCEPTUP

A0063                                                                  CODE IS BAD
0064  REF  22  LAST 1450  07,3764  4 0103 1  TMFAIL2  CS    FLAGWRD7     LOCK OUT FURTHER UPLINK ACTIVITY
0065  REF  48  LAST 1450  07,3765  7 5014 0           MASK  BIT4         (BY SETTING UPLOCKFL = 1) UNTIL
0066  REF  23  LAST 1450  07,3766  26 103 1           ADS   FLAGWRD7     'ERROR RESET' IS SENT VIA UPLINK.
0067  REF  50  LAST 1450  07,3767  0 5333 1           TC    RESUME
0069  REF   6  LAST 1450  07,3770  6 0073 0  UPTEST   AD    KEYTEMP1
```

```
0070   REF 387  LAST 1450   07,3771  10 000 0           CCS     A
0071   REF   1               07,3772  0 3764 1           TC      TMFAIL2
0072                         07,3773   77740 1  HI10     OCT     77740
0073   REF   2  LAST 1451   07,3774  0 3764 1           TC      TMFAIL2
0074   REF 334  LAST 1450   07,3775  0 0002 0           TC      Q

0075                         07,3776   00022 1  ELRCODE  OCT     22

R0076  'UPLINK ACTIVITY LIGHT' IS TURNED OFF BY .....
R0077            1.    VBRELDSP
R0078            2.    ERROR RESET
R0079            3.    UPDATE PROGRAM(P27) ENTERED BY V70,V71,V72,AND V73.


R0080                                  -
R0081  THE RECEPTION OF A BAD CODE(I.E  CCC FAILURE) LOCKS OUT FURTHER UPLINK ACTIVITY BY SETTING BIT4 OF FLAGWRD7 = 1.
R0083  THIS INDICATION WILL BE TRANSFERRED TO THE GROUND BY THE DOWNLINK WHICH DOWNLINKS ALL FLAGWORDS.
R0085  WHEN UPLINK ACTIVITY IS LOCKED OUT ,IT CAN BE ALLOWED WHEN THE GROUND UPLINKS AND 'ERROR RESET' CODE.
R0087  (IT IS RECOMMENDED THAT THE 'ERROR LIGHT RESET' CODE IS PRECEEDED BY 16 BITS THE FIRST OF WHICH IS 1 FOLLOWED
R0089  BY 15 ZEROES. THIS WILL ELIMINATE EXTRANEOUS BITS FROM INLINK WHICH MAY HAVE BEEN LEFT OVER FROM THE ORIGINAL
R0091  FAILURE)
R0092  UPLINK ACTIVITY IS ALSO ALLOWED(UNLOCKED) DURING FRESH START WHEN FRESH START SETS BIT4 OF FLAGWRD7 = 0.
```

L DISPLAY INTERFACE ROUTINES USER'S PAGE NO. 1 EO S3

R0001 DISPLAYS CAN BE CLASSIFIED INTO THE FOLLOWING CATEGORIES-

R0002 1. PRIORITY DISPLAYS- DISPLAYS WHICH TAKE PRIORITY OVER ALL OTHER DISPLAYS. USUALLY THESE DISPLAYS ARE SENT
R0004 OUT UNDER CRITICAL ALARM CONDITIONS.
R0005 2. EXTENDED VERB DISPLAYS- ALL EXTENDED VERBS AND MARK ROUTINES SHOULD USE EXTENDED VERB (MARK) DISPLAYS.
R0007 3. NORMAL DISPLAYS- ALL MISSION PROGRAM DISPLAYS WHICH INTERFACE WITH THE ASTRONAUT DURING THE NORMAL
R0009 SEQUENCE OF EVENTS.
R0010 4. MISC. DISPLAYS- ALL DISPLAYS NOT HANDLED BY THE DISPLAY INTERFACEROUTINES. THESE INCLUDE SUCH DISPLAYS AS
R0012 MM DISPLAYS AND SPECIAL PURPOSE DISPLAYS HANDLED BY PINBALL.

R0013 5. ASTRONAUT INITIATED DISPLAYS- ALL DISPLAYS INITIATED EXTERNALLY.
R0014 THE FOLLOWING TERMS ARE USED TO DESCRIBE THE STATUS OF DISPLAYS-

R0015 1. ACTIVE-THE DISPLAY WHICH IS (1) BEING DISPLAYED TO THE ASTRONAUT AND WAITING FOR A RESPONSE OR
R0017 (2) WAITING FIRST IN LINE FOR THE ASTRONAUT TO FINISH USING THE DSKY OR (3) BEING DISPLAYED ON THE DSKY
R0019 BUT NOT WAITING FOR A RESPONSE.
R0020 2. INACTIVE -A DISPLAY WHICH HAS (1) BEEN ACTIVE BUT WAS INTERRUPTEDBY A DISPLAY OF HIGHER PRIORITY,
R0022 (2) BEEN PUT INTO THE WAITING LIST AT TIME IT WAS REQUESTED DUE TO THE FACT A HIGHER PRIORITY DISPLAY
R0024 WAS ALREADY GOING, (3) BEEN INTERRUPTED BY THE ASTRONAUT (CALLED A PINBRANCH CONDITION, SINCE THIS TYPE
R0026 OF INACTIVE DISPLAY IS USUALLY REACTIVATED ONLY BY PINBALL) OR (4) A DISPLAY WHICH HAS FINISHED BUT STILL
R0028 HAS INFO SAVED FOR RESTART PURPOSES.

R0029 DISPLAY PRIORITIES WORK AS FOLLOWS-

R0030 INTERRUPTS-
R0031 1. THE ASTRONAUT CAN INTERRUPT ANY DISPLAY WITH AN EXTERNAL DISPLAY REQUEST.
R0033 2. INTERNAL DISPLAYS CAN NOT BE SENT OUT WHEN THE ASTRONAUT IS USING THE DSKY.
R0035 3. PRIORITY DISPLAYS INTERRUPT ALL OTHER TYPES OF INTERNAL DISPLAYS. A PRIORITY DISPLAY INTERRUPTING ANOTHER
R0037 PRIORITY DISPLAY WILL CAUSE AN ABORT UNLESS BIT14 IS SET FOR THE LINUS ROUTINE.
R0039 4. A MARK DISPLAY INTERRUPTS ANY NORMAL DISPLAY.
R0040 5. A MARK THAT INTERRUPTS A MARK COMPLETELY REPLACES IT.

R0041 ORDER OF WAITING DISPLAYS-
R0042 1. ASTRONAUT EXTERNAL USE
R0043 2. PRIORITY
R0044 3. INTERRUPTED MARK
R0045 4. INTERRUPTED NORMAL

R0046 5. MARK TO BE REQUESTED (SEE DESCRIPTION OF ENDMARK)
R0047 6. MARK WAITING
R0048 7. NORMAL WAITING

L DISPLAY INTERFACE ROUTINES USER'S PAGE NO. 2 EO S3

P0049 THE DISPLAY ROUTINES ARE INTENDED TO SERVE AS AN INTERFACE BETWEEN THE USER AND PINBALL. THE
R0051 FOLLOWING STATEMENTS CAN BE MADE ABOUT NORMAL DISPLAYS AND PRIORITY DISPLAYS (A DESCRIPTION OF MARK ROUTINES
R0053 WILL FOLLOW LATER):

R0054 1. ALL ROUTINES THAT END IN R HAVE AN IMMEDIATE RETURN TO THE USER. FOR ALL FLASHING DISPLAYS THIS RETURN
R0056 IS TO THE USERS CALL CADR +4. FOR THE ONLY NON FLASHING IMMEDIATE RETURN DISPLAY (GODSPR) THIS RETURN
R0058 IS TO THE USERS CALLING LOC +1.
R0059 2. ALL ROUTINES NOT ENDING IN R DO NOT DO AN IMMEDIATE RETURN TO THE USER.
R0061 3. ALL ROUTINES THAT END IN R START A SEPARATE JOB (MAKEPLAY) WITH USERS JOB PRIORITY.
R0063 4. ALL ROUTINES NOT ENDING IN R BRANCH DIRECTLY TO MAKEPLAY WHICH MAKES THESE DISPLAYS A PART OF THE
R0065 USERS JOB.
R0066 5. ALL DISPLAY ROUTINES ARE CALLED VIA BANKCALL.
R0067 6. TO RESTART A DISPLAY THE USER WILL GENERALLY USE A PHASE OF ONE WITH DESIRED RESTART GROUP (SEE
R0069 DESCRIPTION OF RESTARTS).
R0070 7. ALL FLASHING DISPLAYS HAVE 3 RETURNS TO THE USER FROM ASTRONAUT RESPONSES. A TERMINATE (V34) BRANCHES
R0072 TO THE USERS CALL CADR +1. A PROCEED (V33) BRANCHES TO THE USERS CALL CADR +2. AN ENTER OR RECYCLE
R0074 (V32) BRANCHES TO THE USERS CALL CADR +3.
R0075 8. ALL ROUTINES MUST BE USED UNDER EXECUTIVE CONTROL.

R0076 A DESCRIPTION OF EACH ROUTINE WITH AN EXAMPLE FOLLOWS:

R0077 GODSP IS USED TO DISPLAY A VERB NOUN ARRIVING IN A. NO RETURN IS MADE TO THE USER.

R0079 1. GODSP IS NOT RESTARTABLE
R0080 2. A VERB PASTE WITH GODSP ALWAYS TURNS ON THE FLASH.

```
A0081                                   CAF     VXXNYY
A0082                                   TC      BANKCALL
A0083                                   CADR    GODSP

A0084                           VXXNYY  OCT     OXXYY
```

R0085 GODSPR IS THE SAME AS GODSP ONLY RETURN IS TO THE USER.

```
A0086                                   CAF     VXXNYY
A0087                                   TC      BANKCALL
A0088                                   CADR    GODSPR

A0089                                   ...     ...             IMMEDIATE RETURN OF GODSPR
```

R0090 GOFLASH DISPLAYS A FLASHING VERB NOUN WITH NO IMMEDIATE RETURN TO THE USER. 3 RETURNS ARE POSSIBLE FROM
R0092 THE ASTRONAUT (SEE NO. 7 ABOVE).

```
A0093                                   CAF     VXXNYY          VXX NYY WILL BE A FLASHING VERB NOUN.
A0094                                   TC      BANKCALL
A0095                                   CADR    GOFLASH
A0096                                   ...     ...             TERMINATE RETURN
A0097                                   ...     ...             PROCEED RETURN
A0098                                   ...     ...             ENTER OR RECYCLE RETURN
```

R0099 GOPERFI IS ENTERED WITH DESIRED CHECKLIST VALUE IN A. GOPERFI WILL DISPLAY THIS VALUE IN R1 BY MEANS OF A

R0101 V01 N25.A FLASHING PLEASE PERFORM ON CHECKLIST (V50 N25) IS THEN DISPLAYED. NO IMMEDIATE RETURN IS MADE TO
R0103 USER (SEE NO. 7 ABOVE).

R0104 GOPERF1 BLANKS REGISTERS R2 AND R3

```
A0105                                   CAF     OCTXX           CODE FOR CHECKLIST VALUE XX
A0106                                   TC      BANKCALL
A0107                                   CADR    GOPERF1
A0108                                   ...     ...             TERMINATE RETURN
A0109                                   ...     ...             PROCEED RETURN
A0110                                   ...     ...             ENTER RETURN
```

R0111 GOPERF2 IS ENTERED WITH A VARIABLE NOUN AND V01 (V00 FOR N10 OR N11) IN A. GOPERF2 WILL FIRST DISPLAY THE
R0113 REQUESTED NOUN BY MEANS OF A V01NYY OR A V00NYY. PLEASE PERFORM ON NOUN (V50 NYY) THEN BECOMES A FLASHING
R0115 DISPLAY. NO IMMEDIATE RETURN IS MADE TO THE USER (SEE NO. 7 ABOVE).

R0116 GOPERF2 DOES NOT BLANK ANY REGISTERS

```
A0117                                   CAF     VXXNYY          VARIABLE NOUN YY. XX=00 OR 01.
A0118                                   TC      BANKCALL
A0119                                   CADR    GOPERF2
A0120                                   ...     ...             TERMINATE RETURN
A0121                                   ...     ...             PROCEED RETURN
A0122                                   ...     ...             ENTER RETURN
```

R0123 GOPERF3 IS USED FOR A PLEASE PERFORM ON A PROGRAM NUMBER. THE DESIRED PROGRAM NO. IS ENTERED IN A. GOPERF3
R0125 DISPLAYS THE NO. BY MEANS OF A V06 N07 FOLLOWED BY A FLASHING V50 N07 FOR A PLEASE PERFORM. NO IMMEDIATE RETURN
R0127 IS MADE TO THE USER (SEE NO. 7 ABOVE).

R0128 GOPERF3 BLANKS REGISTERS R2 AND R3

```
A0129                                   CAF     DECXX           REQUEST PERFORM ON PXX
A0130                                   TC      BANKCALL
A0131                                   CADR    GOPERF3
A0132                                   ...     ...             TERMINATE RETURN
A0133                                   ...     ...             PROCEED RETURN
A0134                                   ...     ...             ENTER RETURN
```

R0135 GOPERF4 IS USED FOR A PLEASE PERFORM ON AN OPTION. THE DESIRED OPTION ISENTERED IN A AND STORED IN OPTION1.
R0137 GOPERF4 DISPLAYS R1 AND R2 BY MEANS OF A V04N06 FOLLOWED BY A FLASHING V50N06 FOR A PLEASE PERFORM. NO
R0139 IMMEDIATE RETURN IS MADE TO THE USER (SEE NO. 7 ABOVE).

```
A0140                                   CAF     OCTXX           REQUEST PERFORM ON OPTION XX
A0141                                   TC      BANKCALL
A0142                                   CADR    GOPERF4
A0143                                   ...     ...             TERMINATE RETURN
A0144                                   ...     ...             PROCEED RETURN
A0145                                   ...     ...             ENTER RETURN
```

R0146 GOPERF4 BLANKS REGISTER R3

R0147 GODSPRET IS USED TO DISPLAY A VERB NOUN ARRIVING IN A WITH A RETURN TO THE USER AFTER THE DISPLAY HAS BEEN SENT
R0149 OUT.

```
A0150                                   CAF     VXXNYY
A0151                                   TC      BANKCALL
A0152                                   CADR    GODSPRET

A0153                                   ...     ...             RETURN TO USER
```

R0154 REGODSP IS USED TO DISPLAY A VERB NOUN ARRIVING IN A. REGODSP IS THE SAME AS GODSP ONLY REGODSP REPLACES ANY
R0156 ACTIVE NORMAL DISPLAY IF ONE WAS ACTIVE.

```
A0157                                   CAF     VXXNYY
A0158                                   TC      BANKCALL
A0159                                   CADR    REGODSP
```

R0160 REFLASH IS THE SAME AS GOFLASH ONLY REFLASH REPLACES ANY ACTIVE NORMAL DISPLAY IF ONE WAS ACTIVE.

```
A0162                                   CAF     VXXNYY          VXX NYY WILL BE A FLASHING VERB NOUN
A0163                                   TC      BANKCALL
A0164                                   CADR    REFLASH
A0165                                   ...     ...             TERMINATE RETURN
A0166                                   ...     ...             PROCEED RETURN
A0167                                   ...     ...             ENTER RETURN
```

R0168 GOFLASHR IS SAME AS GOFLASH ONLY AN IMMEDIATE RETURN IS MADE TO THE USERS CALL CADR +4.

```
A0170                                   CAF     VXXNYY
A0171                                   TC      BANKCALL
A0172                                   CADR    GOFLASHR
A0173                                   ...     ...             TERMINATE RETURN
A0174                                   ...     ...             PROCEED RETURN
A0175                                   ...     ...             ENTER OR RECYCLE RETURN

A0176                                   ...     ...             IMMEDIATE RETURN FROM GOFLASHR
```

R0177 GOPERF1R IS THE SAME AS GOPERF1 ONLY GOPERF1R HAS AN IMMEDIATE RETURN TOUSERS CALL CADR +4.

R0179 GOPERF1R BLANKS REGISTERS R2 AND R3

```
A0180                                   CAF     OCTXX           CODE FOR CHECKLIST VALUE XX.
A0181                                   TC      BANKCALL
A0182                                   CADR    GOPERF1R
A0183                                   ...     ...             TERMINATE RETURN
A0184                                   ...     ...             PROCEED RETURN
A0185                                   ...     ...             ENTER RETURN

A0186                                   ...     ...             IMMEDIATE RETURN FROM GOPERF1R
```

R0187 GOPERF2R IS THE SAME AS GOPERF2 ONLY AN IMMEDIATE RETURN IS MADE TO USERS CALL CADR +4.

```
R0189   GOPERF2R DOES NOT BLANK ANY REGISTERS

A0190                           CAF     VXXNYY          VARIABLE NOUN YY REQUESTED.  XX=00 OR 01
A0191                           TC      BANKCALL
A0192                           CADR    GOPERF2R
A0193                           ...     ...             TERMINATE RETURN
A0194                           ...     ...             PROCEED RETURN
A0195                           ...     ...             ENTER RETURN

A0196                           ...     ...             IMMEDIATE RETURN HERE FROM GOPERF2R

R0197   GOPERF3R IS THE SAME AS GOPERF3 ONLY AN IMMEDIATE RETURN IS MADE TO USERS CALL CADR +4.

R0199   GOPERF3R BLANKS REGISTERS R2 AND R3

A0200                           CAF     PROGXX          PERFORM PROGRAM XX
A0201                           TC      BANKCALL
A0202                           CADR    GOPERF3R
A0203                           ...     ...             TERMINATE RETURN
A0204                           ...     ...             PROCEED RETURN
A0205                           ...     ...             ENTER RETURN

A0206                           ...     ...             GOPERF3R IMMEDIATELY RETURNS HERE

R0207   GOPERF4R IS THE SAME AS GOPERF4 ONLY AN IMMEDIATE RETURN IS MADE TO USERS CALL CADR +4.

A0209                           CAF     OCTXX           REQUEST PERFORM ON OPTIONXX
A0210                           TC      BANKCALL
A0211                           CADR    GOPERF4R
A0212                           ...     ...             TERMINATE RETURN
A0213                           ...     ...             PROCEED RETURN
A0214                           ...     ...             ENTER RETURN

A0215                           ...     ...             IMMEDIATE RETURN TO USER

R0216   GOPERF4R BLANKS REGISTER R3

R0217   REFLASHR IS THE SAME AS REFLASH ONLY AN IMMEDIATE RETURN IS MADE TO THE USERS CALL CADR +4.

A0219                           CAF     VXXNYY          VXX NYY WILL BE A FLASHING VERB NOUN
A0220                           TC      BANKCALL
A0221                           CADR    REFLASHR
A0222                           ...     ...             TERMINATE RETURN
A0223                           ...     ...             PROCEED RETURN
A0224                           ...     ...             ENTER RETURN

A0225                           ...     ...             IMMEDIATE RETURN TO USER

R0226   REGODSPR IS THE SAME AS REGODSP ONLY A RETURN (IMMEDIATE) IS MADE TO THE USER.
```

```
A0228                           CAF     VXXNYY
A0229                           TC      BANKCALL
A0230                           CADR    REGODSPR

A0231                           ...     ...             IMMEDIATE RETURN TO USER
```

```
P0232   GOMARK IS USED TO DISPLAY A MARK VERB NOUN ARRIVING IN A. NO RETURN IS MADE TO THE USER.

R0234   GOXDSP = GOMARK

A0235                                   CAF     VXXNYY          VXXNYY CONTAINS VERB AND NOUN
A0236                                   TC      BANKCALL
A0237                                   CADR    GOMARK          OTHER EXTENDED VERBS USE CADR GOXDSP

R0238   GOMARKR IS THE SAME AS GOMARK ONLY RETURN IS TO THE USER.

R0239   GOXDSPR = GOMARKR

A0240                                   CAF     VXXNYY
A0241                                   TC      BANKCALL
A0242                                   CADR    GOMARKR         OTHER EXTENDED VERBS USE CADR GOXDSPR

A0243                                   ...     ...             IMMEDIATE RETURN OF GOMARKR

R0244   GOMARKF DISPLAYS A FLASHING MARK VERB NOUN WITH NO IMMEDIATE RETURN TO THE USER. 3 RETURNS ARE POSSIBLE FROM
R0246   THE ASTRONAUT (SEE NO. 7 ABOVE ).

R0247   GOXDSPF = GOMARKF

A0248                                   CAF     VXXNYY          VXXNYY WILL BE A FLASHING MARK VERB NOUN
A0249                                   TC      BANKCALL
A0250                                   CADR    GOMARKF         OTHER EXTENDED VERBS USE CADR GOXDSPF
A0251                                   ...     ...             TERMINATE RETURN
A0252                                   ...     ...             PROCEED RETURN
A0253                                   ...     ...             ENTER OR RECYCLE RETURN

R0254   GOMARKFR IS THE SAME AS GOMARKF ONLY AN IMMEDIATE RETURN IS MADE TO THE USER CALL CADR +4.

R0256   GOXDSPFR = GOMARKFR

A0257                                   CAF     VXXNYY          FLASHING MARK VERB NOUN
A0258                                   TC      BANKCALL
A0259                                   CADR    GOMARKFR        OTHER EXTENDED VERBS USE CADR GOXDSPFR
A0260                                   ...     ...             TERMINATE RETURN
A0261                                   ...     ...             PROCEED RETURN
A0262                                   ...     ...             ENTER OR RECYCLE RETURN

A0263                                   ...     ...             IMMEDIATE RETURN TO THE USER

R0264   GOMARK1 IS USED FOR A PLEASE PERFORM ON A MARK REQUEST WITH ONLY 1 ASTRONAUT RETURN TO THE USER. NO IMMEDIATE
R0266   RETURN IS MADE. THE DESIRED MARK PLEASE PERFORM VERB AND DESIRED NOUN ISENTERED IN A. GOMARK1 DISPLAYS R1, R2, R
R0268   MEANS OF A V05NYY FOLLOWED BY A FLASHING V5XNYY FOR A PLEASE PERFORM. THE ASTRONAUT WILL RESPOND WITH A MARK
R0270   OR MARK REJECT OR AN ENTER. THE ENTER IS THE ONLY ASTRONAUT RESPONSE THAT WILL COME BACK TO THE USER.

A0272                                   CAF     V5XNYY          X=1,2,3,4   Y= NOUN
A0273                                   TC      BANKCALL
```

```
A0274                                   CADR    GOMARK1

A0275                                   ...     ...             ENTER RETURN

R0276   *** IF BLANKING DESIRED ON NON R ROUTINES, NOTIFY DISPLAYER.

R0277   GOMARK1R IS THE SAME AS A GOMARK1 ONLY AN IMMEDIATE RETURN IS MADE TO THE USERS CALL CADR +2.
A0279                                   CAF     V5XNYY          X=1,2,3,4   YY = NOUN
A0280                                   TC      BANKCALL
A0281                                   CADR    GOMARK1R

A0282                                   ...     ...             ASTRONAUT ENTER RETURN
A0283                                   ...     ...             IMMEDIATE RETURN TO USER

R0284   GOMARK2 IS THE SAME AS GOMARK1 ONLY 3 RETURNS ARE MADE TO THE USER FROM THE ASTRONAUT.
A0286                                   CAF     V5XNYY          X=1,2,3,4   YY=NOUN
A0287                                   TC      BANKCALL
A0288                                   CADR    GOMARK2
A0289                                   ...     ...             TERMINATE RETURN
A0290                                   ...     ...             PROCEED RETURN
A0291                                   ...     ...             ENTER RETURN
R0292   GOMARK2R IS THE SAME AS GOMARK1R ONLY 3 ASTRONAUT RETURNS ARE MADE TO THE USER.

A0294                                   CAF     V5XNYY          X=0,1,2,3,4   YY=NOUN
A0295                                   TC      BANKCALL
A0296                                   CADR    GOMARK2R
A0297                                   ...     ...             TERMINATE RETURN
A0298                                   ...     ...             PROCEED RETURN
A0299                                   ...     ...             ENTER RETURN

A0300                                   ...     ...             IMMEDIATE RETURN TO THE USER

R0301   GOMARK3 IS USED FOR A PLEASE PERFORM ON A MARK REQUEST WITH A 3 COMP. DEC DISPLAY. THE DESIRED MARK PLEASE
R0303   PERFORM VERB AND NOUN ARE ENTERED IN A. GOMARK3 DISPLAYS R1, R2, R3 BY MEANS OF A V06NYY FOLLOWED BY A FLASHING
R0305   V5XNYY FOR A PLEASE PERFORM. GOMARK3 HAS 3 ASTRONAUT RETURNS TO THE USER WITH NO IMMEDIATE RETURN.

A0307                                   CAF     V5XNYY          X=1, 2,3,4 YY=NOUN
A0308                                   TC      BANKCALL
A0309                                   CADR    GOMARK3
A0310                                   ...     ...             TERMINATE RETURN
A0311                                   ...     ...             PROCEED RETURN
A0312                                   ...     ...             ENTER RETURN

R0313   GOMARK4 IS THE SAME AS GOMARK3 ONLY R2 AND R3 ARE BLANKED AND R1 IS DISPLAYED IN OCTAL.

A0315                                   CAF     V5XNYY          X=1,2,3,4 YY=NOUN
A0316                                   TC      BANKCALL
A0317                                   CADR    GOMARK4
A0318                                   ...     ...             TERMINATE RETURN
A0319                                   ...     ...             PROCEED RETURN
```

```
A0320                                   ...     ...             ENTER RETURN

R0321   EXDSPRET IS USED TO DISPLAY A VERB NOUN ARRIVING IN A WITH A RETURN MADE TO THE USER AFTER THE DISPLAY HAS BEEN
R0323   SENT OUT.

A0324                                   CAF     VXXNYY
A0325                                   TC      BANKCALL
A0326                                   CADR    EXDSPRET

A0327                                   ...     ...             RETURN TO USER

R0328   KLEENEX CLEANS OUT ALL MARK DISPLAYS (ACTIVE AND INACTIVE). A RETURN IS MADE TO THE USER AFTER THE MARK DISPLAYS
R0330   HAVE BEEN CLEANED OUT.

A0331                                   TC      BANKCALL
A0332                                   CADR    KLEENEX

A0333                                   ...     ...             RETURN TO USER

R0334   MARKBRAN IS A SPECIAL PURPOSE ROUTINE USED FOR SAVING JOB VAC AREAS (SEE DESCRIPTION OF MARKBRAN BELOW).

A0336                                   TC      BANKCALL
A0337                                   CADR    MARKBRAN
A0338                                   ...     ...             BAD RETURN IF MARK DISPLAY NOT ACTIVE

A0339                                                           (GOOD RETURN TO IMMEDIATE RETURN LOC OF
A0340                                                           LAST FLASHING MARK R ROUTINE)

R0341   PINBRNCH REESTABLISHES THE LAST ACTIVE FLASHING DISPLAY. IF THERE IS NO ACTIVE FLASHING DISPLAY, THE DSKY IS
R0343   BLANKED AND CONTROL IS SENT TO ENDOFJOB.

A0344                                   TC      POSTJUMP
A0345                                   CADR    PINBRNCH

R0346   PRIODSP IS USED AS A PRIORITY DISPLAY.  IT WILL DISPLAY A GOFLASH TYPE DISPLAY WITH THREE POSSIBLE RETURNS FROM
R0348   THE ASTRONAUT(SEE NO.7 ABOVE).

R0349        THE MAIN PURPOSE OF PRIODSP IS TO REPLACE THE PRESENT DISPLAY WITH A DISPLAY OF HIGHER PRIORITY AND TO
R0351   PROVIDE A MEANS FOR RESTORING THE OLD DISPLAY WHEN THE PRIORITY DISPLAY
R0352   IS RESPONDED TO BY THE ASTRONAUT.

R0353        THE FORMER DISPLAY IS RESTORED BY AN AUTOMATIC BRANCH TO WAKE UP THE DISPLAY THAT WAS INTERRUPTED BY THE
R0355   PRIO DISPLAY.

A0356                                   CAF     VXXNYY          VXXNYY WILL BE A FLASHING VERB NOUN
A0357                                   TC      BANKCALL
A0358                                   CADR    PRIODSP
A0359                                   ...     ...             TERMINATE RETURN
A0360                                   ...     ...             PROCEED RETURN
```

```
A0361                                   ...     ...             ENTER OR RECYCLE RETURN

R0362   PRIODSPR IS THE SAME AS PRIODSPONLY AN IMMEDIATE RETURN IS MADE TO THE  USERS CALL CADR +4.

A0364                                   CAF     VXXNYY          VXXNYY WILL BE A FLASHING VERB NOUN
A0365                                   TC      BANKCALL
A0366                                   CADR    PRIODSPR
A0367                                   ...     ...             TERMINATE RETURN
A0368                                   ...     ...             PROCEED RETURN
A0369                                   ...     ...             ENTER OR RECYCLE RETURN

A0370                                   ...     ...             IMMEDIATE RETURN

R0371   PRIOLARM DOES A V05N09 PRIODSPR.
R0372   CLEANDSP CLEANS OUT ALL NORMAL DISPLAYS (ACTIVE AND INACTIVE). A RETURN IS MADE TO THE USER AFTER NORMAL
R0374   DISPLAYS ARE CLEANED OUT.

A0375                                   TC      BANKCALL
A0376                                   CADR    CLEANDSP

A0377                                   ...     ...             RETURN TO USER
```

P0378 GENERAL INFORMATION
R0379 ------- -----------

R0380 ALARM OR ABORT EXIT MODES--

```
A0381                                   PRIOBORT TC     ABORT
A0382                                            OCT    1502
```

R0383 PRIOBORT IS BRANCED TO WHEN (1) A NORMAL DISPLAY IS REQUESTED AND ANOTHER NORMAL DISPLAY IS ALREADY ACTIVE
R0385 (REFLASH AND REGODSP ARE EXCEPTIONS) OR (2) A PRIORITY DISPLAY IS REQUESTED WHEN ANOTHER PRIORITY DISPLAY IS
R0387 ALREADY ACTIVE (A PRIORITY WITH LINUS BIT14 IS AN EXCEPTION).

R0388 ERASABLE INITIALIZATION REQUIRED--

R0389 ACCOMPLISHED BY FRESH START- 1. FLAGWRD4 (USED EXCLUSIVELY BY DISPLAY INTERFACE ROUTINES)
R0391 2. NVSAVE = NORMAL VERB AND NOUN REGISTER.
R0393 3. EBANKTEM = NORMAL INACTIVE FLAGWORD(ALSO CONTAINS NORMALS EBANK).

R0395 5. R1SAVE = MARKBRAN CONTROL WORD
R0396 4. RESTREG = PRIORITY 30 AND SUPERBANK 3.
R0398 OUTPUT--

R0399 NVWORD = PRIO VERB AND NOUN
R0400 NVWORD +1(MARKNV) = MARK VERB AND NOUN
R0401 NVWORD +2(NVSAVE) = NORMAL VERB AND NOUN

R0402 DSPFLG(EBANKSAV) = PRIO FLAGWORD (INCLUDING EBANK)
R0403 DSPFLG +1(MARKEBAN) = MARK FLAGWORD (INCLUDING EBANK)
R0404 DSPFLG +2(EBANKTEM) = NORMAL FLAGWORD (INCLUDIG EBANK)

R0405 CADRFLSH = PRIO USERS CALL CADR +1 LOCATION
R0406 CADRFLSH +1(MARKFLSH) = MARK USERS CALL CADR +1 LOCATION
R0407 CADRFLSH +2(TEMPFLSH) = NORMAL USERS CALL CADR +1 LOCATION

R0408 PRIOTIME = TIME EACH PRIO REQUEST FIRST SENT OUT
R0409 OPTION1 = DESIRED OPTION FROM GOPERF4
R0410 FLAGWRD4 = BIT INFO FOR CONTROL OF ALL DISPLAY ROUTINES
R0411 DSPTEM1 = R1 INFO FOR ASTRONAUT FROM PERFORM DISPLAYS(NORMAL)
R0412 SUBROUTINES USED-- NVSUB, FLAGUP, FLAGDOWN, ENDOFJOB, BLANKSUB, ABORT, JOBWAKE, JOBSLEEP, FINDVAC, PRIOCHNG,
R0414 JAMTERM, NVSUBUSY, FLASHON, ENDIDLE, CHANG1, BANKJUMP, MAKECADR, NOVAC,
R0415 DEBRIS-- (STORED INTO)

R0416 TEMPORARY TEMPORARIES- A, Q, L, MPAC +2, MPAC +3, MPAC +4, MPAC +5, MPAC +6, RUPTREG2, RUPTREG3, CYL,
R0418 EBANK, RUPTREG4, LOC, BANKSET, MODE, MPAC, MPAC +1 4, FACEREG
R0420 ERASABES(SHARED AND USED WITH OTHER PROGRAMS) CADRSTOR, DSPLIST, LOC, DSPTEM1, OPTION1

R0422 ERASABLES(USED ONLY BY DISPLAY ROUTINES)- NVWORD,+1,+2, DSPFLG,+1,+2, CADRFLSH,+1,+2, PRIOTIME, FLAGWRD4,

R0424 R1SAVE, MARK2PAC,

R0425 DEBRIS-- (USED BUT NOT STORED INTO)- NOUNREG, VERBREG, LOCCTR, MONSAVE1
R0426 FLAGWORD DESCRIPTIONS--
R0427 FLAGWRD4- SEE DESCRIPTION UNDER LOG SECTION ERASABLE ASSIGNMENTS

R0428 DSPFLG, DSPFLG+1, DSPFLG +2-
R0429 ----------
R0430 BITS 1 BLANK R1
R0431 2 BLANK R2
R0432 3 BLANK R3
R0433 4 FLASHING DISPLAY REQUESTED
R0434 5 PERFORM DISPLAY REQUESTED
R0435 6 ----- EXDSPRET GODSPRET
R0436 7 PRIO DISPLAY ----- -----
R0437 8 ----- DEC MARK PERFORM -----
R0438 9 EBANK
R0439 10 EBANK
R0440 11 EBANK
R0441 12 ----- ----- V99PASTE
R0442 13 2ND PART OF PERFORM
R0443 15 REFLASH OR REDO ----- REFLASH OR REDO
R0444 15 ----- MARK REQUEST -----
R0445 RESTARTING DISPLAYS--

R0446 RULES FOR THE DSKY OPERATOR--

R0447 1. PROCEED AND TERMINATE SERVE AS RESPONSES TO REQUESTS FOR OPERATOR RESPONSE (FLASHING V/N). AS LONG
R0449 AS THERE IS ANY REQUEST AWAITING OPERATOR RESPONSE, ANY USE OF PROCEED OR TERMINATE WILL SERVE AS
R0451 RESPONSES TO THAT REQUEST. CARE SHOULD BE EXERCISED IN ATTEMPTING TO KILL AN OPERATOR INITIATED MONITOR
R0453 WITH PROCEED AND TERMINATE FOR THIS REASON.
R0454 2. THE ASTRONAUT MUST RESPOND TO A PRIORITY DISPLAY NO SOONER THAN 5 SECS FROM THE TIME THE MISSION
R0456 PROGRAM SENT OUT THE REQUEST FOR OPERATOR RESPONSE (THE ASTRONAUT WOULD SEE THIS DISPLAY FOR LESS TIME
R0458 DUE TO TIME IT TAKES TO GET DISPLAY SENT OUT.) IF THE ASTRONAUT RESPONDS TOO SOON, THE PRIORITY DISPLAY
R0460 IS SENT OUT AGAIN---AND AGAIN UNTIL AN ACCUMULATED 5 SECS FROM TIME THE FIRST PRIORITY DISPLAY WAS SENT
R0462 OUT. THE SAME 5 SEC. DELAY WILL OCCUR AT 163.84 SECS OR IN ANY MULTIPLE OF THAT TIME DUE TO PROGRAM
R0464 CONSIDERATION.
R0465 3. KEY RELEASE BUTTON-
R0466 A) IF THE KEY RELEASE LIGHT IS ON, IT SIMPLY RELEASES THE KEYBOARD AND DISPLAY FOR INTERNAL USE.
R0468 B) IF THE KEY RELEASE LIGHT IS OFF, AND IF SOME REQUEST FOR OPERATOR RESPONSE (FLASHING V/N) IS STILL
R0470 AWAITING RESPONSE THEN IT RE-ESTABLISHES THE DISPLAYS THAT ORIGINALLY REQUESTED RESPONSE.
R0472 IF AN OPERATOR WANTS THEREFORE TO RE-ESTABLISH BUT CONDITION (A) IS ENCOUNTERED, A SECOND DEPRESSION OF
R0474 KEY RELEASE BUTTON MAY BE NECESSARY.
R0475 4. IT IS IMPORTANT TO ANSWER ALL REQUESTS FOR OPERATOR RESPONSE.
R0476 5. IT IS ALWAYS GOOD PRACTICE TO TERMINATE AN EXTENDED VERB BEFORE ASKING FOR ANOTHER ONE OR THE SAME ONE
R0478 OVER AGAIN.

R0479 SPECIAL CONSIDERATIONS--

R0480 1. MPAC +2 SAVED ONLY IN MARK DISPLAYS
R0481 2. GODSP(R),REGODSP(R),GOMARK(R) ALWAYS TURN ON THE FLASH IF ENTERED WITH A PASTE VERB REQUEST.
R0483 3. ALL NORMAL DISPLAYS ARE RESTARTABLE EXCEPT GODSP(R), REGODSP(R)
R0484 4. ALL EXTENDED VERBS WITH DISPLAYS SHOULD START WITH A TC TESTXACT AND FINISH WITH A TC ENDEXT.
R0486 5. GODSP(R) AND REGODSP(R) MUST BE IN THE SAME EBANK AND SUPERBANK AS THE LAST NORMAL DISPLAY RESTARTED
R0488 BY A .1 RESTART PHASE CHANGE.
R0489 6. IN ORDER TO SET UP A NON DISPLAY .1 RESTART POINT, THE USER MUST MAKE CERTAIN THAT RESTREG CONTAINS THE
R0491 CORRECT PRIORITY AND SUPERBANK AND THAT EBANKTEM CONTAINS THE CO
R0491 7. IF CLEANDSP IS RESTARTED VIA A .1 PHASE CHANGE, CAF ZERO SHOULD BE EXECUTED BEFORE THE TC BANKCALL.

L DISPLAY INTERFACE ROUTINES USER'S PAGE NO. 14 EO S3

P0492 CALLING SEQUENCE FOR BLANKING

```
A0493                                          CAF    BITX          X=1,2,3 BLANK R1,R2,R3 RESPECTIVELY
A0494                                          TC     BLANKET
A0495                                          ...    ...           RETURN TO USER HERE
```

R0496 IN ORDER TO USE BLANKET CORRECTLY THE USER MUST USE A DISPLAY ROUTINE THAT ENDS IN R FIRST FOLLOWED BY THE CALL
R0498 TO BLANKET AT THE IMMEDIATE RETURN LOC.

```
 0499                          5526                    BLOCK  02
 0500  REF   1                 4000                    SETLOC FFTAG4
 0501                          5526                    BANK

 0502  REF   1                                         COUNT  02/DSPLA

 0503  REF 701  LAST 1449     5526  54 162 0  BLANKET  TS     MPAC +6
 0504  REF   1                5527  4 0160 1          CS     PLAYTEM4
 0505  REF 702  LAST 1465     5530  7 0162 0          MASK   MPAC +6
 0506  REF 703  LAST 1465     5531  50 161 1          INDEX  MPAC +5
 0507  REF   2  LAST 1465     5532  26 160 1          ADS    PLAYTEM4

 0508  REF 335  LAST 1451     5533  0 0002 0          TC     Q

 0511  REF  60  LAST 1442     5534  0 4701 0  ENDMARK  TC     POSTJUMP
 0512  REF   1                5535   20553 0          CADR   MARKEND
```

```
 05121  REF 278  LAST 1450     5536  3 5021 1  CLEARMRK CAF    ZERO
 05122  REF  20  LAST  935     5537  55'044 1           TS     EXTVBACT

 05123                         5540  0 0004 0           INHINT
 05124  REF  81  LAST 1438     5541  4 5017 0           CS     BIT1
 05125  REF   5  LAST  392     5542  7 0100 1           MASK   FLAGWRD4
 05126  REF   6  LAST 1465     5543  54 100 1           TS     FLAGWRD4

 05127                         5544  0 0003 1           RELINT
 05128  REF 336  LAST 1465     5545  0 0002 0           TC     Q
```

R0513 ***ALL EXTENDED VERB ROUTINES THAT HAVE AT LEAST ONE FLASHING DISPLAY MUST TCF ENDMARK OR TCF ENDEXT WHEN
R0515 FINISHED.

```
 0516                          10,2553                 BANK   10
 0517  REF   1                 10,2000                 SETLOC DISPLAYS
 0518                          10,2553                 BANK

 0519  REF   1                                         COUNT  10/DSPLA
```

R0520 NTERONLY IS USED TO DIFFERENTIATE THE MARK ROUTINE WITH ONLY ONE RETURN TO THE USER FROM THE MARKING ROUTINE WIT
R0522 3 RETURNS TO THE USER. THIS ROUTINE IS ONLY USED BY GOMARK1 AND GOMARK1R.

```
 05291  REF   7  LAST  790    10,2553  0 5536 1  MARKEND  TC     CLEARMRK
 05297  REF   1               10,2554  1 3643 1           TCF    MARKOVER
```

```
0530   REF   1                 10,2555  54 155 1  GOMARK   TS    PLAYTEM1        ENTRANCE FOR MARK GODSP

0531   REF  54  LAST 1449      10,2556  3 5001 0  GOMARS   CAF   BIT15          BIT15 SET FOR ALL MARK REQUESTS
0532   REF   1                 10,2557  1 2722 0           TCF   GOFLASH2

0533   REF 279  LAST 1465      10,2560  3 5021 1  KLEENEX  CAF   ZERO           CLEAN OUT EXTENDED VERBS
0534   REF   2  LAST 1466      10,2561  54 155 1  GOMARKF  TS    PLAYTEM1        ENTRANCE FOR MARK GOFLASH

0535   REF   1                 10,2562  3 3253 0           CAF   MARKFMSK        MARK,FLASH
0536   REF   2  LAST 1466      10,2563  1 2722 0           TCF   GOFLASH2

0539   REF   3  LAST 1466      10,2564  54 155 1  GOMARK2  TS    PLAYTEM1        MARK GOPERFS-3 AST. RETURNS
0540   REF   1                 10,2565  3 3742 0  MARKFORM CAF   MPERFMSK        MARK, PERFORM, FLASH
0541   REF   3  LAST 1466      10,2566  1 2722 0           TCF   GOFLASH2

0542   REF   4  LAST 1466      10,2567  54 155 1  GOMARK3  TS    PLAYTEM1        USED FOR 3COMP DECIMAL PERFORM
0543   REF   1                 10,2570  3 3727 0           CAF   MARK3MSK
0544   REF   4  LAST 1466      10,2571  1 2722 0           TCF   GOFLASH2

0545   REF   5  LAST 1466      10,2572  54 155 1  GOMARK4  TS    PLAYTEM1
0546   REF   1                 10,2573  3 3730 0           CAF   MARK4MSK        MARK,PERFORM,FLASH,BLANK
0547   REF   5  LAST 1466      10,2574  1 2722 0           TCF   GOFLASH2

0548   REF   6  LAST 1466      10,2575  54 155 1  GOMARKR  TS    PLAYTEM1        ENTR+NCE FOR MARK GODSPR

0549   REF  55  LAST 1466      10,2576  3 5001 0           CAF   BIT15
0550   REF   1                 10,2577  1 2700 0           TCF   GODSPR2

0551   REF   7  LAST 1466      10,2600  54 155 1  GOMARKFR TS    PLAYTEM1        ENTRANCE FOR MARK GOFLASHR

0552   REF   2  LAST 1466      10,2601  3 3253 0           CAF   MARKFMSK
0553   REF   1                 10,2602  1 3061 1           TCF   GODSPRS

0559   REF   8  LAST 1466      10,2603  54 155 1  GOMARK2R TS    PLAYTEM1        MARK GOPERFS-3 AST. RETS+ IMMEDIATE RET.
0560   REF   2  LAST 1466      10,2604  3 3742 0           CAF   MPERFMSK        MARK. PERFORM. FLASH
0561   REF   2  LAST 1466      10,2605  1 3061 1           TCF   GODSPRS

05611  REF   9  LAST 1466      10,2606  54 155 1  GOMARK3R TS    PLAYTEM1
05612  REF   2  LAST 1466      10,2607  3 3727 0           CAF   MARK3MSK
05613  REF   3  LAST 1466      10,2610  1 3061 1           TCF   GODSPRS

0562   REF 165  LAST 1440      10,2611  3 5017 1  MAKEMARK CAF   ONE
0563   REF   1                 10,2612  0 3157 1           TC    COPIES

0564   REF   7  LAST 1465      10,2613  3 0100 0           CA    FLAGWRD4        IS NORM OR PRIO BUSY OR WAITING
0565   REF   1                 10,2614  7 3743 0           MASK  OCT34300
0566   REF 388  LAST 1451      10,2615  10 000 0           CCS   A
0567   REF   1                 10,2616  1 2654 0           TCF   CHKPRIO

0568   REF   8  LAST 1466      10,2617  3 0100 0           CA    FLAGWRD4        IS MARK SLEEPING DUE TO ASTRO BUSY
```

```
0569   REF  38  LAST 1443   10,2620  7 5007 1            MASK    BIT9
0570                        10,2621  0 0006 1            EXTEND
0571   REF   1              10,2622  1 2624 1            BZF     MARKPLAY        NO

0572   REF 104  LAST 1314   10,2623  1 5217 1            TCF     ENDOFJOB

0594                        10,2624  0 0004 0  MARKPLAY  INHINT
0595   REF  27  LAST 1395   10,2625  4 5022 0            CS      FIVE            RESET MARK OVER NORM, SET MARK
0596   REF   9  LAST 1466   10,2626  7 0100 1            MASK    FLAGWRD4
05965  REF 166  LAST 1466   10,2627  6 5017 1            AD      ONE
0597   REF  10  LAST 1467   10,2630  54 100 1            TS      FLAGWRD4
0598                        10,2631  0 0003 1            RELINT

0599   REF   1              10,2632  4 1070 0  GOGOMARK  CS      MARKFLAG        PERFORM
0600   REF  40  LAST 1447   10,2633  7 5013 1            MASK    BIT5
0601   REF 389  LAST 1466   10,2634  10 000 0            CCS     A
0602   REF   1              10,2635  1 2640 0            TCF     MARKCOP
0603   REF   1              10,2636  4 0370 1            CS      MARKNV
0604   REF   2  LAST 1467   10,2637  54 370 1            TS      MARKNV

0605   REF 167  LAST 1467   10,2640  3 5017 1  MARKCOP   CAF     ONE             MARK INDEX
0606   REF   1              10,2641  1 3040 1            TCF     PRIOPLAY

0607   REF   1              10,2642  3 0165 0  COPYTOGO  CA      MPAC2SAV
0608   REF 704  LAST 1465   10,2643  54 156 1            TS      MPAC +2

0609   REF   1              10,2644  50 164 1  COPYPACS  INDEX   COPINDEX
0610   REF   1              10,2645  3 3753 0            CAF     PRIOOCT
0611   REF   1              10,2646  54 162 0            TS      GENMASK

0612   REF   2  LAST 1467   10,2647  50 164 1            INDEX   COPINDEX
0613   REF   1              10,2650  3 1067 1            CAF     EBANKSAV
0614   REF   1              10,2651  54 160 1            TS      TEMPOR2         ACTIVE EBANK AND FLAG

0615   REF  64  LAST 1442   10,2652  54 003 0            TS      EBANK

0616   REF 337  LAST 1465   10,2653  0 0002 0            TC      Q
```

R0617 PINCHEK CHECKS TO SEE IF THE CURRENT MARK REQUEST IS MADE BY THE ASTRONAUT WHILE INTERRUPTING A GOPLAY DISPLAY
R0619 (A NORMAL OR A PRIO). IF THE ASTRONAUT TRIES TO MARK DURING A PRIO, THE CHECK FAIL LIGHT GOES ON AND THE MARK
R0621 REQUEST IS ENDED. IF HE TRIES TO MARK DURING A NORM, THE MARK IS ALLOWED. IN THIS CASE THE NORM IS PUT TO SLEEP
R0623 UNTIL ALL MARKING IS FINISHED.

R0624 IF THE MARK REQUEST COMES FROM THE PROGRAM DURING A TIME THE ASTRONAUT IS NOT INTERRUPTING A NORMAL OR A
R0626 PRIO, THE MARK REQUEST IS PUT TO SLEEP UNTIL THE +RESENT ACTIVE DISPLAY IS RESPONDED TO BY THE ASTRONAUT.

```
0628   REF  11  LAST 1467   10,2654  3 0100 0  CHKPRIO  CA      FLAGWRD4        MARK ATTEMPT DURING PRIO
0629   REF   1              10,2655  7 3476 0            MASK    OCT24100
0630   REF 390  LAST 1467   10,2656  10 000 0            CCS     A
0631   REF   1              10,2657  1 3676 1            TCF     MARSLEEP
```

```
0632   REF  12  LAST 1467   10.2660  4 0100 1           CS      FLAGWRD4
0633   REF  35  LAST 1450   10,2661  7 5015 1           MASK    BIT3          SET MARK OVER NORM
0634                        10.2662  0 0004 0           INHINT
0635   REF  13  LAST 1468   10,2663  26 100 1           ADS     FLAGWRD4

0636   REF   1              10,2664  1 2756 0           TCF     SETNORM

0637   REF   3  LAST 1467   10.2665  3 0370 0 MARKPERF  CA      MARKNV
0638   REF   1              10,2666  7 4160 0           MASK    VERBMASK
0639   REF   1              10,2667  1 3342 0           TCF     NV50DSP

0640   REF  10  LAST 1466   10,2670  54 155 1 GODSP     TS      PLAYTEM1

0641   REF 280  LAST 1466   10,2671  3 5021 1 GODSP2    CAF     ZERO
0642   REF   6  LAST 1466   10,2672  1 2722 0           TCF     GOFLASH2

0643   REF  11  LAST 1468   10,2673  54 155 1 GODSPRET  TS      PLAYTEM1      ENTRANCE FOR A GODSP WITH A PASTE

0644   REF  53  LAST 1438   10,2674  3 5012 1           CAF     BIT6          SET BIT6 TO GO BACK TO USER AFTER NVSUB
0645   REF   7  LAST 1468   10,2675  1 2722 0           TCF     GOFLASH2

0646   REF  12  LAST 1468   10,2676  54 155 1 GODSPR    TS      PLAYTEM1

0647   REF 281  LAST 1468   10,2677  3 5021 1 GODSPR1   CAF     ZERO
0648   REF   3  LAST 1465   10,2700  54 160 1 GODSPR2   TS      PLAYTEM4

0649   REF 282  LAST 1468   10,2701  3 5021 1           CAF     ZERO          * DONT MOVE
0650   REF   1              10,2702  1 3063 0           TCF     GODSPRS1

R0651          CLEANDSP IS USED FOR CLEARING OUT A NORMAL DISPLAY THAT IS PRESENTLY ACTIVE OR A NORMAL DISPLAY THAT IS
R0653   SET UP TO BE STARTED OR RESTARTED.

R0654          NORMALLY THE USER WILL NOT NEED TO USE THIS ROUTINE SINCE A NEW NORMAL DISPLAY AUTOMATICALLY CLEARS OUT AN
R0656   OLD DISPLAY.

R0657          CALLING SEQUENCE FOR CLEANDSP-

A0658                                                 TC      BANKCALL
A0659                                                 CADR    CLEANDSP

0660   REF 283  LAST 1468   10,2703  3 5021 1 CLEANDSP  CAF     ZERO
0661   REF  13  LAST 1468   10,2704  54 155 1 REFLASH   TS      PLAYTEM1

0662   REF   1              10,2705  3 3726 1           CAF     REDOMASK      FLASH AND PERMIT
0663   REF   8  LAST 1468   10,2706  1 2722 0           TCF     GOFLASH2

0667   REF  14  LAST 1468   10,2707  54 155 1 REGODSP   TS      PLAYTEM1

0668   REF  79  LAST 1436   10,2710  3 5002 0           CAF     BIT14
0669   REF   9  LAST 1468   10,2711  1 2722 0           TCF     GOFLASH2
```

```
0670   REF  15  LAST 1468   10,2712  54 155 1  REGODSPR TS    PLAYTEM1

0671   REF  80  LAST 1468   10,2713  3 5002 0            CAF   BIT14
0672   REF   2  LAST 1466   10,2714  1 2700 0            TCF   GODSPR2

06721  REF  16  LAST 1469   10,2715  54 155 1  CLOCPLAY TS    PLAYTEM1
06722  REF   1              10,2716  3 3765 0            CAF   CLOCKCON
06723  REF  10  LAST 1468   10,2717  1 2722 0            TCF   GOFLASH2
0673   REF  17  LAST 1469   10,2720  54 155 1  GOFLASH  TS    PLAYTEM1

0674   REF  49  LAST 1450   10,2721  3 5014 1            CAF   BIT4          LEAVE ONLY FLASH BIT SET
0675   REF   4  LAST 1468   10,2722  54 160 1  GOFLASH2 TS    PLAYTEM4

0676   REF   1              10,2723  0 3144 0            TC    SAVELOCS

0677                        10,2724  0 0003 1            RELINT

0678   REF   1              10,2725  1 2770 1            TCF   MAKEPLAY      BRANCH DIRECT WITH NO SEPARATE JOB CALL

0679   REF  18  LAST 1469   10,2726  54 155 1  PRIODSPR TS    PLAYTEM1

0680   REF   1              10,2727  3 3745 1            CAF   BITS7+4
0681   REF   4  LAST 1466   10,2730  1 3061 1            TCF   GODSPRS

0682   REF  19  LAST 1469   10,2731  54 155 1  PRIODSP  TS    PLAYTEM1

0683   REF   2  LAST 1469   10,2732  3 3745 1  SETPRIO  CAF   BITS7+4
0684   REF  11  LAST 1469   10,2733  1 2722 0            TCF   GOFLASH2

0685   REF 284  LAST 1468   10,2734  3 5021 1  MAKEPRIO CAF   ZERO
0686   REF   3  LAST 1467   10,2735  54 164 0            TS    COPINDEX

0687   REF   1              10,2736  0 3616 0            TC    LINUSCHR
0688   REF   1              10,2737  1 2744 0            TCF   HIPRIO        LINUS RETURN
0689   REF  14  LAST 1468   10,2740  3 0100 0            CA    FLAGWRD4
0690   REF   1              10,2741  7 3764 0            MASK  OCT20100      IS PRIO IN ENDIDLE OR BUSY
0691   REF 391  LAST 1467   10,2742  10 000 0            CCS   A
0692   REF   1              10,2743  1 3017 0            TCF   PRIOBORT      YES, ABORT

0693   REF  15  LAST 1469   10,2744  3 0100 0  HIPRIO   CA    FLAGWRD4      MARK ACTIVE
0694   REF   1              10,2745  7 7765 0            MASK  OCT40400
0695                        10,2746  0 0006 1            EXTEND
0696   REF   1              10,2747  1 2752 1            BZF   ASKIFNRM      NO

0697   REF 285  LAST 1469   10,2750  3 5021 1  SETMARK  CAF   ZERO
0698   REF   1              10,2751  1 3216 0            TCF   JOBXCHS

0699   REF  16  LAST 1469   10,2752  3 0100 0  ASKIFNRM CA    FLAGWRD4      NORMAL ACTIVE
0700   REF   1              10,2753  7 3762 0            MASK  OCT10200      BITS 13+8
0701                        10,2754  0 0006 1            EXTEND
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0702   REF   1                10,2755  1 2760 0           BZF     OKTOCOPY        NO

0703   REF 168  LAST 1467     10,2756  3 5017 1  SETNORM  CAF     ONE
0704   REF   2  LAST 1469     10,2757  1 3216 0           TCF     JOBXCHS

0705   REF   1                10,2760  0 3156 0  OKTOCOPY TC      COPYNORM
0706   REF   1                10,2761  0 3427 0           TC      WITCHONE

0707   REF   8  LAST 1439     10,2762  0 5201 1           TC      JOBWAKE

0708   REF   1                10,2763  0 3444 0           TC      XCHTOEND

0709   REF  22  LAST 1416     10,2764  3 0025 0  REDOPRIO CA      TIME1           SAVE TIME PRIODSP SENT OUT
0710   REF   1                10,2765  55'147 0           TS      PRIOTIME

0711   REF 286  LAST 1469     10,2766  3 5021 1  KEEPPRIO CAF     ZERO            START UP PRIO DISPLAY
0712   REF   2  LAST 1467     10,2767  1 3040 1           TCF     PRIOPLAY

0713   REF  29  LAST 1442     10,2770  3 0167 1  MAKEPLAY CA      PRIORITY        SAVE USERS PRIORITY
07131  REF   3  LAST 1442     10,2771  7 7674 1           MASK    PRIO37
07132  REF   1                10,2772  54 163 1           TS      USERPRIO

07133  REF   1                10,2773  3 7670 1           CAF     PRIO33          RAISE PRIORITY FOR FAST JOBS AFTER WAKE
07134  REF  10  LAST  861     10,2774  0 5210 1           TC      PRIOCHNG

07135  REF   5  LAST 1469     10,2775  3 0160 0           CA      PLAYTEM4        IS IT MARK OR PRIO OR NORM
0714   REF   1                10,2776  7 3744 1           MASK    BITS15+7
0715   REF 392  LAST 1469     10,2777  10 000 0           CCS     A
0716   REF   1                10,3000  1 2734 1           TCF     MAKEPRIO        ITS PRIO
0717   REF   1                10,3001  1 3003 0           TCF     IFLEGAL
0718   REF   1                10,3002  1 2611 1           TCF     MAKEMARK        ITS MARK

0719   REF  77  LAST 1440     10,3003  3 5016 0  IFLEGAL  CAF     TWO
0720   REF   4  LAST 1469     10,3004  54 164 0           TS      COPINDEX

0721   REF   2  LAST 1469     10,3005  0 3616 0           TC      LINUSCHR

0722   REF   1                10,3006  1 3021 0           TCF     OKTOPLAY        LINUS RETURN
0723   REF   3  LAST  200     10,3007  4 1071 1           CS      EBANKTEM
0724   REF  50  LAST 1469     10,3010  7 5014 0           MASK    BIT4
0725   REF 393  LAST 1470     10,3011  10 000 0           CCS     A
0726   REF   2  LAST 1470     10,3012  1 3021 0           TCF     OKTOPLAY        NO

0727   REF  17  LAST 1469     10,3013  3 0100 0           CA      FLAGWRD4        WAS NORM ASLEEP
0728   REF   1                10,3014  7 3735 1           MASK    NBUSMASK        ARE ANY NORMS ASLEEP
0729                          10,3015  0 0006 1           EXTEND
0730   REF   3  LAST 1470     10,3016  1 3021 0           BZF     OKTOPLAY        NO

0731   REF  12  LAST 1442     10,3017  0 5721 0  PRIOBORT TC      POODOO
0732                          10,3020   01502 1           OCT     1502
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0733   REF   1                10,3021  0 3160 0  OKTOPLAY TC     COPIES2

07331  REF   2  LAST 1470     10,3022  3 0163 0            CA     USERPRIO
07332                         10,3023  0 0006 1            EXTEND
07333  REF  24  LAST 1410     10,3024  04 007 1            ROR    SUPERBNK
07334  REF   3  LAST  197     10,3025  54 366 0            TS     RESTREG

0737   REF  18  LAST 1470     10,3026  3 0100 0            CA     FLAGWRD4      PRIO OR MARK GOING
0738   REF   1                10,3027  7 3736 1            MASK   PMMASK
0739   REF 394  LAST 1470     10,3030  10 000 0            CCS    A
0740   REF   1                10,3031  1 3176 0            TCF    GOSLEEPS      YES

0741                          10,3032  1 3034 1            TCF    +2
0742   REF   2  LAST 1471     10,3033  1 3176 0            TCF    GOSLEEPS      MARK GOING

R0743  COULD PUT NORM BUSY CHECK HERE TO SAVE TIME
0744   REF   2  LAST 1470     10,3034  0 3427 0            TC     WITCHONE      IS IT NVSUB BUSY, ENDIDLE OR NOONE
0745   REF   9  LAST 1470     10,3035  0 5201 1            TC     JOBWAKE

0746   REF   2  LAST 1470     10,3036  0 3444 0            TC     XCHTOEND

0747   REF  78  LAST 1470     10,3037  3 5016 0  PLAYJUM1  CAF    TWO
0748   REF   5  LAST 1470     10,3040  54 164 0  PRIOPLAY  TS     COPINDEX

0749   REF   1                10,3041  1 3312 0            TCF    GOPLAY

0750   REF  20  LAST 1469     10,3042  54 155 1  EXDSPRET  TS     PLAYTEM1

0751   REF   2  LAST  158     10,3043  3 7703 1            CAF    BIT15+6
0752   REF  12  LAST 1469     10,3044  1 2722 0            TCF    GOFLASH2

0753   REF   2  LAST  760     10,3045  55'045 0  GOPERF1   TS     NORMTEM1      STORE DESIRED CHECKLIST VALUE
0754   REF   1                10,3046  3 3720 1            CAF    V01N25        USED TO DISPLAY CHECKLIST VALUE IN R1

0755   REF  21  LAST 1471     10,3047  54 155 1  GOPERFS   TS     PLAYTEM1

0756   REF   1                10,3050  3 3717 0            CAF    PERFMASK      LEAVE ONLY FLASH, PERFORM, BLANKING
0757   REF  13  LAST 1471     10,3051  1 2722 0            TCF    GOFLASH2

0758   REF  22  LAST 1471     10,3052  54 155 1  GOPERF2   TS     PLAYTEM1      DESIRED VERB-NOUN TO DISPLAY R1,R2,R3

0759   REF   1                10,3053  3 3723 1            CAF    PERF2MSK
0760   REF  14  LAST 1471     10,3054  1 2722 0            TCF    GOFLASH2

0764   REF   1                10,3055  0 3137 1  GOPERF4   TC     PURRS4

0765   REF  15  LAST 1471     10,3056  1 2722 0            TCF    GOFLASH2

0766   REF  23  LAST 1471     10,3057  54 155 1  GOFLASHR  TS     PLAYTEM1
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0767   REF  51  LAST 1470   10,3060  3 5014 1          CAF     BIT4          LEAVE ONLY FLASH BIT SET
0768   REF   6  LAST 1470   10,3061  54 160 1  GODSPRS TS      PLAYTEM4

0769   REF  50  LAST 1435   10,3062  3 6214 0          CAF     THREE

0770                        10,3063  0 0004 0  GODSPRS1 INHINT                IMMEDIATE RETURN IS CALL CADR +4
0771   REF   9  LAST 1439   10,3064  54 072 0          TS      RUPTREG3

0772   REF  30  LAST 1470   10,3065  3 0167 1          CA      PRIORITY      MAKE DISPLAY ONE HIGHER THAN USER
0773   REF   4  LAST 1470   10,3066  7 7674 1          MASK    PRIO37
0774   REF  12  LAST 1217   10,3067  54 063 0          TS      NEWPRIO

07741  REF   7  LAST 1472   10,3070  3 0160 0          CA      PLAYTEM4      IS THIS A FLASHING R DISPLAY
07742  REF  52  LAST 1472   10,3071  7 5014 0          MASK    BIT4
07743  REF 395  LAST 1471   10,3072  10 000 0          CCS     A
07744  REF   1               10,3073  1 3101 0          TCF     VACDSP        YES, MAKE DSPLAY JOB A VAC
07745  REF  13  LAST 1472   10,3074  3 0063 1          CA      NEWPRIO       NO, MAKE DSPLAY JOB A NOVAC
07746  REF  34  LAST 1449   10,3075  0 5134 1          TC      NOVAC
07747  REF   7  LAST  708   E7,1777                    EBANK=  WHOCARES
07748  REF   2  LAST 1469   10,3076   02770 0          2CADR   MAKEPLAY
07748                        10,3077   20067 1
07749  REF   1               10,3100  1 3107 0          TCF     BOTHJOBS

0775   REF  35  LAST 1442   10,3101  3 0006 1  VACDSP  CA      BBANK
0776                        10,3102  0 0006 1          EXTEND
0777   REF  25  LAST 1471   10,3103  04 007 1          ROR     SUPERBNK
0778   REF 190  LAST 1447   10,3104  54 001 1          TS      L
0779   REF   1               10,3105  3 3761 1          CAF     MAKEGEN
0780   REF   3  LAST  418   10,3106  0 5160 0          TC      SPVAC

0781   REF   2  LAST 1469   10,3107  0 3144 0  BOTHJOBS TC     SAVELOCS      COPY TEMPS INTO PERMANENT REGISTERS

0782                        10,3110  0 0006 1          EXTEND                SAVE NVWORD AND USERS MPAC +2
0783   REF 705  LAST 1467   10,3111  3 0156 0          DCA     MPAC +1
0784   REF  25  LAST 1449   10,3112  50 064 0          INDEX   LOCCTR
0785   REF 706  LAST 1472   10,3113  52 156 1          DXCH    MPAC +1

0786                        10,3114  0 0006 1          EXTEND                SAVE USERS CADR, FLAGS AND EBANK
0787   REF 707  LAST 1472   10,3115  3 0160 0          DCA     MPAC +3
0788   REF  26  LAST 1472   10,3116  50 064 0          INDEX   LOCCTR
0789   REF 708  LAST 1472   10,3117  52 160 1          DXCH    MPAC +3

0790   REF  27  LAST 1472   10,3120  3 0064 0          CA      LOCCTR
0791   REF 709  LAST 1472   10,3121  54 161 0          TS      MPAC +5

0792   REF   1               10,3122  0 3151 1          TC      SAVELOCR
0793                        10,3123  0 0003 1          RELINT

0794   REF   9  LAST 1404   10,3124  1 4704 1          TCF     BANKJUMP      CALL CADR +4
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0795   REF   3  LAST 1471   10,3125  55'045 0  GOPERF1R TS     NORMTEM1        DESIRED CHECKLIST VALUE

0796   REF   2  LAST 1471   10,3126  3 3720 1           CAF    V01N25          DISPLAYS CHECKLIST VALUE IN R1

0797   REF  24  LAST 1471   10,3127  54 155 1  GOPERFRS TS     PLAYTEM1

0798   REF   2  LAST 1471   10,3130  3 3717 0           CAF    PERFMASK        LEAVE ONLY FLASH, PERFORM, BLANKING
0799   REF   5  LAST 1469   10,3131  1 3061 1           TCF    GODSPRS

0800   REF  25  LAST 1473   10,3132  54 155 1  GOPERF2R TS     PLAYTEM1        DESIRED VERB-NOUN TO DISPLAY R1,R2,R3

0801   REF   2  LAST 1471   10,3133  3 3723 1           CAF    PERF2MSK
0802   REF   6  LAST 1473   10,3134  1 3061 1           TCF    GODSPRS

0806   REF   2  LAST 1471   10,3135  0 3137 1  GOPERF4R TC     PURRS4

0807   REF   7  LAST 1473   10,3136  1 3061 1           TCF    GODSPRS

0808   REF   7  LAST  896   10,3137  55'131 1  PURRS4   TS     OPTION1         DESIRED OPTION CODE

0809   REF   1              10,3140  3 3724 0           CAF    V04N06
0810   REF  26  LAST 1473   10,3141  54 155 1           TS     PLAYTEM1

0811   REF   1              10,3142  3 3725 1           CAF    PERF4MSK        FLASH,PERFORM AND BLANK R3
0812   REF 338  LAST 1467   10,3143  0 0002 0           TC     Q

0813                        10,3144  0 0004 0  SAVELOCS INHINT

0815   REF   1              10,3145  4 3734 0           CS     OCT3400         EBANK BITS
0816   REF   8  LAST 1472   10,3146  7 0160 1           MASK   PLAYTEM4
0817   REF  65  LAST 1467   10,3147  6 0003 1           AD     EBANK
0818   REF   9  LAST 1473   10,3150  54 160 1           TS     PLAYTEM4

0819   REF 339  LAST 1473   10,3151  22 002 0  SAVELOCR LXCH   Q

0820   REF   6  LAST 1441   10,3152  0 4711 1           TC     MAKECADR
0821   REF   1              10,3153  54 157 0           TS     PLAYTEM3

0822   REF  10  LAST 1472   10,3154  6 0072 1           AD     RUPTREG3        NOT USED FOR NON R ROUTINES
0823   REF 191  LAST 1472   10,3155  0 0001 0           TC     L

0824   REF 287  LAST 1470   10,3156  3 5021 1  COPYNORM CAF    ZERO
0825   REF   6  LAST 1471   10,3157  54 164 0  COPIES   TS     COPINDEX
0826                        10,3160  0 0004 0  COPIES2  INHINT
0827   REF  10  LAST 1473   10,3161  3 0160 0           CA     PLAYTEM4        FLAGWORD
0828   REF   7  LAST 1473   10,3162  50 164 1           INDEX  COPINDEX
0829   REF   2  LAST 1467   10,3163  55'067 0           TS     EBANKSAV        EQUIV TO DSPFLG

0830   REF   1              10,3164  7 3752 0           MASK   CADRMASK        FLASH AND GODSPRET
0831                        10,3165  0 0006 1           EXTEND
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0832   REF   1                10,3166  1 3172 1            BZF     SKIPADD

0833   REF   2  LAST 1473     10,3167  3 0157 1            CA      PLAYTEM3
0834   REF   8  LAST 1473     10,3170  50 164 1            INDEX   COPINDEX
0835   REF   3  LAST  177     10,3171  54 372 0            TS      CADRFLSH

0836   REF  27  LAST 1473     10,3172  3 0155 0  SKIPADD   CA      PLAYTEM1        VERB NOUN
0837   REF   9  LAST 1474     10,3173  50 164 1            INDEX   COPINDEX
0838   REF   1                10,3174  54 367 1            TS      NVWORD

0842   REF   1                10,3175  1 3453 1            TCF     RELINTQ

0843   REF  10  LAST 1474     10,3176  50 164 1  GOSLEEPS  INDEX   COPINDEX
0844   REF   2  LAST 1467     10,3177  3 3753 0            CA      PRIOOCT
0845   REF   1                10,3200  7 3202 0            MASK    WAITMASK
0846   REF   1                10,3201  0 7722 1            TC      UPENT2
0847                          10,3202    03004 0  WAITMASK OCT     3004
0848   REF 169  LAST 1470     10,3203  4 5017 0            CS      ONE
0849   REF  11  LAST 1474     10,3204  6 0164 1            AD      COPINDEX
0850   REF   1                10,3205  54 154 0            TS      FACEREG

0851   REF   2  LAST 1474     10,3206  50 154 1  XCHSLEEP  INDEX   FACEREG
0852   REF   1                10,3207  3 3732 1            CAF     WAKECADR
0853                          10,3210  0 0004 0            INHINT
0854   REF  10  LAST 1471     10,3211  0 5201 1            TC      JOBWAKE         FIND CADR IN JOB AREA

0855   REF   3  LAST 1471     10,3212  0 3444 0            TC      XCHTOEND        CAUSES AWAKENED JOB TO GO TO ENDOFJOB

0858   REF   3  LAST 1474     10,3213  50 154 1            INDEX   FACEREG        REPLACE SAME CADR BUT NEW JOB AREA
0859   REF   2  LAST 1474     10,3214  3 3732 1            CAF     WAKECADR
0860   REF   7  LAST 1441     10,3215  1 5175 0            TCF     JOBSLEEP

0861   REF   4  LAST 1474     10,3216  54 154 0  JOBXCHS   TS      FACEREG         CONTROLS TYPE OF DISPLAY PUT TO SLEEP
0862   REF   3  LAST 1471     10,3217  0 3427 0            TC      WITCHONE
0863   REF  11  LAST 1474     10,3220  0 5201 1            TC      JOBWAKE
0864   REF   5  LAST 1474     10,3221  3 0154 1            CA      FACEREG
0865   REF  28  LAST 1472     10,3222  50 064 0            INDEX   LOCCTR
0866   REF   6  LAST 1474     10,3223  54 154 0            TS      FACEREG

0867   REF   1                10,3224  3 3237 1            CAF     XCHOADD
0868   REF   1                10,3225  0 3445 1            TC      XCHNYLOC

0869   REF   7  LAST 1474     10,3226  50 154 1            INDEX   FACEREG
0870   REF   1                10,3227  3 3754 1            CA      MARKOCT
0871   REF   1                10,3230  7 3756 1            MASK    IDLESLEP
0872   REF   1                10,3231  0 7740 0            TC      DOWNENT2
0873                          10,3232    74004 0  IDLEMASK OCT     74004           * DONT MOVE

0874   REF   8  LAST 1474     10,3233  50 154 1            INDEX   FACEREG         BIT SHOWS PRIO INTERRUPTED NORM OR MARK
0875   REF  41  LAST 1467     10,3234  3 5013 0            CA      BIT5            BIT5 FOR MARK, BIT4 FOR NORMAL
```

```
0876   REF   22  LAST 1433   10,3235  6 5015 0          AD      FOUR
0877   REF    2  LAST 1474   10,3236  0 7722 1          TC      UPENT2      FLAG ROUTINE DOES RELINT
0878   REF    1              10,3237   03206 0 XCHQADD  GENADR  XCHSLEEP    * DONT MOVE
0879   REF   19  LAST 1471   10,3240  3 0100 0          CA      FLAGWRD4
0880   REF   36  LAST 1468   10,3241  7 5015 1          MASK    BIT3        IF BIT3 THEN MARK OVER NORM
0881   REF  396  LAST 1472   10,3242  10 000 0          CCS     A
0882   REF    2  LAST 1467   10,3243  0 2624 0 GENMARK  TC      MARKPLAY    USED AS GENADR FOR JOBWAKE
0883   REF    2  LAST 1470   10,3244  1 2760 0          TCF     OKTOCOPY

0884   REF  288  LAST 1473   10,3245  3 5021 1 MARKWAKE CAF     ZERO
0885   REF    2  LAST 1467   10,3246  54 160 1 WAKEPLAY TS      TEMPOR2

0886   REF    3  LAST 1475   10,3247  50 160 0          INDEX   TEMPOR2
0887   REF    1              10,3250  3 3746 1          CA      BITS5+11
0888   REF   23  LAST 1475   10,3251  6 5015 0          AD      FOUR
0889   REF    2  LAST 1474   10,3252  0 7740 0          TC      DOWNENT2
0890                         10,3253   40010 1 MARKFMSK OCT     40010       ***DONT MOVE

0891   REF    4  LAST 1475   10,3254  50 160 0          INDEX   TEMPOR2
0892   REF    3  LAST 1474   10,3255  3 3732 1          CAF     WAKECADR
0893                         10,3256  0 0004 0          INHINT
0894   REF   12  LAST 1474   10,3257  0 5201 1          TC      JOBWAKE

0895   REF    1              10,3260  1 3557 1          TCF     ENDRET
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R0896        ALL .1 RESTARTS BRANCH DIRECTLY TO INITDSP. NORMAL DISPLAYS ARE THEONLY DISPLAYS ALLOWED TO USE .1 RESTARTS
R0898   INITDSP FIRST RESTORES THE EBANK AND THE SUPERBANK TO THE MOST RECENT NORMAL EBANK AND SUPERBANK.
R0900        IF THE MOST RECENT NORMAL DISPLAY REQUEST WAS NOT FINISHED, CONTROLIS SENT BACK TO THE LAST NORMAL USER.
R0902   OTHERWISE THE NORMAL DISPLAY SET UP IN THE NORMAL DISPLAY REGS IS STARTED UP IMMEDIATELY.

0904   REF    4  LAST 1470   10,3261  3 1071 0 INITDSP  CA      EBANKTEM    RESTORE MOST RECECT NORMAL EBANK
0905   REF   66  LAST 1473   10,3262  54 003 0          TS      EBANK

0906   REF    4  LAST 1471   10,3263  3 0366 1          CA      RESTREG     SUPERBANK AND JOB PRIORITY
0907   REF    1              10,3264  0 4773 0          TC      SUPERSW     RESTORE SUPERBANK

0908   REF    5  LAST 1472   10,3265  7 7674 1          MASK    PRIO37
0909   REF   11  LAST 1470   10,3266  0 5210 1          TC      PRIOCHNG

0910   REF   51  LAST 1472   10,3267  4 6214 1          CS      THREE
0911   REF    4  LAST  622   10,3270  6 0374 1          AD      TEMPFLSH
0912   REF   10  LAST 1472   10,3271  1 4704 1          TCF     BANKJUMP

0913                         10,3272  0 0003 1 PINBRNCH RELINT                FOR GOPIN USERS
09135  REF    1              10,3273  3 1072 0          CA      MARK2PAC    NEEDED TO SAVE MPAC +2 FOR MARK USERS
0914   REF  710  LAST 1472   10,3274  54 156 1          TS      MPAC +2     ONLY

0915   REF   20  LAST 1475   10,3275  3 0100 0          CA      FLAGWRD4    PINBRANCH CONDITION
0916   REF    1              10,3276  7 7707 1          MASK    PINMASK
0917   REF  397  LAST 1475   10,3277  10 000 0          CCS     A
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0918                          10,3300  1 3303 0            TCF     +3
0919   REF    1               10,3301  1 3713 0            TCF     ERASER          ** NOTHING IN ENDIDLE
0920   REF    3  LAST 1475    10,3302  1 2624 1            TCF     MARKPLAY

0921   REF   57  LAST 1446    10,3303  0 5546 0 NORMBNCH   TC      UPFLAG          SET PINBRANCH BIT
0922   REF    1               10,3304   00105 0            ADRES   PINBRFLG

0923   REF   81  LAST 1469    10,3305  3 5002 0            CAF     BIT14           PRIO INTERRUPTED
0924   REF   21  LAST 1475    10,3306  7 0100 1            MASK    FLAGWRD4
0925   REF  398  LAST 1475    10,3307  10 000 0            CCS     A
0926   REF    1               10,3310  1 2766 0            TCF     KEEPPRIO

0927   REF    1               10,3311  1 3037 1            TCF     PLAYJUM1

0928   REF    1               10,3312  0 2644 0 NVDSP      TC      COPYPACS

09281  REF    5  LAST 1475    10,3313  3 0160 0            CA      TEMPOR2         SET UP BLANK BITS FOR NVMONOPT IN CASE
09282  REF   23  LAST 1442    10,3314  7 5023 1            MASK    SEVEN           USER REQUESTS BLANKING MONITOR
09283  REF  192  LAST 1473    10,3315  54 001 1            TS      L

0929   REF   55  LAST 1443    10,3316  4 5003 0            CS      BIT13
0930   REF   12  LAST 1474    10,3317  50 164 1            INDEX   COPINDEX
0931   REF    1               10,3320  7 1067 0            MASK    DSPFLG
0932   REF   13  LAST 1476    10,3321  50 164 1            INDEX   COPINDEX
0933   REF    2  LAST 1476    10,3322  55'067 0            TS      DSPFLG

0934   REF   30  LAST 1442    10,3323  7 5010 1            MASK    BIT8            BIT8 SET IF DEC MARK PERFORM DISPLAY
0935   REF    5  LAST 1175    10,3324  54 141 1            TS      TEM1

0936   REF  711  LAST 1475    10,3325  3 0156 0            CA      MPAC +2
0937   REF    2  LAST 1467    10,3326  54 165 1            TS      MPAC2SAV

0938   REF    2  LAST 1475    10,3327  55'072 1            TS      MARK2PAC        * FOR DISK ONLY *
0939   REF   14  LAST 1476    10,3330  50 164 1            INDEX   COPINDEX
0940   REF    2  LAST 1474    10,3331  10 367 1            CCS     NVWORD
0941   REF    1               10,3332  1 3341 0            TCF     NVDSP1
0942   REF    1               10,3333  1 3455 1            TCF     CLEANEND
0943   REF    4  LAST 1468    10,3334  4 0370 1            CS      MARKNV
0944   REF    5  LAST 1476    10,3335  54 370 1            TS      MARKNV          IN CASE MARKPLAY AWAKENED AFTER SLEEPING
0945   REF   12  LAST 1437    10,3336  7 6043 1            MASK    LOW7
0946   REF    1               10,3337  6 3737 1            AD      V05N00M1
0947   REF    6  LAST 1476    10,3340  6 0141 0            AD      TEM1
0948   REF  170  LAST 1474    10,3341  6 5017 1 NVDSP1     AD      ONE
0949   REF    1               10,3342  0 4171 1 NV50DSP    TC      NVMONOPT
0950   REF    1               10,3343  1 3467 0            TCF     REST            IF BUSY
0951   REF    6  LAST  386    10,3344  0 4447 1            TC      FLASHOFF        IN CASE OF EXTENDED VERB NON FLASH

0952   REF    1               10,3345  0 2642 0            TC      COPYTOGO        MPACS DESTROYED BY NVSUB
0953   REF   63  LAST 1448    10,3346  0 5560 1            TC      DOWNFLAG        UNSET SLEEPING BITS
0954   REF    1               10,3347   00102 1            ADRES   MRKNVFLG
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09541  REF   64  LAST 1476   10,3350  0 5560 1          TC      DOWNFLAG
09542  REF    1              10,3351   00103 0          ADRES   NRMNVFLG
09543  REF   65  LAST 1477   10,3352  0 5560 1          TC      DOWNFLAG
09544  REF    1              10,3353   00104 1          ADRES   PRONVFLG
0955   REF    6  LAST 1476   10,3354  3 0160 0 BLANKCHK CA      TEMPOR2     BLANK BITS 1,2,3 IF SET
0956   REF    2  LAST  357   10,3355  0 4271 1          TC      BLANKSUB
0957   REF    1              10,3356  1 3312 0          TCF     NVDSP
0958   REF   42  LAST 1474   10,3357  3 5013 0 PERFCHEK CAF     BIT5        BIT 5 FOR PERFORM
0959   REF    7  LAST 1477   10,3360  7 0160 1          MASK    TEMPOR2
0960   REF  399  LAST 1476   10,3361  10 000 0          CCS     A           IS THIS A GOPERF DISPLAY
0961   REF    1              10,3362  1 3405 1          TCF     1STOR2ND    YES

0962   REF   53  LAST 1472   10,3363  3 5014 1 GOANIDLE CAF     BIT4
0963   REF    8  LAST 1477   10,3364  7 0160 1          MASK    TEMPOR2
0964   REF  400  LAST 1477   10,3365  10 000 0          CCS     A
0965   REF    1              10,3366  1 3502 1          TCF     FLASHSUB    IT IS

0966   REF    9  LAST 1477   10,3367  4 0160 1          CS      TEMPOR2     IS THIS A GODSPRET
0967   REF   54  LAST 1468   10,3370  7 5012 0          MASK    BIT6
0968   REF  401  LAST 1477   10,3371  10 000 0          CCS     A
0969   REF    1              10,3372  1 3377 0          TCF     ISITNOO

09691  REF   15  LAST 1476   10,3373  50 164 1          INDEX   COPINDEX
09692  REF    4  LAST 1474   10,3374  3 0372 1          CA      CADRFLSH
09693  REF  712  LAST 1476   10,3375  54 157 0          TS      MPAC +3
09694  REF    1              10,3376  1 3575 1          TCF     ENDIT

0972   REF   16  LAST 1477   10,3377  50 164 1 ISITNOO  INDEX   COPINDEX    IS THIS A PASTE
0973   REF    3  LAST 1476   10,3400  3 0367 0          CA      NVWORD
0974   REF   13  LAST 1476   10,3401  7 6043 1          MASK    LOW7        CHECK MADE FOR PINBRNCH AND PRIO ON MARK
0975                         10,3402  0 0006 1          EXTEND
0976   REF    2  LAST 1477   10,3403  1 3502 1          BZF     FLASHSUB    YES, ASSUME PASTE ALWAYS ON FLASH

0977   REF  105  LAST 1467   10,3404  1 5217 1          TCF     ENDOFJOB    NOT FLASH, NOT GOPERF, THERFORE EXIT

0978   REF   10  LAST 1477   10,3405  3 0160 0 1STOR2ND CA      TEMPOR2
0979   REF   56  LAST 1476   10,3406  7 5003 0          MASK    BIT13
0980   REF  402  LAST 1477   10,3407  10 000 0          CCS     A
0981   REF    1              10,3410  1 3363 0          TCF     GOANIDLE    SECOND

0982   REF   57  LAST 1477   10,3411  3 5003 1          CA      BIT13
0983   REF   17  LAST 1477   10,3412  50 164 1          INDEX   COPINDEX
0984   REF    3  LAST 1476   10,3413  27'067 0          ADS     DSPFLG

09845                        10,3414  22 007 0          ZL
0985                         10,3415  0 0006 1          EXTEND              IS IT MARK
0986   REF    1              10,3416  6 2665 0          BZMF    MARKPERF    YES

0987   REF   37  LAST 1413   10,3417  7 5004 1          MASK    BIT12
09871                        10,3420  0 0006 1          EXTEND
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09872  REF   1                10,3421  1 3425 0           BZF     V50PASTE
09874  REF  20  LAST  722     10,3422  4 1145 1           CS      NVWORD1      NVOWRD1= -0 IS V97. NVWORD1= -400 IS V99
098741 REF   1                10,3423  6 3763 0           AD      V97N00
09875  REF   2  LAST 1468     10,3424  1 3342 0           TCF     NV50DSP
0988   REF   1                10,3425  3 3722 0 V50PASTE  CAF     V50N00
0989   REF   3  LAST 1478     10,3426  1 3342 0           TCF     NV50DSP      DISPLAY SECOND PART OF GOPERF

0990   REF  43  LAST 1477     10,3427  4 5013 1 WITCHONE  CS      BIT5         TURN OFF KEY RELEASE LIGHT
0991                          10,3430  0 0006 1           EXTEND
0992   REF  35  LAST 1450     10,3431  03 011 1           WAND    DSALMOUT

0993   REF  22  LAST 1476     10,3432  3 0100 0           CA      FLAGWRD4
0994   REF   1                10,3433  7 3740 0           MASK    NVBUSMSK     IS IT NVSUB ASLEEP
0995   REF 403  LAST 1477     10,3434  10 000 0           CCS     A
0996   REF 171  LAST 1476     10,3435  3 5017 1           CAF     ONE
0997   REF 193  LAST 1476     10,3436  54 001 1           TS      L
0998   REF 289  LAST 1475     10,3437  3 5021 1           CAF     ZERO
0999   REF 194  LAST 1478     10,3440  50 001 0           INDEX   L
1000   REF  11  LAST  376     10,3441  57'042 0           XCH     CADRSTOR

1001                          10,3442  0 0004 0           INHINT
1002   REF 340  LAST 1473     10,3443  0 0002 0           TC      Q

1003   REF   6  LAST  366     10,3444  3 4233 1 XCHTOEND  CAF     ENDINST      TC ENDOFJOB REPLACES GENADR IN LOC FOR
1004   REF  29  LAST 1474     10,3445  56 064 0 XCHNYLOC  XCH     LOCCTR       WAS THIS ADDRESS SLEEPING
1005                          10,3446  0 0006 1           EXTEND
1006   REF   2  LAST 1474     10,3447  6 3453 0           BZMF    RELINTQ      NO
1007   REF  30  LAST 1478     10,3450  56 064 0           XCH     LOCCTR       YES
1008   REF  31  LAST 1478     10,3451  50 064 0           INDEX   LOCCTR
1009   REF  43  LAST 1439     10,3452  54 164 0           TS      LOC

1010                          10,3453  0 0003 1 RELINTQ   RELINT
1011   REF 341  LAST 1478     10,3454  0 0002 0           TC      Q            BACK TO USER

1012   REF   5  LAST  823     10,3455  3 7667 1 CLEANEND  CAF     PRIO32       ONE LOWER THAN DISPLAYS SLEEPING
1014   REF  32  LAST 1419     10,3456  0 5147 0           TC      FINDVAC
1015   REF   2  LAST  184       0371                     EBANK=  NVSAVE
1016   REF   1                10,3457   04245 0          2CADR   JAMTERM
1016   REF   1                10,3460   04060 0

1017   REF   3  LAST 1477     10,3461  1 3503 0           TCF     FLASHSUB +1

1018   REF  23  LAST 1478     10,3462  3 0100 0 ISITPRIO  CA      FLAGWRD4
1019   REF   1                10,3463  7 3510 1           MASK    ITISMASK     IS PINBRFLG, MARKIDFLG SET
1020                          10,3464  0 0006 1           EXTEND
1021   REF   2  LAST 1469     10,3465  1 3017 0           BZF     PRIOBORT
1022   REF 106  LAST 1477     10,3466  1 5217 1           TCF     ENDOFJOB

1023   REF  12  LAST 1478     10,3467  11'042 1 REST      CCS     CADRSTOR     IS SOMEONE IN ENDIDLE
1024   REF 107  LAST 1478     10,3470  1 5217 1           TCF     ENDOFJOB     YES
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L DISPLAY INTERFACE ROUTINES

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1025   REF   1              10,3471  1 3473 0           TCF    RESTSLEP

1026   REF 108  LAST 1478   10,3472  1 5217 1           TCF    ENDOFJOB

1027   REF   2  LAST 1467   10,3473  3 0162 1  RESTSLEP CA     GENMASK       SET NVSLEEP BITS
1028   REF   1              10,3474  7 3741 1           MASK   ASTROMSK
1029   REF   3  LAST 1475   10,3475  0 7722 1           TC     UPENT2
1030                        10,3476   24100 0  OCT24100 OCT    24100         *** DONT MOVE

1031   REF  18  LAST 1477   10,3477  50 164 1           INDEX  COPINDEX
1032   REF   1              10,3500  3 3731 1           CAF    NVCADR
1033   REF   2  LAST  382   10,3501  0 4456 1           TC     NVSUBUSY      BUSY OR ABORT IF ILLEGAL

1034   REF   4  LAST  365   10,3502  0 4443 0  FLASHSUB TC     FLASHON

1035   REF  19  LAST 1479   10,3503  3 0164 1           CA     COPINDEX      COPINDEX DESTROYED BY ENDIDLE
1036   REF   1              10,3504  54 157 0           TS     COPMPAC

1037   REF   3  LAST 1479   10,3505  3 0162 1           CA     GENMASK
1038   REF   1              10,3506  7 3232 0           MASK   IDLEMASK
1039   REF   4  LAST 1479   10,3507  0 7722 1           TC     UPENT2
1040                        10,3510   40040 1  ITISMASK OCT    40040         *** ENDIDLE ALLOW *** DONT MOVE

1041   REF   2  LAST  192   10,3511  3 1073 1           CA     RISAVE        IS THIS A REPEAT AND RETURN DISPLAY
1042   REF  20  LAST 1479   10,3512  50 164 1           INDEX  COPINDEX
1043   REF  37  LAST 1475   10,3513  7 5015 1           MASK   BIT3
1044   REF 404  LAST 1478   10,3514  10 000 0           CCS    A
1045   REF   1              10,3515  1 3602 1           TCF    UNSETRI       YES

1046   REF  13  LAST 1478   10,3516  11'042 1           CCS    CADRSTOR      SEE IF SOMEONE ALREADY IN ENDIDLE
1047   REF   1              10,3517  1 3462 0           TCF    ISITPRIO
1048                        10,3520  1 3522 0           TCF    +2
1049   REF   2  LAST 1479   10,3521  1 3462 0           TCF    ISITPRIO

1050   REF   1              10,3522  0 4223 0           TC     ENDIDLE
1051   REF   1              10,3523  1 3614 0  IDLERETI TCF    TERMATE

1052   REF   1              10,3524  1 3633 0           TCF    PROCEED       ENDIDLE RETURNS HERE ON PROCEED

1053   REF   1              10,3525  4 3750 1           CS     LOWLOAD
1054   REF 713  LAST 1477   10,3526  6 0154 1           AD     MPAC          VERBREG
1055                        10,3527  0 0006 1           EXTEND
1056   REF 405  LAST 1479   10,3530  26 000 0           DIM    A
1057                        10,3531  0 0006 1           EXTEND
1058   REF   1              10,3532  1 3703 1           BZF    LOADITIS      V21 OR V22 OR V23 ON DSKY
1059   REF  79  LAST 1471   10,3533  3 5016 0  OKTOENT  CAF    TWO
1060   REF   1              10,3534  54 161 0  ENDOUT   TS     OUTHERE

1061   REF  24  LAST 1478   10,3535  3 0100 0           CA     FLAGWRD4      CHECK NATURE OF ENDIDLE RETURN
1062   REF  16  LAST 1411   10,3536  7 4105 0           MASK   OCT60000
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1063   REF 406  LAST 1479   10,3537  10 000 0           CCS     A
1064   REF   1              10,3540  1 3543 1           TCF     TIMECHEK        PRIO ENDIDLE RETURN
1065   REF   1              10,3541  1 3651 1           TCF     NORMRET         NORMAL ENDIDLE RETURN
1066   REF   1              10,3542  1 3635 0           TCF     MARKRET         MARK ENDIDLE RETURN

1067   REF  23  LAST 1470   10,3543  4 0025 1  TIMECHEK CS      TIME1
1068   REF   2  LAST 1470   10,3544  6 1147 1           AD      PRIOTIME
1069   REF 407  LAST 1480   10,3545  10 000 0           CCS     A
1070                        10,3546  4 0000 0           COM
1071   REF   5  LAST 1416   10,3547  6 7700 1           AD      OCT37776
1072   REF 172  LAST 1478   10,3550  6 5017 1           AD      ONE
1073   REF   1              10,3551  6 3774 0           AD      -2SEC
1074                        10,3552  0 0006 1           EXTEND
1075   REF   2  LAST 1476   10,3553  6 2766 1           BZMF    KEEPPRIO

1076   REF   2  LAST 1480   10,3554  1 3651 1           TCF     NORMRET

1084   REF 173  LAST 1480   10,3555  3 5017 1  NORMWAKE CAF     ONE
1085   REF   1              10,3556  1 3246 0           TCF     WAKEPLAY

1086   REF   2  LAST 1479   10,3557  10 161 0  ENDRET   CCS     OUTHERE
1087   REF 174  LAST 1480   10,3560  6 5017 1           AD      ONE
1088                        10,3561  1 3563 0           TCF     +2              NORMAL ENDIDLE EXIT
1089   REF 109  LAST 1479   10,3562  1 5217 1           TCF     ENDOFJOB
1090   REF   2  LAST 1479   10,3563  50 157 1           INDEX   COPMPAC
1091   REF   5  LAST 1477   10,3564  6 0372 1           AD      CADRFLSH
1092   REF 714  LAST 1479   10,3565  54 157 0           TS      MPAC +3

1093   REF   4  LAST 1479   10,3566  3 0162 1           CA      GENMASK         REMOVE ENDIDLE AND PINBRANCH BITS
1094   REF   1              10,3567  7 3571 0           MASK    PINIDMSK
1095   REF   3  LAST 1475   10,3570  0 7740 0           TC      DOWNENT2
1096                        10,3571   74044 1  PINIDMSK OCT     74044           *** DONT MOVE

1097   REF  52  LAST 1475   10,3572  4 6214 1           CS      THREE           BLANK EVERYTHING EXCEPT MM
1098   REF   2  LAST  237   10,3573  0 4170 0           TC      NVSUB
1099                        10,3574  1 3575 1           TCF     +1

1100   REF   3  LAST 1471   10,3575  3 0163 0  ENDIT    CA      USERPRIO        RETURN TO USERS PRIORITY
1101   REF   6  LAST 1475   10,3576  7 7674 1           MASK    PRIO37
1102   REF  12  LAST 1475   10,3577  0 5210 1           TC      PRIOCHNG
1103   REF 715  LAST 1480   10,3600  3 0157 1           CA      MPAC +3
1104   REF  11  LAST 1475   10,3601  1 4704 1           TCF     BANKJUMP

1105   REF  21  LAST 1479   10,3602  50 164 1  UNSETRI  INDEX   COPINDEX        RESET REPEAT AND RETURN REQUEST
1106   REF  38  LAST 1479   10,3603  4 5015 1           CS      BIT3
1107   REF   3  LAST 1479   10,3604  7 1073 0           MASK    RISAVE
1108   REF   4  LAST 1480   10,3605  55'073 0           TS      RISAVE

1109   REF 290  LAST 1478   10,3606  3 5021 1           CAF     ZERO            *** 205 ONLY MARKBRAN USERS IN
1110   REF   2  LAST 1475   10,3607  0 4773 0           TC      SUPERSW         SUPERBANK 0
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L DISPLAY INTERFACE ROUTINES USER'S PAGE NO. 30 E0 S3

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1111   REF  53  LAST 1480   10,3610  3 6214 0  -1        CAF    THREE      RETURN TO USERS IMMEDIATE RETURN LOC
1112   REF  22  LAST 1480   10,3611  50 164 1  IMMEDRET  INDEX  COPINDEX
1113   REF   6  LAST 1480   10,3612  6 0372 1            AD     CADRFLSH
1114   REF  12  LAST 1480   10,3613  1 4704 1            TCF    BANKJUMP

1115   REF 291  LAST 1480   10,3614  3 5021 1  TERMATE   CAF-   ZERO       ASTRONAUT TERMINATE (V34) RETURNS TO
1116   REF   1              10,3615  1 3534 1            TCF    ENDOUT

1117   REF  11  LAST 1473   10,3616  4 0160 1  LINUSCHR  CS     PLAYTEM4   IS THIS A LINUS
1118   REF  82  LAST 1476   10,3617  7 5002 1            MASK   BIT14
1119   REF 408  LAST 1480   10,3620  10 000 0            CCS    A
1120   REF   4  LAST 1404   10,3621  1 6706 1            TCF    Q+1        NO
1121   REF   3  LAST 1474   10,3622  4 0157 0            CS     PLAYTEM3   YES, IS IT ALREADY IN ENDIDLE
1122   REF  23  LAST 1481   10,3623  50 164 1            INDEX  COPINDEX
1123   REF   7  LAST 1481   10,3624  6 0372 1            AD     CADRFLSH
1124                        10,3625  0 0006 1            EXTEND
1125                        10,3626  1 3630 0            BZF    +2         YES

1126   REF 342  LAST 1478   10,3627  0 0002 0            TC     Q          NO
1127   REF  12  LAST  388   10,3630  11'012 1            CCS    DSPLOCK    IS THE ASTRONAUT BUSY
1128   REF 110  LAST 1480   10,3631  0 5217 0            TC     ENDOFJOB   END THE NEW DISPLAY, ITS ALREADY ACTIVE
1129   REF 343  LAST 1481   10,3632  0 0002 0            TC     Q

R1130  MORE LOGIC COULD BE INCORPORATED HERE TO MAKE SURE A RECYCLE IS A RECYCLAND CONVERSLY THAT A LOAD IS A LOAD.
1132   REF 175  LAST 1480   10,3633  3 5017 1  PROCEED   CAF    ONE        ASTRONAUT PROCEED (V33) RETURNS
1133   REF   2  LAST 1481   10,3634  1 3534 1            TCF    ENDOUT

R1138        LASTPLAY CHECKS TO SEE IF (1) THE LAST NORMAL DISPLAY WAS EITHER INTERRUPTED BY A PRIO OR A MARK (MARK
R1140  COULD ONLY HAPPEN DURING PINBRANCH) OR IF (2) THE LAST NORMAL DISPLAY WAS REQUESTED WHILE A HIGHER PRIORITY
R1142  DISPLAY WAS GOING RESULTING IN THE NORMAL BEING PUT TO SLEEP.

R1143        IF EITHER OF THE ABOVE 2 CONDITIONS EXISTS , THE NORMAL DISPLAY IS AWAKENED TO GO TO PLAYJUMI WHICH STARTS
R1145  UP THE MOST RECENT VALID NORMAL DISPLAY. IF THESE 2 CONDITIONS DO NOT EXIST. CONTROL GOES TO PLAYJUMI WHICH IS
R1147  STARTED IMMEDIATELY WITH THE ASSUMPTION THAT THE MOST RECENT NORMAL DISPLAY IS ALREADY IN-ENDIDLE(DURING A
R1149  PINBRANCH) OR THAT A RESTART HAS OCCURRED AND THE DISPLAY CAN BE STARTED AS A .1 RESTART.

1163   REF  41  LAST 1423   10,3635  4 6211 1  MARKRET   CS     SIX
1164   REF  25  LAST 1479   10,3636  7 0100 1            MASK   FLAGWRD4
1165                        10,3637  0 0004 0            INHINT                *** MAY MOVE DISPLAY FLAGWORD OUT OF
1166   REF  26  LAST 1481   10,3640  54 100 1            TS     FLAGWRD4

1167                        10,3641  0 0003 1            RELINT                INHINT REALM
1168   REF   2  LAST 1475   10,3642  1 3557 1            TCF    ENDRET

1169   REF   2  LAST 1434   10,3643  3 7716 0  MARKOVER  CAF    MINUS1     RUPTREG2 IS - MEANS ENDOFJOB TO ENDRET
1170   REF   3  LAST 1480   10,3644  54 161 0            TS     OUTHERE

1171   REF  27  LAST 1481   10,3645  3 0100 0            CA     FLAGWRD4   IS ENDIDFLG SET
1172   REF  15  LAST 1404   10,3646  7 4371 1            MASK   PRIO30     IS NORMAL OR PRIO IN ENDIDLE
1173   REF 409  LAST 1481   10,3647  10 000 0            CCS    A
```

```
1174   REF   1                 10,3650  1 3303 0            TCF     NORMBNCH

1175   REF  28  LAST 1481      10,3651  3 0100 0  NORMRET   CA      FLAGWRD4        IS MARK SLEEPING
1176   REF   2  LAST 1475      10,3652  7 3746 0            MASK    BITS5+11        OR WAITING
1177   REF 410  LAST 1481      10,3653  10 000 0            CCS     A
1178   REF   1                 10,3654  1 3245 0            TCF     MARKWAKE

1179   REF  29  LAST 1482      10,3655  3 0100 0            CA      FLAGWRD4        NO
1180   REF   1                 10,3656  7 3747 1            MASK    BITS4+10        IS NORMAL INTERRUPTED OR WAITING
1181   REF 411  LAST 1482      10,3657  10 000 0            CCS     A
1182   REF   1                 10,3660  1 3555 0            TCF     NORMWAKE        YES

1183   REF   5  LAST 1475      10,3661  3 1071 0            CA      EBANKTEM        NO. WAS IT A FLASH REQUEST
1184   REF   8  LAST 1442      10,3662  7 5033 0            MASK    OCT50           OR A GODSPRET
1185   REF 412  LAST 1482      10,3663  10 000 0            CCS     A
1186   REF   3  LAST 1481      10,3664  1 3557 1            TCF     ENDRET          YES
1187   REF   3  LAST 1478      10,3665  3 0371 1            CA      NVSAVE
1188                           10,3666  0 0006 1            EXTEND
1189   REF   4  LAST 1482      10,3667  1 3557 1            BZF     ENDRET

1190   REF   4  LAST  692      10,3670  3 5067 0            CAF     PRIO15
1191                           10,3671  0 0004 0            INHINT
1192   REF  35  LAST 1472      10,3672  0 5134 1            TC      NOVAC
1193   REF   4  LAST 1477         0367                     EBANK=  NVWORD
1194   REF   2  LAST 1476      10,3673   03037 0            2CADR   PLAYJUM1
1194                           10,3674   20060 0

1195   REF   5  LAST 1482      10,3675  1 3557 1            TCF     ENDRET

1196   REF  30  LAST 1482      10,3676  3 0100 0  MARSLEEP  CA      FLAGWRD4        IS MARK ALREADY IN
1197   REF   3  LAST 1482      10,3677  7 3746 0            MASK    BITS5+11
1198   REF 413  LAST 1482      10,3700  10 000 0            CCS     A
1199   REF 111  LAST 1481      10,3701  1 5217 1            TCF     ENDOFJOB        YES
11991  REF   3  LAST 1471      10,3702  1 3176 0            TCF     GOSLEEPS

1200   REF   3  LAST 1480      10,3703  50 157 1  LOADTIT5  INDEX   COPMPAC
1201   REF   5  LAST 1482      10,3704  3 0367 0            CA      NVWORD
1202   REF  14  LAST 1477      10,3705  7 6043 1            MASK    LOW7
1203                           10,3706  4 0000 0            COM
1204   REF 716  LAST 1480      10,3707  6 0155 0            AD      MPAC +1         NOUNREG
1205                           10,3710  0 0006 1            EXTEND
1206   REF   1                 10,3711  1 3533 0            BZF     OKTOENT         NO, THEN LOAD IS VALID
1207   REF   7  LAST  941      10,3712  1 3272 1            TCF     PINBRNCH        YES, ACCEPT LOAD BUT ASK FOR LAST AGAIN

1208   REF  54  LAST 1481      10,3713  4 6214 1  ERASER    CS      THREE           BLANK EVERYTHINGEXCEPT MM
1209   REF   3  LAST 1480      10,3714  0 4170 0            TC      NVSUB
1210   REF 112  LAST 1482      10,3715  1 5217 1            TCF     ENDOFJOB
1211   REF 113  LAST 1482      10,3716  1 5217 1            TCF     ENDOFJOB

1212                           10,3717   00036 1  PERFMASK  OCT     0036            FLASH,PERFORM,BLANK R2 AND R3
```

```
1213                                10,3720   00231 1  V01N25    VN      00125
1214                                10,3721   01407 0  V06N07    VN      00607     GOPERF3 VN DISPLAY BEFORE V50
1215                                10,3722   14400 0  V50N00    VN      5000
1216                                10,3723   00030 1  PERF2MSK  OCT     00030     FLASH, PERFORM
1217                                10,3724   01006 0  V04N06    VN      00406
1218                                10,3725   00014 1  PERF4MSK  OCT     14        FLASH, BLANK R3
1219  REF   8  LAST 1482           10,3272            GOAGIN    EQUALS  PINBRNCH
1220                                10,3726   20010 1  REDOMASK  OCT     20010     BITS 4 AND 14
1221                                10,3727   40230 1  MARK3MSK  OCT     40230     MARK,DECIMAL NOUN, PERFORM,FLASH
1222                                10,3730   40036 0  MARK4MSK  OCT     40036     MARK,PERFORM,FLASH,BLANK 2 AND 3
1223  REF   1                       10,3731   20764 0  NVCADR    CADR    REDOPRIO
1224  REF   4  LAST 1476           10,3732   20624 0  WAKECADR  CADR    MARKPLAY
1225  REF   3  LAST 1482           10,3733   21037 0            CADR    PLAYJUM1

1226                                10,3734   03400 0  OCT3400   OCT     3400      EBANK MASK
1227                                10,3735   11210 1  NBUSMASK  OCT     11210
1228                                10,3736   66521 1  PMMASK    OCT     66521
1229  REF   4  LAST  364              4160            VERBMASK  =       MID7      (OCT 37600)
1230                                10,3737   01177 1  V05N00M1  OCT     1177      V05 MINUS ONE
1231  REF   1                       10,2555            GOXDSP    EQUALS  GOMARK
1232  REF   1                       10,2575            GOXDSPR   EQUALS  GOMARKR
1233  REF   6  LAST  572            10,2561            GOXDSPF   EQUALS  GOMARKF
1234  REF   4  LAST  935            10,2600            GOXDSPFR  EQUALS  GOMARKFR
1235  REF   4  LAST  573              5534             ENDEXT    EQUALS  ENDMARK
1236  REF  14  LAST 1216              0165             MPAC2SAV  EQUALS  BANKSET
1238                                10,3740   00700 0  NVBUSMSK  OCT     700
12385                               10,3741   00704 1  ASTROMSK  OCT     704
1239                                10,3742   40030 0  MPERFMSK  OCT     40030     BIT 15,5,4 FOR MARK,PERFORM,FLASH
1240                                10,3743   34300 0  OCT34300  OCT     34300
1241                                10,3744   40100 1  BITS15+7  OCT     40100
1242                                10,3745   00110 1  BITS7+4   OCT     110
1243  REF   3  LAST 1473              1067             DSPFLG    EQUALS  EBANKSAV
1244  REF   1                          1070            MARKFLAG  EQUALS  MARKEBAN
1245  REF   6  LAST 1482              1071             SAVEFLAG  EQUALS  EBANKTEM
1246                                10,3746   02020 1  BITS5+11  OCT     2020      * DONT MOVE
1247                                10,3747   01010 1  BITS4+10  OCT     1010      * DONT MOVE
1249                                10,3750   00026 0  LOWLOAD   DEC     22
1250                                10,3751   77730 0  BUSYMASK  OCT     77730
1252                                10,3752   00050 1  CADRMASK  OCT     50
1253  REF   8  LAST 1425              7707             PINMASK   EQUALS  13,14,15
1254  REF   2  LAST 1477           10,3312             GOPLAY    EQUALS  NVDSP
A1255                                                  PRIOSAVE  EQUALS  RISAVE
1256  REF 717  LAST 1482              0157             COPMPAC   EQUALS  MPAC +3
1257  REF 718  LAST 1483              0160             TEMPOR2   EQUALS  MPAC +4
1258  REF 719  LAST 1483              0161             OUTHERE   EQUALS  MPAC +5
1259  REF  44  LAST 1478              0164             COPINDEX  EQUALS  LOC
1260  REF  26  LAST 1182              0163             USERPRIO  EQUALS  MODE
1261  REF 720  LAST 1483              0162             GENMASK   EQUALS  MPAC +6
1262                                10,3753   20144 1  PRIOOCT   OCT     20144     PRIO
1263                                10,3754   42424 0  MARKOCT   OCT     42424     MARK
```

```
1264                                10,3755   11254 1          OCT     11254          NORM

1265                                10,3756   74704 1  IDLESLEP OCT     74704
1266                                10,3757   67777 1  OCT67777 OCT     67777
1267   REF  14  LAST  935             5526            LINUS    EQUALS  BLANKET
1268   REF 721  LAST 1483             0154            FACEREG  EQUALS  MPAC
1269   REF 722  LAST 1484             0155            PLAYTEM1 EQUALS  MPAC +1
1270   REF 723  LAST 1484             0157            PLAYTEM3 EQUALS  MPAC +3
1271   REF 724  LAST 1484             0160            PLAYTEM4 EQUALS  MPAC +4
1273                                10,3760   40420 0  OCT40420 OCT     40420
1274   REF   3  LAST 1472           10,3761   02770 0  MAKEGEN  GENADR  MAKEPLAY
1275                                10,3762   10200 1  OCT10200 OCT     10200
1276                                10,3763   30200 0  V97N00   VN      09700          PASTE FOR V97 OR V99
12761                               10,3764   20100 1  OCT20100 OCT     20100
12762                               10,3765   24030 1  CLOCKCON OCT     24030          FLASH, PERFORM, V99 OR V97 PASTE,REFLASH
```

L SERVICE ROUTINES USER'S PAGE NO. 1 E0 S3

```
0037                                7722                BLOCK  3
0038   REF   2  LAST 1225          6000                SETLOC FFTAG6
0039                                7722                BANK
0040   REF   1                                          COUNT  03/FLAG

0043   REF 195  LAST 1478          7722  54 001 1  UPENT2 TS     L      WHICH FLAGWORD IS IT
0044   REF   4  LAST 1414          7723  7 5023 1          MASK   OCT7
0045   REF 196  LAST 1485          7724  56 001 0          XCH    L      SAVE IN L FOR INDEXING

0046   REF   3  LAST 1396          7725  7 5731 0          MASK   OCT77770  OBTAIN THE BIT INFORMATION
0047                                7726  0 0004 0          INHINT        PREVENT INTERUPTS
0048   REF  37  LAST 1436          7727  54 061 1          TS     ITEMP1   STORE THE BIT INFORMATION TEMPORARIALY

0049   REF 197  LAST 1485          7730  50 001 0          NDX    L
0050   REF  12  LAST 1022          7731  4 0074 0          CS     FLAGWRD0
0051   REF  38  LAST 1485          7732  7 0061 1          MASK   ITEMP1
0052   REF 198  LAST 1485          7733  50 001 0          NDX    L
0053   REF  13  LAST 1485          7734  26 074 0          ADS    FLAGWRD0
0054                                7735  0 0003 1          RELINT        RELEASE INTERUPT INHIBIT

0055   REF 344  LAST 1481          7736  24 002 0          INCR   Q      OBTAIN THE CORRECT RETURN ADDRESS
0056   REF 345  LAST 1485          7737  0 0002 0          TC     Q      RETURN

0059   REF 199  LAST 1485          7740  54 001 1  DOWNENT2 TS     L      WHICH FLAGWORD IS IT
0060   REF   5  LAST 1485          7741  7 5023 1          MASK   OCT7
0061   REF 200  LAST 1485          7742  56 001 0          XCH    L      SAVE IN L FOR INDEXING

0062   REF   4  LAST 1485          7743  7 5731 0          MASK   OCT77770  OBTAIN THE BIT INFORMATION
0063                                7744  4 0000 0          COM           START TO PROCESS THE INFORMATION

0064                                7745  0 0004 0          INHINT        PREVENT INTERUPTS
0065   REF 201  LAST 1485          7746  50 001 0          NDX    L
0066   REF  14  LAST 1485          7747  7 0074 0          MASK   FLAGWRD0
0067   REF 202  LAST 1485          7750  50 001 0          NDX    L
0068   REF  15  LAST 1485          7751  54 074 0          TS     FLAGWRD0
0069                                7752  0 0003 1          RELINT        RELEASE INTERUPT INHIBIT

0070   REF 346  LAST 1485          7753  24 002 0          INCR   Q      OBTAIN THE CORRECT RETURN ADDRESS
0071   REF 347  LAST 1485          7754  0 0002 0          TC     Q      RETURN

0072   REF  24  LAST 1476           5023             OCT7   EQUALS SEVEN
0073                              10,3766                    BANK   IO
```

```
P0074
R0075       UPFLAG AND DOWNFLAG ARE ENTIRELY GENERAL FLAG SETTING AND CLEARING SUBROUTINES.  USING THEM, WHETHER OR
R0077   NOT IN INTERRUPT, ONE MAY SET OR CLEAR ANY SINGLE, NAMED BIT IN ANY ERASABLE REGISTER, SUBJECT OF COURSE TO
R0079   EBANK SETTING.  A "NAMED" BIT, AS THE WORD IS USED HERE, IS ANY BIT WITH A NAME FORMALLY ASSIGNED BY THE YUL
R0081   ASSEMBLER.

R0082       AT PRESENT THE ONLY NAMED BITS ARE THOSE IN THE FLAGWORDS.  ASSEMBLER CHANGES WILL MAKE IT POSSIBLE TO
R0084   NAME ANY BIT IN ERASABLE MEMORY.

R0085       CALLING SEQUENCES ARE AS FOLLOWS:-

R0086                           TC     UPFLAG                   TC     DOWNFLAG
R0087                           ADRES  NAME OF FLAG             ADRES  NAME OF FLAG

R0088       RETURN IS TO THE LOCATION FOLLOWING THE "ADRES" ABOUT .58 MS AFTER THE "TC".

R0090       UPON RETURN A CONTAINS THE CURRENT FLAGWRD SETTING.

 0091                                5546                     BLOCK  02
 0092   REF   5  LAST 1413          4000                     SETLOC FFTAG1
 0093                                5546                     BANK
 0094   REF   1                                               COUNT* $$/FLAG

 0095   REF 348  LAST 1485          5546  3 0002 0  UPFLAG    CA     Q
 0096   REF   1                     5547  0 5564 0           TC     DEBIT
 0097                               5550  4 0000 0           COM                     +(15 - BIT)
 0098                               5551  0 0006 1           EXTEND
 0099   REF  15  LAST 1131          5552  04 001 1           ROR    LCHAN            SET BIT
 0100   REF  39  LAST 1485          5553  50 061 0  COMFLAG   INDEX  ITEMP1
 0101   REF  16  LAST 1485          5554  54 074 0           TS     FLAGWRD0
 0102   REF   5  LAST 1411          5555  22 063 1           LXCH   ITEMP3
 0103                               5556  0 0003 1           RELINT
 0104   REF 203  LAST 1485          5557  0 0001 0           TC     L


 0105   REF 349  LAST 1486          5560  3 0002 0  DOWNFLAG CA     Q
 0106   REF   2  LAST 1486          5561  0 5564 0           TC     DEBIT
 0107   REF 204  LAST 1486          5562  7 0001 1           MASK   L                RESET BIT
 0108   REF   1                     5563  1 5553 0           TCF    COMFLAG


 0109   REF 176  LAST 1481          5564  6 5017 1  DEBIT    AD     ONE              GET DE BITS
 0110                               5565  0 0004 0           INHINT
 0111   REF   6  LAST 1486          5566  54 063 0           TS     ITEMP3
 0112   REF   4  LAST 1197          5567  3 5026 0           CA     LOW4             DEC15
 0113   REF  40  LAST 1486          5570  54 061 1           TS     ITEMP1
 0114   REF   7  LAST 1486          5571  50 063 1           INDEX  ITEMP3
 0115                               5572  2'7777 0           CA     0 -1             ADRES
 0116   REF 205  LAST 1486          5573  54 001 1           TS     L
 0117   REF 292  LAST 1481          5574  3 5021 1           CA     ZERO
```

0118			5575 0 0006 1	EXTEND		
0119	REF 41	LAST 1486	5576 10 061 1	DV	ITEMP1	A = FLAGWRD, L = (15 - BIT)
0120	REF 42	LAST 1487	5577 52 062 1	DXCH	ITEMP1	
0121	REF 43	LAST 1487	5600 50 061 0	INDEX	ITEMP1	
0122	REF 17	LAST 1486	5601 3 0074 1	CA	FLAGWRD0	
0123	REF 206	LAST 1486	5602 54 001 1	TS	L	CURRENT STATE
0124	REF 31	LAST 1435	5603 50 062 0	INDEX	ITEMP2	
0125	REF 56	LAST 1466	5604 4 5001 1	CS	BIT15	-(15 - BIT)
0126	REF 350	LAST 1486	5605 0 0002 0	TC	Q	

```
P0127   DELAYJOB- A GENERAL ROUTINE TO DELAY A JOB A SPECIFIC AMOUNT OF TIME BEFORE PICKING UP AGAIN.

R0129   ENTRANCE REQUIREMENTS...
A0130                                                   CAF     DT              DELAY JOB FOR DT CENTISECS
A0131                                                   TC      BANKCALL
A0132                                                   CADR    DELAYJOB

 0133                           06,3770                 BANK    06
 0134   REF   1                00,2000                 SETLOC  DLAYJOB
 0135                          00,3732                 BANK

R0136   THIS MUST REMAIN IN BANK 0 ****************************************
 0137   REF   1                                        COUNT   00/DELAY

 0138                          00,3732  0 0004 0 DELAYJOB INHINT
 0139   REF 351  LAST 1487     00,3733  54 002 1         TS      Q               STORE DELAY DT IN Q FOR DLY -1 IN

 0140   REF   1                00,3734  3 6214 0        CAF     DELAYNUM        WAITLIST
 0141   REF  37  LAST 1437     00,3735  54 070 1 DELLOOP TS     RUPTREG1
 0142   REF 414  LAST 1482     00,3736  50 000 1         INDEX   A
 0143   REF   5  LAST  192     00,3737  3 1141 1         CA      DELAYLOC        IS THIS DELAYLOC AVAILABLE
 0144                          00,3740  0 0006 1         EXTEND
 0145   REF   1                00,3741  1 3746 0         BZF     OK2DELAY        YES

 0146   REF  38  LAST 1488     00,3742  10 070 1         CCS     RUPTREG1        NO. TRY NEXT DELAYLOC
 0147   REF   1                00,3743  1 3735 1         TCF     DELLOOP

 0148   REF   7  LAST 1229     00,3744  0 7755 1         TC      BAILOUT         NO AVAILABLE LOCS AVAILABLE.
 0149                          00,3745   01104 0         OCT     1104

 0150   REF   1                00,3746  3 3766 0 OK2DELAY CA     TCSLEEP         SET WAITLIST IMMEDIATE RETURN
 0151   REF   5  LAST 1224     00,3747  54 061 1         TS      WAITEXIT

 0152   REF  32  LAST 1210     00,3750  3 0004 0         CA      FBANK
 0153   REF  39  LAST 1488     00,3751  6 0070 0         AD      RUPTREG1        STORE BBANK FOR TASK CALL
 0154   REF 207  LAST 1487     00,3752  54 001 1         TS      L

 0155   REF   1                00,3753  3 3767 1         CAF     WAKECAD         STORE CADR FOR TASK CALL
 0156   REF   2  LAST 1224     00,3754  1 5255 1         TCF     DLY2 -1         DLY IS IN WAITLIST ROUTINE

 0157   REF   7  LAST 1473     00,3755  0 4711 1 TCGETCAD TC     MAKECADR        GET CALLERS FCADR

 0158   REF  40  LAST 1488     00,3756  50 070 0         INDEX   RUPTREG1
 0159   REF   6  LAST 1488     00,3757  55'141 0         TS      DELAYLOC        SAVE DELAY CADRS

 0160   REF   8  LAST 1474     00,3760  0 5175 1         TC      JOBSLEEP

 0161   REF 293  LAST 1486     00,3761  3 5021 1 WAKER   CAF     ZERO
 0162   REF  36  LAST 1472     00,3762  50 006 1         INDEX   BBANK
 0163   REF   7  LAST 1438     00,3763  57'141 1         XCH     DELAYLOC        MAKE DELAYLOC AVAILABLE
```

L SERVICE ROUTINES

```
0164   REF  13  LAST 1475   00,3764  0 5201 1            TC      JOBWAKE

0165   REF  71  LAST 1439   00,3765  0 5324 1            TC      TASKOVER

0166   REF   1              00,3766   03753 0  TCSLEEP   GENADR  TCGETCAD -2
0167   REF   1              00,3767   03761 1  WAKECAD   GENADR  WAKER
```

P0169 GENTRAN, A BLOCK TRANSFER ROUTINE.

R0170 WRITTEN BY D. EYLES
R0171 MOD 1 BY KERNAN UTILITYM REV 17 11/18/67

R01722 MOD 2 BY SCHULENBERG (REMOVE RELINT) SKIPPER REV 4 2/28/68

R0173 THIS ROUTINE IS USEFULL FOR TRANSFERING N CONSECUTIVE ERASABLE OR FIXED QUANTITIES TO SOME OTHER N
R0175 CONSECUTIVE ERASABLE LOCATIONS. IF BOTH BLOCKS OF DATA ARE IN SWITCHABLE EBANKS, THEY MUST BE IN THE SAME ONE.

R0177 GENTRAN IS CALLABLE IN A JOB AS WELL AS A RUPT. THE CALLING SEQUENCE IS:

```
A0179                    I       CA      N-1         # OF QUANTITIES MINUS ONE.
A0180                    I +1    TC      GENTRAN     IN FIXED-FIXED.
A0181                    I +2    ADRES   L           STARTING ADRES OF DATA TO BE MOVED.
A0182                    I +3    ADRES   M           STARTING ADRES OF DUPLICATION BLOCK.
A0183                    I +4                        RETURNS HERE.
```

R0184 GENTRAN TAKES 25 MCT'S (300 MICROSECONDS) PER ITEM + 5 MCT'S (60 MICS) FOR ENTERING AND EXITING.

R0186 A, L AND ITEMP1 ARE NOT PRESERVED.

```
 0187                        5606                    BLOCK  02
 0188  REF   2  LAST 1465    4000                    SETLOC FFTAG4
 0189                        5606                    BANK

 0190  REF  44  LAST 1487    0061                    EBANK= ITEMP1

 0191  REF   1                                       COUNT* $$/TRAN

 0192                        5606  0 0004 0  GENTRAN  INHINT
 0193  REF  45  LAST 1490    5607  54 061 1          TS     ITEMP1       SAVE N-1.
 0194  REF 352  LAST 1488    5610  50 002 0          INDEX  Q            C(Q) = ADRES L.
 0195                        5611  6 0000 1          AD     0            ADRES (L + N - 1).
 0196  REF 415  LAST 1488    5612  50 000 1          INDEX  A
 0197                        5613  3 0000 1          CA     0            C(ABOVE).
 0198  REF 208  LAST 1488    5614  54 001 1          TS     L            SAVE DATA.
 0199  REF  46  LAST 1490    5615  3 0061 0          CA     ITEMP1
 0200  REF 353  LAST 1490    5616  50 002 0          INDEX  Q
 0201                        5617  6 0001 0          AD     1            ADRES (M + N - 1).
 0202  REF 416  LAST 1490    5620  50 000 1          INDEX  A
 0203                        5621  22 000 1          LXCH   0            STUFF IT.
 0204  REF  47  LAST 1490    5622  10 061 1          CCS    ITEMP1       LOOP UNTIL N-1 = 0.
 0205  REF  14  LAST  831    5623  1 5607 1          TCF    GENTRAN +1
 0207  REF   4  LAST 1404    5624  1 6710 0          TCF    Q+2          RETURN TO CALLER.
```

P0208 B5OFF ZERO BIT 5 OF EXTVBACT, WHICH IS SET BY TESTXACT.

R0209 MAY BE USED AS NEEDED BY ANY EXTENDED VERB WHICH HAS DONE TESTXACT

```
 0211   REF   1                                          COUNT* $$/EXTVB

 0212   REF  44  LAST 1478      5625  4 5013 1  B5OFF    CS      BIT5
 0213   REF  21  LAST 1465      5626  7 1044 1           MASK    EXTVBACT
 0214   REF  22  LAST 1491      5627  55'044 1           TS      EXTVBACT
 0215   REF 114  LAST 1482      5630  0 5217 0           TC      ENDOFJOB
```

P0216 SUBROUTINES TO TURN OFF AND TURN ON TRACKER FAIL LIGHT.

```
0217                                5631  0 0004 0  TRFAILOF INHINT
0218  REF   1                      5632  4 7704 1            CS      OCT40200        TURN OFF TRACKER LIGHT
0219  REF  46  LAST 1428           5633  7 1036 1            MASK    DSPTAB +11D
0220  REF  57  LAST 1487           5634  6 5001 0            AD      BIT15
0221  REF  47  LAST 1492           5635  55'036 1            TS      DSPTAB +11D
02215 REF  37  LAST  388           5636  4 1331 0            CS      OPTMODES        TO INSURE THAT OCDU FAIL WILL GO ON
02216 REF  47  LAST 1410           5637  7 5011 0            MASK    BIT7            AGAIN IF IT WAS ON IN ADDITION TO
02217 REF  38  LAST 1492           5640  27'331 0            ADS     OPTMODES        TRACKER FAIL.

0222                                5641  0 0003 1  REQ       RELINT
0223  REF 354  LAST 1490           5642  0 0002 0            TC      Q

0224                                5643  0 0004 0  TRFAILON  INHINT
0225  REF  48  LAST 1492           5644  4 1036 1            CS      DSPTAB +11D     TURN ON
0226  REF   2  LAST 1492           5645  7 7704 1            MASK    OCT40200
0227  REF  49  LAST 1492           5646  27'036 1            ADS     DSPTAB +11D
0228  REF   1                      5647  1 5641 0            TCF     REQ
```

L ALARM AND ABORT USER'S PAGE NO. 1 E0 S3

```
R0001            THE FOLLOWING SUBROUTINE MAY BE CALLED TO DISPLAY A NON-ABORTIVE ALARM CONDITION. IT MAY BE CALLED
R0003   EITHER IN INTERRUPT OR UNDER EXECUTIVE CONTROL.

R0004            CALLING SEQUENCE IS AS FOLLOWS:

R0005            TC     ALARM
R0006            OCT    NNNNN
R0007                                (RETURNS HERE)
 0008                            5650                    BLOCK  02
 0009   REF   1                 4000                    SETLOC FFTAG7
 0010                            5650                    BANK

 0011   REF   8  LAST  389      0375                    EBANK= FAILREG

 0012   REF   1                                         COUNT  02/ALARM

R0013   ALARM TURNS ON THE PROGRAM ALARM LIGHT, BUT DOES NOT DISPLAY.

 0014                            5650  0 0004 0  ALARM    INHINT

 0015   REF 355  LAST 1492       5651  3 0002 0          CA     Q
 0016   REF   4  LAST 1396       5652  55'363 1  ALARM2  TS     ALMCADR
 0017   REF 356  LAST 1493       5653  50 002 0          INDEX  Q
 0018                            5654  3 0000 1          CA     0
 0019   REF 209  LAST 1490       5655  54 001 1  BORTENT TS     L

 0020   REF  37  LAST 1488       5656  3 0006 1  PRIOENT CA     BBANK
 00202                           5657  0 0006 1   +1     EXTEND
 00204  REF  26  LAST 1472       5660  04 007 1          ROR    SUPERBNK        ADD SUPER BITS.
 0021   REF   5  LAST 1493       5661  55'364 0          TS     ALMCADR +1

 0022   REF 357  LAST 1493       5662  3 0002 0  LARMENT CA     0               STORE RETURN FOR ALARM
 0023   REF  48  LAST 1490       5663  54 061 1          TS     ITEMP1

 00232  REF  45  LAST 1483       5664  3 0164 1          CA     LOC
 00233  REF   1                  5665  54 057 1          TS     LOCALARM
 00234  REF  15  LAST 1483       5666  3 0165 0          CA     BANKSET
 00236  REF   1                  5667  54 060 0          TS     BANKALRM

 0024   REF   9  LAST 1493       5670  10 375 1  CHKFAIL1 CCS    FAILREG         IS ANYTHING IN FAILREG
 0025   REF   1                  5671  1 5674 0          TCF    CHKFAIL2        YES TRY NEXT REG
 0026   REF  10  LAST 1493       5672  22 375 0          LXCH   FAILREG
 0027   REF   1                  5673  1 5706 1          TCF    PROGLARM        TURN ALARM LIGHT ON FOR FIRST ALARM

 0028   REF  11  LAST 1493       5674  10 376 1  CHKFAIL2 CCS    FAILREG +1
 0029   REF   1                  5675  1 5700 1          TCF    FAIL3
 0030   REF  12  LAST 1493       5676  22 376 0          LXCH   FAILREG +1
 0031   REF   1                  5677  1 5711 1          TCF    MULTEXIT

 0032   REF  13  LAST 1493       5700  3 0377 1  FAIL3   CA     FAILREG +2
```

```
0033   REF  37  LAST 1231      5701  7 4777 0            MASK    POSMAX
0034   REF 417  LAST 1490      5702  10 000 0            CCS     A
0035   REF   1                 5703  1 5715 0            TCF     MULTFAIL
0036   REF  14  LAST 1493      5704  22 377 1            LXCH    FAILREG +2
0037   REF   2  LAST 1493      5705  1 5711 1            TCF     MULTEXIT

0038   REF  50  LAST 1492      5706  4 1036 1  PROGLARM  CS      DSPTAB +11D
0039   REF   2  LAST 1469      5707  7 7765 0            MASK    OCT40400
0040   REF  51  LAST 1494      5710  27'036 1            ADS     DSPTAB +11D

0041   REF  49  LAST 1493      5711  56 061 0  MULTEXIT  XCH     ITEMP1          OBTAIN RETURN ADDRESS IN A
0042                           5712  0 0003 1            RELINT
0043   REF 418  LAST 1494      5713  50 000 1            INDEX   A
0044                           5714  0 0001 0            TC      1

0045   REF 210  LAST 1493      5715  3 0001 0  MULTFAIL  CA      L
0046   REF  58  LAST 1492      5716  6 5001 0            AD      BIT15
0047   REF  15  LAST 1494      5717  54 377 0            TS      FAILREG +2

0048   REF   3  LAST 1494      5720  1 5711 1            TCF     MULTEXIT

R0049  PRIOLARM DISPLAYS V05N09 VIA PRIODSPR WITH 3 RETURNS TO THE USER FROM THE ASTRONAUT AT CALL LOC +1,+2,+3 AND
R0051  AN IMMEDIATE RETURN TO THE USER AT CALL LOC +4. EXAMPLE FOLLOWS,
A0052                                                  CAF     OCTXX           ALARM CODE
A0053                                                  TC      BANKCALL
A0054                                                  CADR    PRIOLARM

A0055                                                  ...     ...
A0056                                                  ...     ...
A0057                                                  ...     ...             ASTRONAUT RETURN
A0058                                                  TC      PHASCHNG        IMMEDIATE RETURN TO USER. RESTART
A0059                                                  OCT     X.1             PHASE CHANGE FOR PRIO DISPLAY

0060                           10,3766                 BANK    10
0061   REF   2  LAST 1465      10,2000                 SETLOC  DISPLAYS
0062                           10,3766                 BANK

0063   REF   2 LAST 1465 TO 1485:   651   651*        COUNT   10/DSPLA

0064                           10,3766  0 0004 0  PRIOLARM INHINT                  * * * KEEP IN DISPLAY ROUTINES BANK
0065   REF 211  LAST 1494      10,3767  54 001 1            TS      L               SAVE ALARM CODE

0066   REF  24  LAST 1442      10,3770  3 0133 0            CA      BUF2            2 CADR OF PRIOLARM USER
0067   REF   6  LAST 1493      10,3771  55'363 1            TS      ALMCADR
0068   REF  25  LAST 1494      10,3772  3 0134 1            CA      BUF2 +1
0069   REF   1                 10,3773  0 5657 0            TC      PRIDENT +1      * LEAVE L ALONE
0071                           10,3774   77467 1  -2SEC     DEC     -200            *** DONT MOVE
0072   REF   7  LAST  805      10,3775  3 5050 1            CAF     V05N09
0073   REF   1                 10,3776  1 2726 1            TCF     PRIODSPR
```

```
0074                                5721                    BLOCK   02
0075    REF    1                    6000                    SETLOC  FFTAG13
0076                                7755                    BANK

0077    REF    2 LAST 1493 TO 1494:    41    41*            COUNT   02/ALARM

0078                                7755  0 0004 0  BAILOUT  INHINT
0079    REF  358  LAST 1493         7756  3 0002 0           CA      Q
0080    REF    7  LAST 1494         7757  55'363 1           TS      ALMCADR

00801   REF  246  LAST 1446         7760  0 4662 1           TC      BANKCALL
00802   REF    2  LAST  186         7761   40000 0           CADR    VAC5STOR

0081    REF    8  LAST 1495         7762  51'363 0           INDEX   ALMCADR
0082                                7763  3 0000 1           CAF     0
0083    REF    1                    7764  0 5655 1           TC      BORTENT
0084                                7765   40400 1  OCT40400 OCT     40400

00845                               7766  0 0004 0           INHINT
0085    REF   80  LAST 1479         7767  3 5016 0  WHIMPER  CA      TWO
00851   REF   17  LAST 1404         7770  6 0005 1           AD      Z
00852   REF    1                    7771  54 017 0           TS      BRUPT
00853                               7772  5 0017 1           RESUME
00854   REF   61  LAST 1465         7773  0 4701 0           TC      POSTJUMP        RESUME SENDS CONTROL HERE
008541  REF    3  LAST  260         7774   12651 0           CADR    ENEMA

008543  REF    2  LAST 1493         4000                    SETLOC  FFTAG7
008545                              5721                    BANK

008546                              5721  0 0004 0  POODOO   INHINT
008547  REF  359  LAST 1495         5722  3 0002 0           CA      0
008548  REF    9  LAST 1495         5723  55'363 1           TS      ALMCADR

008549  REF  247  LAST 1495         5724  0 4662 1           TC      BANKCALL
00855   REF    3  LAST 1495         5725   40000 0           CADR    VAC5STOR        STORE ERASABLES FOR DEBUGGING PURPOSES.

008555  REF   10  LAST 1495         5726  51'363 0           INDEX   ALMCADR
008556                              5727  3 0000 1           CAF     0
008557  REF    2  LAST 1495         5730  0 5655 1  ABORT2   TC      BORTENT

008558                              5731   77770 1  OCT77770 OCT     77770           DONT MOVE
00856   REF    2  LAST  199         5732  3 5012 1           CA      V37FLBIT        IS AVERAGE G ON
008561  REF   24  LAST 1450         5733  7 0103 1           MASK    FLAGWRD7
008562  REF  419  LAST 1494         5734  10 000 0           CCS     A
008563  REF    1                    5735  0 7766 1           TC      WHIMPER -1      YES.  DONT DO POODOO.  DO BAILOUT.

0086    REF   66  LAST 1477         5736  0 5560 1           TC      DOWNFLAG
0087    REF    9  LAST 1350         5737   00067 0           ADRES   STATEFLG

0088    REF   67  LAST 1495         5740  0 5560 1           TC      DOWNFLAG
```

```
0089   REF   5  LAST 1349      5741   00236 0            ADRES  REINTFLG

0090   REF  68  LAST 1495      5742   0 5560 1           TC     DOWNFLAG
0091   REF   5  LAST 1448      5743    00054 0           ADRES  NODOFLAG

0092   REF 248  LAST 1495      5744   0 4662 1           TC     BANKCALL
0093   REF   2  LAST  184      5745    12501 0           CADR   MR.KLEAN
0094   REF   2  LAST 1495      5746   0 7767 0           TC     WHIMPER

0095                           5747   0 0004 0  CCSHOLE  INHINT
0096   REF 360  LAST 1495      5750   3 0002 0           CA     Q
0097   REF  11  LAST 1495      5751   55'363 1           TS     ALMCADR
0098   REF 249  LAST 1496      5752   0 4662 1           TC     BANKCALL
0099   REF   4  LAST 1495      5753    40000 0           CADR   VAC5STOR
0100   REF   1                 5754   3 5756 0           CA     OCT1103
0101   REF   1                 5755   0 5730 0           TC     ABORT2
0102                           5756    01103 1  OCT1103  OCT    1103
0103                           5757   0 0004 0  CURTAINS INHINT
0104   REF 361  LAST 1496      5760   3 0002 0           CA     Q
0105   REF   2  LAST 1396      5761   0 5652 0           TC     ALARM2
0106                           5762    00217 0  OCT217   OCT    00217
0107   REF  12  LAST 1496      5763   0 1363 0           TC     ALMCADR        RETURN TO USER

0108   REF 115  LAST 1491      5217                      EQUALS ENDOFJOB
R0109  CALLING SEQUENCE FOR VARALARM

A0110                                                    CAF    (ALARM)
A0111                                                    TC     VARALARM

R0112  VARALARM TURNS ON PROGRAM ALARM LIGHT BUT DOES NOT DISPLAY
0113                           5764   0 0004 0  VARALARM INHINT

0114   REF 212  LAST 1494      5765   54 001 1           TS     L              SAVE USERS ALARM CODE

0115   REF 362  LAST 1496      5766   3 0002 0           CA     Q              SAVE USERS Q
0116   REF  13  LAST 1496      5767   55'363 1           TS     ALMCADR

0117   REF   2  LAST 1494      5770   0 5656 1           TC     PRIDENT
0118                           5771    00014 1  OCT14    OCT    14             DONT MOVE

0119   REF  14  LAST 1496      5772   0 1363 0           TC     ALMCADR        RETURN TO USER

0120   REF   8  LAST 1488      7755             ABORT    EQUALS BAILOUT        *** TEMPORARY UNTIL ABORT CALLS OUT
```

L UPDATE PROGRAM USER'S PAGE NO. 1 E0 S3

R0001 PROGRAM NAME: P27
R0002 WRITTEN BY: KILROY/ DE WOLF

R0003 MOD NO: 6
R0004 MOD BY: KILROY
R0005 DATE: 01DEC67

R0006 LOG SECTION: UPDATE PROGRAM.

R0007 FUNCT. DESCR: P27 (THE UPDATE PROGRAM) PROCESSES COMMANDS AND DATA
R0008 INSERTIONS REQUESTED BY THE GROUND VIA UPLINK.
R0009 THE P27 PROGRAM WILL ACCEPT UPDATES
R0010 ONLY DURING P00 FOR THE LM, AND ONLY DURING P00,
R0011 P02, AND FRESH START FOR THE CSM

R0012 CALLING SEQ: PROGRAM IS INITIATED BY UPLINK ENTRY OF VERBS 70, 71, 72 AND 73.

R0014 SUBROUTINES: TESTXACT, NEWMODEX, NEWMODEX +3, GOXDSPF, BANKCALL, FINDVAC, INTPRET, INTSTALL, TPAGREE,
R0016 INTWAKEU, ENDEXT, POSTJUMP, FALTON, NEWPHASE, PHASCHNG

R0017 NORMAL EXIT: TC ENDEXT

R0018 ALARM/ABORT: TC FALTON FOLLOWED BY TC ENDEXT

R0019 RESTARTS: P27 IS RESTART PROTECTED IN TWO WAYS...
R0020 1. PRIOR TO VERIFLAG INVERSION(WHICH IS CAUSED BY THE GROUND/ASTRONAUT'S VERIFICATION OF UPDATE
R0022 DATA BY SENDING A V33E WHEN V21N02 IS FLASHING)---
R0023 NO PROTECTION EXCEPT PRE-P27 MODE IS RESTORED, COAST + ALIGN DOWNLIST IS SELECTED AND UPLINK
R0025 ACTIVITY LIGHT IS TURNED OFF.(JUST AS IF A V34E WAS SENT DURING P27 DATA LOADS).
R0027 V70,V71,V72 OR V73 WILL HAVE TO BE COMPLETELY RESENT BY USER.
R0029 2. AFTER VERIFLAG INVERSION(WHEN UPDATE OF THE SPECIFIED ERASABLES IS BEING PERFORMED)---
R0031 PROTECTED AGAINST RESTARTS.

R0032 DEBRIS: UPBUFF (20D) TEMP STORAGE FOR ADDRESSES AND CONTENTS.
R0033 UPVERB (1) VERB NUMBER MINUS 70D (E.G. FOR V72, UPVERB = 72D - 70D = 2)
R0035 UPOLDMOD (1) FOR MAJOR MODE INTERRUPTED BY P27.
R0036 COMPNUMB (1) TOTAL NUMBER OF COMPONENTS TO BE TRANSMITTED.
R0038 UPCOUNT (1) ACTUAL NUMBER OF COMPONENTS RECEIVED.
R0039 UPTEMP (1) SCRATCH, BUT USUALLY CONTAINS COMPONENT NUMBER TO BE CHANGED DURING VERIFY CYCLE

R0041 INPUT:

R0042 ENTRY: DESCRIPTION

R0043 V70EXXXXXEXXXXXE (LIFTOFF TIME INCREMENT) DOUBLE PRECISION OCTAL TIME INCREMENT, XXXXX XXXXX.
R0045 IS ADDED TO TEPHEM, SUBTRACTED FROM AGC CLOCK(TIME2,TIME1), SUBTRACTED FROM CSM STATE
R0047 VECTOR TIME(TETCSM) AND SUBTRACTED FROM LEM STATE VECTOR TIME(TETLEM).
R0049 THE DP OCTAL TIME INCREMENT IS SCALED AT 2(28).

L UPDATE PROGRAM USER'S PAGE NO. 2 E0 S3

```
R0050   V71EIIEAAAAE     (CONTIGUOUS BLOCK UPDATE) II-2 OCTAL COMPONENTS,XXXXX,
R0051   XXXXXE           ARE LOADED INTO ERASABLE STARTING AT ECADR, AAAA.
R0052   XXXXXE           IT IS .GE. 3 .AND. .LE. 20D.,
R0053                    AND (AAAA + II - 3) DOES NOT PRODUCE AN ADDRESS IN THE
R0054   9 NEXT BANK
R0055    .               SCALING IS SAME AS INTERNAL REGISTERS.

R0056   V72EIIE          (SCATTER UPDATE) (II-1)/2 OCTAL COMPONENTS,XXXXX, ARE
R0057   AAAAEXXXXXE      LOADED INTO ERASABLE LOCATIONS, AAAA.
R0058   AAAAEXXXXXE      II IS .GE. 3 .AND. .LE. 19D, AND MUST BE ODD.
R0060    .               SCALING IS SAME AS INTERNAL REGISTERS.

R0061   V73EXXXXXEXXXXXE (OCTAL CLOCK INCREMENT) DOUBLE PRECISION OCTAL TIME
R0062                    INCREMENT XXXXX XXXXX, IS ADDED TO THE AGC CLOCK, IN
R0063                    CENTISECONDS SCALED AT (2)28.
R0064                    THIS LOAD IS THE OCTAL EQUIVALENT OF V55.


R0065   OUTPUT:          IN ADDITION TO THE ABOVE REGISTER LOADS, ALL UPDATES
R0066                    COMPLEMENT BIT3 OF FLAGWORD7.


R0067   ADDITIONAL NOTES: VERB 71, JUST DEFINED ABOVE WILL BE USED TO PERFORM BUT NOT LIMITED TO THE FOLLOWING UPDATES--
R0069                    1. CSM/LM STATE VECTOR UPDATE
R0072                    2. REFSMMAT UPDATE


R0073            THE FOLLOWING COMMENTS DELINEATE EACH SPECIAL UPDATE----

R0074   1. CSM/LM STATE VECTOR UPDATE(ALL DATA ENTRIES IN OCTAL)

R0075   ENTRIES:         DATA DEFINITION:                                        SCALE FACTORS:
R0077   V71E             CONTIGUOUS BLOCK UPDATE VERB
R0078      21E           NUMBER OF COMPONENTS FOR STATE VECTOR UPDATE
R0080    AAAAE           ECADR OF 'UPSVFLAG'
R0082   XXXXXE           STATE VECTOR IDENTIFIER: 00001 FOR CSM, 77776 FOR LEM - EARTH SPHERE OF INFLUENCE SCALING
R0083                                              00002 FOR CSM, 77775 FOR LEM - LUNAR SPHERE OF INFLUENCE SCALING
R0084   XXXXXEXXXXXE     X POSITION
R0086   XXXXXEXXXXXE     Y POSITION
R0088   XXXXXEXXXXXE     Z POSITION
R0090   XXXXXEXXXXXE     X VELOCITY
R0092   XXXXXEXXXXXE     Y VELOCITY
R0094   XXXXXEXXXXXE     Z VELOCITY
R0096   XXXXXEXXXXXE     TIME FROM AGC CLOCK ZERO
R0098   V33E             VERB 33 TO SIGNAL THAT THE STATE VECTOR IS READY TO BE STORED.


R0144   2. REFSMMAT(ALL DATA ENTRIES IN OCTAL)
R0145   ENTRIES:         DATA DEFINITIONS:                                       SCALE FACTORS:
```

```
R0147   V71E           CONTIGUOUS BLOCK UPDATE VERB
R0148     24E           NUMBER OF COMPONENTS FOR REFSMMAT UPDATE
R0150    AAAAE          ECADR OF 'REFSMMAT'
R0152   XXXXXEXXXXXE    ROW 1 COLUMN 1                                  2(-1)
R0154   XXXXXEXXXXXE    ROW 1 COLUMN 2                                  2(-1)
R0156   XXXXXEXXXXXE    ROW 1 COLUMN 3                                  2(-1)
R0158   XXXXXEXXXXXE    ROW 2 COLUMN 1                                  2(-1)
R0160   XXXXXEXXXXXE    ROW 2 COLUMN 2                                  2(-1)
R0162   XXXXXEXXXXXE    ROW 2 COLUMN 3                                  2(-1)
R0164   XXXXXEXXXXXE    ROW 3 COLUMN 1                                  2(-1)
R0166   XXXXXEXXXXXE    ROW 3 COLUMN 2                                  2(-1)
R0168   XXXXXEXXXXXE    ROW 3 COLUMN 3                                  2(-1)
R0170   V33E            VERB 33 TO SIGNAL THAT REFSMMAT IS READY TO BE STORED.

 0171                           07,3777                  BANK    07
 0172   REF   4 LAST  549      43,2000                  SETLOC  EXTVERBS
 0173                           43,3725                  BANK

 0174   REF  13 LAST  787      E3,1706                  EBANK=  TEPHEM

 0175   REF   1                                         COUNT*  $$/P27
 0176   REF   1                43,3726  3 5021 1 V70UPDAT CAF    UP70            COMES HERE ON V70E
 0177   REF   2 LAST  236      43,3727  1 3735 1         TCF    V73UPDAT +1

 0178   REF   1                43,3730  3 5017 1 V71UPDAT CAF    UP71            COMES HERE ON V71E
 0179   REF   3 LAST 1499      43,3731  1 3735 1         TCF    V73UPDAT +1

 0180   REF   1                43,3732  3 5016 0 V72UPDAT CAF    UP72            COMES HERE ON V72E
 0181   REF   4 LAST 1499      43,3733  1 3735 1         TCF    V73UPDAT +1

 0182   REF   1                43,3734  3 6214 0 V73UPDAT CAF    UP73            COMES HERE ON V73E

 0183   REF   1                43,3735  54 331 1   +1    TS     UPVERBSV        SAVE UPVERB UNTIL IT'S OK TO ENTER P27

 0184   REF  17 LAST  267      43,3736  0 2076 1         TC     TESTXACT        GRAB DISPLAY IF AVAILABLE, OTHERWISE
A0185                                                                           TURN*OPERATOR ERROR* ON AND TERMINATEJOB

 0186   REF  18 LAST 1404      43,3737  3 1011 0         CA     MODREG          CHECK IF UPDATE ALLOWED
 0187                          43,3740  0 0006 1         EXTEND                 FIRST CHECK FOR MODREG = +0, -0
 0188                          43,3741  1 3743 0         BZF    +2              (+0 = P00, -0 = FRESH START)
 0189   REF   1                43,3742  0 3753 0         TC     CKMDMORE        NOW CHECK FOR PROGRAM WHICH CAN BE
A0190                                                                           INTERRUPTED BY P27.

 0191   REF  19 LAST 1499      43,3743  31'011 0         CAE    MODREG          UPDATE ALLOWED.
 0192   REF   2 LAST   72      43,3744  54 301 1         TS     UPOLDMOD        SAVE CURRENT MAJOR MODE
```

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```
0193   REF   2  LAST 1499   43,3745  30 331 0            CAE    UPVERBSV        SET UPVERB TO INDICATE TO P27
0194   REF   2  LAST   72   43,3746  54 302 1            TS     UPVERB          WHICH EXTENDED VERB CALLED IT.

0195   REF 177  LAST 1486   43,3747  3 5017 1            CAF    ONE
0196   REF   2  LAST   72   43,3750  54 303 0            TS     UPCOUNT         INITIALIZE UPCOUNT TO 1

0197   REF  62  LAST 1495   43,3751  0 4701 0            TC     POSTJUMP        LEAVE EXTENDED VERB BANK AND
0198   REF   1               43,3752   57373 1           CADR   UPPART2         GO TO UPDATE PROGRAM(P27) BANK.


0199   REF  13  LAST 1449   43,3753  4 0101 0  CKMDMORE  CS     FLAGWRD5
0200   REF  31  LAST 1476   43,3754  7 5010 1            MASK   BIT8            CHECK IF COMPUTER IS LGC
0201   REF 420  LAST 1495   43,3755  10 000 0            CCS    A               IS COMPUTER LGC OR AGC
0202   REF   1               43,3756  1 3764 0  UPERLEM  TCF    UPERROR         ERROR- IT'S THE LEM + MODE IS NOT P00.
0203   REF  81  LAST 1495   43,3757  4 5016 1            CS     TWO
0204   REF  20  LAST 1499   43,3760  7 1011 1            MASK   MODREG
0205   REF 421  LAST 1500   43,3761  10 000 0            CCS    A
0206   REF   2  LAST 1500   43,3762  1 3764 0  UPERCMC  TCF    UPERROR         ERROR- IT'S THE CMC AND MODE IS NOT
A0207                                                                         P00 OR P02.
0208   REF 363  LAST 1496   43,3763  0 0002 0            TC     Q               ALLOW UPDATE TO PROCEED

0209   REF  63  LAST 1500   43,3764  0 4701 0  UPERROR   TC     POSTJUMP        TURN ON 'OPERATOR ERROR' LIGHT
0210   REF   1               43,3765   57754 0           CADR   UPERROUT +2     GO TO COMMON UPDATE PROGRAM EXIT

02101  REF  13  LAST 1403   30,2000                     SBANK= LOWSUPER
0211   REF 294  LAST 1488      5021           UP70      EQUALS ZERO
0212   REF 178  LAST 1500      5017           UP71      EQUALS ONE
0213   REF  82  LAST 1500      5016           UP72      EQUALS TWO
0214   REF  55  LAST 1482      6214           UP73      EQUALS THREE


0215                         04,3757                     BANK   04
0216   REF   2  LAST 1331   27,2000                     SETLOC UPDATE2
0217                         27,3373                     BANK

0218   REF   1                                           COUNT* $$/P27

0219                         27,3373           UPPART2   EQUALS                 UPDATE PROGRAM - PART 2

0220   REF 104  LAST 1446   27,3373  0 5412 0            TC     PHASCHNG        SET RESTART GROUP 6 TO RESTORE OLD MODE
0221                         27,3374   07026 1           OCT    07026           AND DOWNLIST AND EXIT IF RESTART OCCURS.
0222                         27,3375   30000 1           OCT    30000           PRIORITY SAME AS CHRPRIO
0223   REF   7  LAST  177      0304                     EBANK= UPBUFF
0224   REF   1               27,3376   03704 1           2CADR  UPOUT +1
0224   REF   1               27,3377   56060 1

0225   REF 179  LAST 1500   27,3400  3 5017 1            CAF    ONE
0226   REF   8  LAST 1097   27,3401  54 332 1            TS     DNLSTCOD        DOWNLIST

0227   REF  13  LAST  800   27,3402  0 5354 0            TC     NEWMODEX        SET MAJOR MODE = 27
```

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```
0228                        27,3403   00033 1          DEC     27

0229  REF   3  LAST 1500    27,3404   50 302 0         INDEX   UPVERB     BRANCH DEPENDING ON WHETHER THE UPDATE
0230                        27,3405   1 3406 1         TCF     +1          VERB REQUIRES A FIXED OR VARIABLE NUMBER
0231                        27,3406   1 3411 1         TCF     +3          V70 FIXED.                  (OF COMPONENTS.
0232  REF   1               27,3407   1 3414 1         TCF     OHWELL1     V71 VARIABLE - GO GET NO. OF COMPONENTS
0233  REF   2  LAST 1501    27,3410   1 3414 1         TCF     OHWELL1     V72 VARIABLE - GO GET NO. OF COMPONENTS
0234  REF  83  LAST 1500    27,3411   3 5016 0         CA      TWO         V73 (AND V70) FIXED
0235  REF   4  LAST  177    27,3412   54 300 0         TS      COMPNUMB    SET NUMBER OF COMPONENTS TO 2.
0236  REF   1               27,3413   1 3437 0         TCF     OHWELL2     GO GET THE TWO UPDATE COMPONENTS

0237  REF   1               27,3414   3 3507 0 OHWELL1 CAF     ADUPBUFF    * REQUEST USER TO SEND NUMBER  *
0238  REF 725  LAST 1484    27,3415   54 156 1         TS      MPAC +2     * OF COMPONENTS PARAMETER(II). *
0239  REF   1               27,3416   3 3510 0   +2    CAF     UPLOADNV    (CK4V32 RETURNS HERE IF V32 ENCOUNTERED)
0240  REF 250  LAST 1496    27,3417   0 4662 1         TC      BANKCALL    DISPLAY A FLASHING V21N01
0241  REF  14  LAST  632    27,3420    20561 1         CADR    GOXDSPF     TO REQUEST II.
0242  REF   1               27,3421   1 3704 0         TCF     UPOUT4      V34 TERMINATE UPDATE(P27) RETURN
0243  REF   3  LAST 1501    27,3422   1 3416 0         TCF     OHWELL1 +2
0244  REF   1               27,3423   0 3500 1         TC      CK4V32      DATA OR V32 RETURN
0245  REF  49  LAST 1395    27,3424   4 5016 1         CS      BIT2
0246  REF   8  LAST 1500    27,3425   6 0304 0         AD      UPBUFF      IS II(NUMBER OF COMPONENTS PARAMETER)
0247                        27,3426   0 0006 1         EXTEND              .GE. 3 AND .LE. 20D.
0248  REF   4  LAST 1501    27,3427   6 3416 1         BZMF    OHWELL1 +2
0249  REF   9  LAST 1501    27,3430   4 0304 1         CS      UPBUFF
0250  REF   1               27,3431   6 4376 1         AD      UP21
0251                        27,3432   0 0006 1         EXTEND
0252  REF   5  LAST 1501    27,3433   6 3416 1         BZMF    OHWELL1 +2
0253  REF  10  LAST 1501    27,3434   30 304 0         CAE     UPBUFF
0254  REF   5  LAST 1501    27,3435   54 300 0         TS      COMPNUMB    SAVE II IN COMPNUMB

R0257           UPBUFF LOADING SEQUENCE

02571 REF   3  LAST 1500    27,3436   24 303 1         INCR    UPCOUNT     INCREMENT COUNT OF COMPONENTS RECEIVED.
0258  REF   1               27,3437   3 3654 0 OHWELL2 CAF     ADUPBFM1    CALCULATE LOCATION(ECADR) IN UPBUFF
0259  REF   4  LAST 1501    27,3440   6 0303 1         AD      UPCOUNT     WHERE NEXT COMPONENT SHOULD BE STORED.
0260  REF 726  LAST 1501    27,3441   54 156 1   +2    TS      MPAC +2     PLACE ECADR INTO R3.
0261  REF   2  LAST 1501    27,3442   3 3510 0   +3    CAF     UPLOADNV    (CK4V32 RETURNS HERE IF V32 ENCOUNTERED)
0262  REF 251  LAST 1501    27,3443   0 4662 1         TC      BANKCALL    DISPLAY A FLASHING V21N01
0263  REF  15  LAST 1501    27,3444    20561 1         CADR    GOXDSPF     TO REQUEST DATA.
0264  REF   2  LAST 1501    27,3445   1 3704 0         TCF     UPOUT4      V34 TERMINATE UPDATE(P27) RETURN.
0265  REF   2  LAST 1501    27,3446   1 3442 1         TCF     OHWELL2 +3  V33 PROCEED RETURN
0266  REF   2  LAST 1501    27,3447   0 3500 1         TC      CK4V32      DATA OR V32 RETURN
0267  REF   5  LAST 1501    27,3450   4 0303 0         CS      UPCOUNT     HAVE WE FINISHED RECEIVING ALL
0268  REF   6  LAST 1501    27,3451   6 0300 1         AD      COMPNUMB    THE DATA WE EXPECTED.
0269                        27,3452   0 0006 1         EXTEND
0270  REF   1               27,3453   6 3455 0         BZMF    UPVERIFY    YES- GO TO VERIFICATION SEQUENCE
0272  REF   3  LAST 1501    27,3454   1 3436 1         TCF     OHWELL2 -1  NO- REQUEST ADDITIONAL DATA.
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R0273 VERIFY SEQUENCE

0274	REF	1		27,3455	3 3506 1	UPVERIFY	CAF	ADUPTEMP	PLACE ECADR WHERE COMPONENT NO. INDEX
0275	REF	727	LAST 1501	27,3456	54 156 1		TS	MPAC +2	IS TO BE STORED INTO R3.
0276	REF	1		27,3457	3 3511 1		CAF	UPVRFYNV	(CK4V32 RETURNS HERE IF V32 ENCOUNTERED)
0277	REF	252	LAST 1501	27,3460	0 4662 1		TC	BANKCALL	DISPLAY A FLASHING V21N02 TO REQUEST
0278	REF	16	LAST 1501	27,3461	20561 1		CADR	GOXDSPF	DATA CORRECTION OR VERIFICATION.
0279	REF	3	LAST 1501	27,3462	1 3704 0		TCF	UPOUT4	V34 TERMINATE UPDATE(P27) RETURN
0280	REF	1		27,3463	1 3512 0		TCF	UPSTORE	V33 DATA SENT IS GOOD. GO STORE IT.
0281	REF	3	LAST 1501	27,3464	0 3500 1		TC	CK4V32	COMPONENT NO. INDEX OR V32 RETURN
0282	REF	2	LAST 72	27,3465	3 0330 1		CA	UPTEMP	DOES THE COMPONENT NO. INDEX JUST SENT
0283				27,3466	0 0006 1		EXTEND		SPECIFY A LEGAL COMPONENT NUMBER?
0284	REF	2	LAST 1501	27,3467	6 3455 0		BZMF	UPVERIFY	NO. IT IS NOT POSITIVE NONZERO
0285	REF	3	LAST 1502	27,3470	4 0330 0		CS	UPTEMP	
0286	REF	7	LAST 1501	27,3471	6 0300 1		AD	COMPNUMB	
0289	REF	82	LAST 1465	27,3472	6 5017 1		AD	BIT1	
0290				27,3473	0 0006 1		EXTEND		
0291	REF	3	LAST 1502	27,3474	6 3455 0		BZMF	UPVERIFY	NO
0292	REF	2	LAST 1501	27,3475	3 3654 0		CAF	ADUPBFM1	YES- BASED ON THE COMPONENT NO. INDEX
0293	REF	4	LAST 1502	27,3476	6 0330 1		AD	UPTEMP	CALCULATE THE ECADR OF LOCATION IN
0294	REF	4	LAST 1501	27,3477	1 3441 1		TCF	DHWELL2 +2	UPBUFF WHICH USER WANTS TO CHANGE.
0295	REF	2	LAST 1500	27,3704		UPOUT4	EQUALS	UPOUT +1	COMES HERE ON V34 TO TERMINATE UPDATE

R0296 CHECK FOR VERB 32 SEQUENCE

0297	REF	728	LAST 1502	27,3500	4 0154 0	CK4V32	CS	MPAC	ON DATA RETURN FROM 'GOXDSPF'
0298	REF	55	LAST 1477	27,3501	7 5012 0		MASK	BIT6	ON DATA RETURN FROM "GOXDSP"& THE CON-
0299	REF	422	LAST 1500	27,3502	10 000 0		CCS	A	TENTS OF MPAC = VERB. SO TEST FOR V32.
0300	REF	364	LAST 1500	27,3503	0 0002 0		TC	Q	IT'S NOT A V32. IT'S DATA. PROCEED.
0301	REF	365	LAST 1502	27,3504	50 002 0		INDEX	Q	
0302				27,3505	7'7771 0		TC	0 -6	V32 ENCOUNTERED - GO BACK AND GET DATA
0305	REF	5	LAST 1502	27,3506	00330 1	ADUPTEMP	ADRES	UPTEMP	ADDRESS OF TEMP STORAGE FOR CORRECTIONS
0306	REF	11	LAST 1501	27,3507	00304 0	ADUPBUFF	ADRES	UPBUFF	ADDRESS OF UPDATE DATA STORAGE BUFFER
0307				27,3510	05201 1	UPLOADNV	VN	2101	VERB 21 NOUN 01
0308				27,3511	05202 1	UPVRFYNV	VN	2102	VERB 21 NOUN 02
0309	REF	3	LAST 1204	4376		UP21	=	MD1	DEC 21 = MAX NO OF COMPONENTS +1
03121	REF	28	LAST 1467	5022		UPOTPHAS	EQUALS	FIVE	

R0313 PRE-STORE AND FAN TO APPROPRIATE BRANCH SEQUENCE

0314				27,3512		UPSTORE	EQUALS		GROUND HAS VERIFIED UPDATE. STORE DATA.
0315				27,3512	0 0004 0			INHINT	
0316	REF	25	LAST 1495	27,3513	30 103 0		CAE	FLAGWRD7	INVERT VERIFLAG(BIT3 OF FLAGWRD7) TO
0317	REF	213	LAST 1496	27,3514	56 001 0		XCH	L	INDICATE TO THE GROUND(VIA DOWNLINK)
0318	REF	39	LAST 1480	27,3515	3 5015 0		CAF	BIT3	THAT THE V33(WHICH THE GROUND SENT TO

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0319                              27,3516  0 0006 1           EXTEND              VERIFY THE UPDATE) HAS BEEN SUCCESSFULLY
0320   REF  16  LAST 1486        27,3517  06 001 0           RXOR    LCHAN       RECEIVED BY THE UPDATE PROGRAM
0321   REF  26  LAST 1502        27,3520  54 103 1           TS      FLAGWRD7

0322   REF 105  LAST 1500        27,3521  0 5412 0           TC      PHASCHNG    SET RESTART GROUP 6 TO REDO THE UPDATE
0323                              27,3522   04026 1           OCT     04026       DATA STORE IF A RESTART OCCURS.
0324                              27,3523  0 0004 0           INHINT              (BECAUSE PHASCHNG DID A RELINT)

0325   REF  84  LAST 1501        27,3524  4 5016 1           CS      TWO         GO TO UPFNDVAC IF INSTALL IS REQUIRED,
0326   REF   4  LAST 1501        27,3525  6 0302 0           AD      UPVERB      THAT IS, IF IT'S A V70 - V72.
0327                              27,3526  0 0006 1           EXTEND              GO TO UPEND73 IF IT'S A V73.
0328   REF   1                   27,3527  6 3536 1           BZMF    UPFNDVAC

R0330                VERB 73 BRANCH

0331                              27,3530  0 0006 1 UPEND73   EXTEND              V73-PERFORM DP OCTAL AGC CLOCK INCREMENT
0332   REF  12  LAST 1502        27,3531  3 0305 1           DCA     UPBUFF
0333   REF  13  LAST 1503        27,3532  52 315 1           DXCH    UPBUFF +8D
0334   REF   1                   27,3533  0 3561 0           TC      TIMEDIDL
0335   REF  13  LAST  773        27,3534  0 4400 1           TC      FALTON      ERROR- TURN ON *OPERATOR ERROR* LIGHT
0336   REF   3  LAST 1502        27,3535  0 3704 1           TC      UPOUT +1    GO TO COMMON UPDATE PROGRAM EXIT

0337   REF   7  LAST 1449        27,3536  3 4371 0 UPFNDVAC CAF     CHRPRIO     (USE EXTENDED VERB PRIORITY)
0338   REF  33  LAST 1478        27,3537  0 5147 0           TC      FINDVAC     GET VAC AREA FOR 'CALL INTSTALL'
0339   REF  14  LAST 1499        E3,1706                    EBANK=  TEPHEM
0340   REF   1                   27,3540   03543 0          2CADR   UPJOB       (NOTE: THIS WILL ALSO SET EBANK FOR
0340   REF   1                   27,3541   56063 1
0341   REF 116  LAST 1496        27,3542  0 5217 0           TC      ENDOFJOB    'TEPHEM' UPDATE BY V70)

0342   REF 246  LAST 1368        27,3543  0 6006 1 UPJOB    TC      INTPRET     THIS COULD BE A STATE VECTOR UPDATE--SO
0343                              27,3544   77624 1          CALL                WAIT(PUT JOB TO SLEEP) IF ORBIT INT(DI)
0344   REF  33  LAST 1329        27,3545   27442 0                   INTSTALL    IS IN PROGRESS--OR--GRAB DI AND RETURN
A0345                                                                            TO UPWAKE IF DI IS NOT IN PROGRESS.

0346                              27,3546   77776 1 UPWAKE    EXIT

0347   REF 106  LAST 1503        27,3547  0 5412 0           TC      PHASCHNG    RESTART PROTECT(GROUP 6)
0348                              27,3550   04026 1          OCT     04026

0350   REF  58  LAST 1476        27,3551  0 5546 0           TC      UPFLAG      SET INTEGRATION RESTART BIT
0351   REF   6  LAST 1496        27,3552   00236 0          ADRES   REINTFLG
0352                              27,3553  0 0004 0           INHINT
0355                              27,3554            UPPART3 EQUALS

0356   REF   5  LAST 1503        27,3554  50 302 0           INDEX   UPVERB      BRANCH TO THE APPROPRIATE UPDATE VERB
0357                              27,3555  1 3556 0           TCF     +1          ROUTINE TO ACTUALLY PERFORM THE UPDATE
0358   REF   1                   27,3556  1 3715 0           TCF     UPEND70     V70
0359   REF   1                   27,3557  1 3624 0           TCF     UPEND71     V71
0360   REF   1                   27,3560  1 3656 0           TCF     UPEND72     V72
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R0361 ROUTINE TO INCREMENT CLOCK(TIME2,TIME1) WITH CONTENTS OF DP WORD AT UPBUFF.

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0363                              27,3561  0 0006 1  TIMEDIDL EXTEND
0364  REF   6  LAST 1502         27,3562  22 330 1            QXCH   UPTEMP          SAVE Q FOR RETURN
0365  REF 295  LAST 1500         27,3563  3 5021 1            CAF    ZERO            ZERO AND SAVE TIME2,TIME1
0366                              27,3564  22 007 0            ZL
0367  REF  34  LAST 1448         27,3565  52 025 1            DXCH   TIME2
0368  REF  14  LAST 1503         27,3566  52 327 0            DXCH   UPBUFF +18D     STORE IN CASE OF OVERFLOW

0369  REF   1                     27,3567  3 5022 1            CAF    UPOTPHAS        DO
0370  REF 214  LAST 1502         27,3570  54 001 1            TS     L               A
0371                              27,3571  4 0000 0            COM                    QUICK
03711 REF   3  LAST  696         27,3572  52 765 1            DXCH   -PHASE6         PHASCHNG

0372                              27,3573  0 0004 0  TIMEDIDR INHINT

0373  REF 296  LAST 1504         27,3574  3 5021 1            CAF    ZERO
0374                              27,3575  22 007 0            ZL                     PICK UP INCREMENTER(AND ZERO
0375  REF 729  LAST 1502         27,3576  54 156 1            TS     MPAC +2         IT IN CASE OF RESTARTS) AND
0376  REF  15  LAST 1504         27,3577  52 315 1            DXCH   UPBUFF +8D      STORE IT
0377  REF 730  LAST 1504         27,3600  52 155 1            DXCH   MPAC            INTO MPAC FOR TPAGREE.

0378                              27,3601  0 0006 1            EXTEND
0379  REF  16  LAST 1504         27,3602  3 0327 1            DCA    UPBUFF +18D
0380  REF 731  LAST 1504         27,3603  20 155 1            DAS    MPAC            FORM SUM IN MPAC
0381                              27,3604  0 0006 1            EXTEND
0382  REF   1                     27,3605  1 3614 0            BZF    DELTATOK        TEST FOR OVERFLOW
0383  REF 297  LAST 1504         27,3606  3 5021 1            CAF    ZERO
0384  REF  17  LAST 1504         27,3607  52 327 0            DXCH   UPBUFF +18D     OVERFLOW, RESTORE OLD VALUE OF CLOCK
0385  REF  35  LAST 1504         27,3610  20 025 1            DAS    TIME2           AND TURN ON OPERATOR ERROR

0386  REF 107  LAST 1503         27,3611  0 5412 0            TC     PHASCHNG        RESTART PROTECT(GROUP 6)
0387                              27,3612   04026 1            OCT    04026

0388  REF   7  LAST 1504         27,3613  0 0330 1            TC     UPTEMP          GO TO ERROR EXIT

0389  REF  14  LAST 1448         27,3614  0 7226 0  DELTATOK TC     TPAGREE         FORCE SIGN AGREEMENT
0390  REF 732  LAST 1504         27,3615  52 155 1            DXCH   MPAC
0391  REF  36  LAST 1504         27,3616  20 025 1            DAS    TIME2           INCREMENT TIME2,TIME1

0392  REF 108  LAST 1504         27,3617  0 5412 0            TC     PHASCHNG        RESTART PROTECT(GROUP 6)
0393                              27,3620   04026 1            OCT    04026

0394                              27,3621  0 0004 0            INHINT
0395  REF   8  LAST 1504         27,3622  50 330 1            INDEX  UPTEMP          (CODED THIS WAY FOR RESTART PROTECTION)
0396                              27,3623  0 0001 0            TC     1               NORMAL RETURN
R0397           VERB 71 BRANCH

0402  REF  18  LAST 1504         27,3624  30 305 1  UPEND71   CAE    UPBUFF +1       SET EBANK
0403  REF  67  LAST 1475         27,3625  54 003 0            TS     EBANK              AND
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0404   REF  17  LAST 1435   27,3626  7 4373 0          MASK    LOW8        CALCULATE
0405   REF   9  LAST 1504   27,3627  54 330 0          TS      UPTEMP      S-REG VALUE OF RECEIVING AREA

0406   REF   5  LAST 1435   27,3630  6 7714 1          AD      NEG3        IN THE PROCESS OF
0407   REF   8  LAST 1502   27,3631  6 0300 1          AD      COMPNUMB    PERFORMING
0408             LAST 1502   27,3632  0 0006 1          EXTEND              THIS UPDATE
0409   REF   1              27,3633  1 3641 0          BZF     STORLP71    WILL WE
0410   REF  39  LAST 1467   27,3634  7 5007 1          MASK    BIT9        OVERFLOW
0411   REF 423  LAST 1502   27,3635  10 000 0          CCS     A           INTO THE NEXT EBANK....
0412   REF   2  LAST 1500   27,3636  1 3752 0          TCF     UPERROUT    YES

0413   REF   6  LAST 1505   27,3637  3 7714 1          CA      NEG3        NO- CALCULATE NUMBER OF
0414   REF   9  LAST 1505   27,3640  6 0300 1          AD      COMPNUMB    WORDS TO BE STORED MINUS ONE
0415   REF 733  LAST 1504   27,3641  54 154 0 STORLP71 TS      MPAC        SAVE NO. OF WORDS REMAINING MINUS ONE
0416   REF 424  LAST 1505   27,3642  50 000 1          INDEX   A           TAKE NEXT UPDATE WORD FROM
0417   REF  19  LAST 1504   27,3643  3 0306 1          CA      UPBUFF +2   UPBUFF AND
0418   REF 215  LAST 1504   27,3644  54 001 1          TS      L           SAVE IT IN L
0419   REF 734  LAST 1505   27,3645  3 0154 1          CA      MPAC        CALCULATE NEXT
0420   REF  10  LAST 1505   27,3646  6 0330 1          AD      UPTEMP      RECEIVING ADDRESS
0421   REF 425  LAST 1505   27,3647  50 000 1          INDEX   A
0422             E3,1400              EBANK= 1400
0423             27,3650  23'400 1    LXCH    1400        UPDATE THE REGISTER  BY CONTENTS OF L
0424   REF  15  LAST 1503   E3,1706              EBANK= TEPHEM
0425   REF 735  LAST 1505   27,3651  10 154 0          CCS     MPAC        ARE THERE ANY WORDS LEFT TO BE STORED
0426   REF   2  LAST 1505   27,3652  1 3641 0          TCF     STORLP71    YES
0427   REF   4  LAST 1503   27,3653  1 3703 1          TCF     UPOUT       NO- THEN EXIT UPDATE PROGRAM
0428   REF  20  LAST 1505   27,3654   00303 1 ADUPBFM1 ADRES   UPBUFF -1   SAME AS ADUPBUFF BUT LESS 1 (DON'T MOVE)
0429   REF   5  LAST 1505   27,3655  1 3703 1          TCF     UPOUT       NO- EXIT UPDATE(HERE WHEN COMPNUMB = 3)

R0430            VERB 72 BRANCH

0431   REF  83  LAST 1502   27,3656  3 5017 1 UPEND72  CAF     BIT1        HAVE AN ODD NO. OF COMPONENTS
0432   REF  10  LAST 1505   27,3657  7 0300 0          MASK    COMPNUMB    BEEN SENT FOR A V72 UPDATE...
0433   REF 426  LAST 1505   27,3660  10 000 0          CCS     A
0434             27,3661  1 3663 0          TCF     +2          YES
0435   REF   3  LAST 1505   27,3662  1 3752 0          TCF     UPERROUT    ERROR- SHOULD BE ODD NO. OF COMPONENTS
0451   REF  50  LAST 1501   27,3663  4 5016 1          CS      BIT2
0452   REF  11  LAST 1505   27,3664  6 0300 1          AD      COMPNUMB
0453   REF 736  LAST 1505   27,3665  54 154 0 LDLOOP72 TS      MPAC        NOW PERFORM THE UPDATE
0454   REF 427  LAST 1505   27,3666  50 000 1          INDEX   A
0455   REF  21  LAST 1505   27,3667  30 305 1          CAE     UPBUFF +1   PICK UP NEXT UPDATE WORD
0456   REF 428  LAST 1505   27,3670  22 000 1          LXCH    A
0457   REF 737  LAST 1505   27,3671  10 154 0          CCS     MPAC        SET POINTER TO ECADR(MUST BE CCS)
0458   REF 738  LAST 1505   27,3672  54 154 0          TS      MPAC
0459   REF 429  LAST 1505   27,3673  50 000 1          INDEX   A
0460   REF  22  LAST 1505   27,3674  30 305 1          CAE     UPBUFF +1   PICK UP NEXT ECADR OF REG TO BE UPDATED
0461   REF  68  LAST 1504   27,3675  54 003 0          TS      EBANK       SET EBANK
0462   REF  18  LAST 1505   27,3676  7 4373 0          MASK    LOW8        ISOLATE RELATIVE ADDRESS
0463   REF 430  LAST 1505   27,3677  50 000 1          INDEX   A
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0464                              E3,1400                    EBANK= 1400
0465                              27,3700  23'400 1          LXCH   1400          UPDATE THE REGISTER BY CONTENTS OF L
0466  REF  16  LAST 1505         E3,1706                    EBANK= TEPHEM
0467  REF 739  LAST 1505         27,3701  10 154 0          CCS    MPAC          ARE WE THROUGH THE V72 UPDATE...
0468  REF   1                    27,3702  1 3665 0          TCF    LDLOOP72      NO

R0469           NORMAL FINISH OF P27

0470                              27,3703           UPOUT    EQUALS
0471  REF   1                    27,3703  0 2671 0          TC     INTWAKEU      RELEASE  GRAB  OF ORBITAL INTEGRATION
0472  REF   3  LAST 1499         27,3704  30 301 0  +1      CAE    UPOLDMOD      RESTORE PRIOR P27 MODE
0473  REF  14  LAST 1500         27,3705  0 5357 0          TC     NEWMODEX +3
0474  REF 298  LAST 1504         27,3706  3 5021 1          CAF    ZERO
0475  REF   9  LAST 1500         27,3707  54 332 1          TS     DNLSTCOD
0476  REF   3  LAST  593         27,3710  0 3757 1          TC     UPACTOFF      TURN OFF 'UPLINK ACTIVITY' LIGHT

0477                              27,3711  0 0006 1          EXTEND               KILL GROUP 6.
0478  REF  17  LAST 1424         27,3712  3 5021 1          DCA    NEGO
0479  REF   4  LAST 1504         27,3713  52 765 1          DXCH   -PHASE6

0480  REF  34  LAST  935         27,3714  0 5534 0          TC     ENDEXT        EXTENDED VERB EXIT

R0481           VERB 70 BRANCH

0482                              27,3715  0 0006 1  UPEND70  EXTEND               V70 DOES THE FOLLOWING WITH DP DELTA
0483  REF  23  LAST 1505         27,3716  4 0305 0          DCS    UPBUFF        TIME IN UPBUFF
0484  REF  24  LAST 1506         27,3717  52 315 1          DXCH   UPBUFF +8D
0485  REF   2  LAST 1503         27,3720  0 3561 0          TC     TIMEDIDL      DECREMENT AGC CLOCK

0486  REF   4  LAST 1505         27,3721  0 3752 1          TC     UPERROUT      ERROR WHILE DECREMENTING CLOCK -- EXIT

0487  REF  17  LAST 1506         E3,1706                    EBANK= TEPHEM
0488                              27,3722  0 0006 1          EXTEND
0489  REF  25  LAST 1506         27,3723  4 0305 0          DCS    UPBUFF        COPY DECREMENTERS FOR
0490  REF  26  LAST 1506         27,3724  52 317 0          DXCH   UPBUFF +10D   RESTART PROTECTION
0491                              27,3725  0 0006 1          EXTEND
0492  REF  27  LAST 1506         27,3726  4 0305 0          DCS    UPBUFF
0493  REF  28  LAST 1506         27,3727  52 321 0          DXCH   UPBUFF +12D

0494  REF 109  LAST 1504         27,3730  0 5412 0          TC     PHASCHNG      RESTART PROTECT(GROUP 6)
0495                              27,3731   04026 1          DCT    04026

0496  REF 299  LAST 1506         27,3732  3 5021 1          CAF    ZERO
0497                              27,3733  22 007 0          ZL
0498  REF  29  LAST 1506         27,3734  52 317 0          DXCH   UPBUFF +10D   DECREMENT CSM STATE VECTOR TIME
0499  REF   3  LAST  210         27,3735  21'571 1          DAS    TETCSM

0500  REF 300  LAST 1506         27,3736  3 5021 1          CAF    ZERO
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0501                          27,3737  22 007 0          ZL
0502  REF  30  LAST 1506     27,3740  52 321 0          DXCH   UPBUFF +12D     DECREMENT LEM STATE VECTOR TIME
0503  REF   3  LAST   86     27,3741  21'643 0          DAS    TETLEM

0504  REF 301  LAST 1506     27,3742  3 5021 1          CAF    ZERO
0505                          27,3743  22 007 0          ZL
0506  REF  31  LAST 1507     27,3744  52 305 0          DXCH   UPBUFF
0507  REF  18  LAST 1506     27,3745  21'710 1          DAS    TEPHEM +1       INCREMENT TP TEPHEM
0508  REF  19  LAST 1507     27,3746  27'706 0          ADS    TEPHEM

0509  REF 110  LAST 1506     27,3747  0 5412 0          TC     PHASCHNG        RESTART PROTECT(GROUP 6)
0510                          27,3750   04026 1          OCT    04026

0511  REF  32  LAST 1507       0304                     EBANK= UPBUFF

0512  REF   6  LAST 1505     27,3751  0 3703 0          TC     UPOUT           GO TO STANDARD UPDATE PROGRAM EXIT


R0513           ERROR SEQUENCE

0514  REF  14  LAST 1503     27,3752  0 4400 1 UPERROUT TC     FALTON          TURN ON *OPERATOR ERROR* LIGHT
0515  REF   7  LAST 1507     27,3753  1 3703 1          TCF    UPOUT           GO TO COMMON UPDATE PROGRAM EXIT

0516  REF  15  LAST 1507     27,3754  0 4400 1   +2     TC     FALTON          TURN ON 'OPERATOR ERROR' LIGHT
0517  REF   4  LAST 1506     27,3755  0 3757 1          TC     UPACTOFF        TURN OFF'UPLINK ACTIVITY'LIGHT
0518  REF  35  LAST 1506     27,3756  0 5534 0          TC     ENDEXT          EXTENDED VERB EXIT
A0519                                                                        (THE PURPOSE OF UPERROUT +2 EXIT IS
A0520                                                                        TO PROVIDE AN ERROR EXIT WHICH DOES NOT
A0521                                                                        RESET ANY RESTART GROUPS)
A0522


R0523           :UPACTOFF: IS A ROUTINE TO TURN OFF UPLINK ACTIVITY LIGHT ON ALL EXITS FROM UPDATE PROGRAM(P27).

0525  REF  40  LAST 1502     27,3757  4 5015 1 UPACTOFF CS     BIT3
0527                          27,3760  0 0006 1          EXTEND                  TURN OFF UPLINK ACTIVITY LIGHT
0528  REF  36  LAST 1478     27,3761  03 011 1          WAND   DSALMOUT         (BIT 3 OF CHANNEL 11)
0530  REF 366  LAST 1502     27,3762  0 0002 0          TC     Q
```

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0001                          22,3510                    BANK   22
0002  REF   1                 22,2000                    SETLOC RTBCODES
0003                          22,3510                    BANK

0004  REF  13  LAST 1359      E5,1713                    EBANK= XNB
0005  REF   1                                            COUNT* $$/RTB

R0006           LOAD TIME2, TIME1 INTO MPAC:

0007                          22,3510  0 0006 1  LOADTIME EXTEND
0008  REF  37  LAST 1504      22,3511  3 0025 0           DCA    TIME2
0009  REF   2  LAST 1124      22,3512  1 6024 0           TCF    SLOAD2

R0010           CONVERT THE SINGLE PRECISION 2'S COMPLEMENT NUMBER ARRIVING IN MPAC (SCALED IN HALF-REVOLUTIONS) TO A
R0012  DP 1'S COMPLEMENT NUMBER SCALED IN REVOLUTIONS.

0016  REF 740  LAST 1506      22,3513  10 154 0  CDULOGIC CCS    MPAC
0017  REF 302  LAST 1507      22,3514  3 5021 1           CAF    ZERO
0018                          22,3515  1 3520 1           TCF    +3
0019                          22,3516  13 517 0           NOOP
0020  REF  25  LAST 1207      22,3517  4 5002 1           CS     HALF

0021  REF 741  LAST 1508      22,3520  54 155 1           TS     MPAC +1
0022  REF 303  LAST 1508      22,3521  3 5021 1           CAF    ZERO
0023  REF 742  LAST 1508      22,3522  56 154 1           XCH    MPAC
0024                          22,3523  0 0006 1           EXTEND
0025  REF  26  LAST 1508      22,3524  7 5002 1           MP     HALF
0026  REF 743  LAST 1508      22,3525  20 155 1           DAS    MPAC
0027  REF  68  LAST 1387      22,3526  1 6030 0           TCF    DANZIG          MODE IS ALREADY AT DOUBLE-PRECISION

R0040           READ THE PIPS INTO MPAC WITHOUT CHANGING THEM:

0041                          22,3527  0 0004 0  READPIPS INHINT
0042  REF  13  LAST 1429      22,3530  3 0037 0           CA     PIPAX
0043  REF 744  LAST 1508      22,3531  54 154 0           TS     MPAC
0044  REF   4  LAST 1429      22,3532  3 0040 0           CA     PIPAY
0045  REF 745  LAST 1508      22,3533  54 157 0           TS     MPAC +3
0046  REF   7  LAST 1429      22,3534  3 0041 1           CA     PIPAZ
0047                          22,3535  0 0003 1           RELINT
0048  REF 746  LAST 1508      22,3536  54 161 0           TS     MPAC +5

0049  REF 304  LAST 1508      22,3537  3 5021 1           CAF    ZERO
0050  REF 747  LAST 1508      22,3540  54 155 1           TS     MPAC +1
0051  REF 748  LAST 1508      22,3541  54 160 1           TS     MPAC +4
0052  REF 749  LAST 1508      22,3542  54 162 0           TS     MPAC +6

0053  REF   3  LAST 1182      22,3543  1 6470 0  VECMODE  TCF    VMODE
R0054           FORCE TP SIGN AGREEMENT IN MPAC:

0055  REF  15  LAST 1504      22,3544  0 7226 0  SGNAGREE TC     TPAGREE
```

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0056   REF  69  LAST 1508   22,3545  1 6030 0            TCF    DANZIG

R0057                CONVERT THE DP 1'S COMPLEMENT ANGLE SCALED IN REVOLUTIONS TO A SINGLE PRECISION 2'S COMPLEMENT ANGLE
R0059  SCALED IN HALF-REVOLUTIONS.

0060   REF   1                 22,3546  0 3576 0  1STO2S   TC     1TO2SUB
0061   REF 305  LAST 1508     22,3547  3 5021 1            CAF    ZERO
0062   REF 750  LAST 1508     22,3550  54 155 1            TS     MPAC +1
0063   REF   5  LAST 1152     22,3551  1 6027 0            TCF    NEWMODE

R0064                DO 1STO2S ON A VECTOR OF ANGLES:

0065   REF   2  LAST 1509     22,3552  0 3576 0  V1STO2S   TC     1TO2SUB        ANSWER ARRIVES IN A AND MPAC.

0066   REF 751  LAST 1509     22,3553  52 162 0            DXCH   MPAC +5
0067   REF 752  LAST 1509     22,3554  52 155 1            DXCH   MPAC
0068   REF   3  LAST 1509     22,3555  0 3576 0            TC     1TO2SUB
0069   REF 753  LAST 1509     22,3556  54 156 1            TS     MPAC +2

0070   REF 754  LAST 1509     22,3557  52 160 1            DXCH   MPAC +3
0071   REF 755  LAST 1509     22,3560  52 155 1            DXCH   MPAC
0072   REF   4  LAST 1509     22,3561  0 3576 0            TC     1TO2SUB
0073   REF 756  LAST 1509     22,3562  54 155 1            TS     MPAC +1

0074   REF 757  LAST 1509     22,3563  3 0161 1            CA     MPAC +5
0075   REF 758  LAST 1509     22,3564  54 154 0            TS     MPAC

0076   REF 180  LAST 1500     22,3565  3 5017 1  TPMODE    CAF    ONE            MODE IS TP.
0077   REF   6  LAST 1509     22,3566  1 6027 0            TCF    NEWMODE

R0078                V1STO2S FOR 2 COMPONENT VECTOR. USED BY RR.

0079   REF   5  LAST 1509     22,3567  0 3576 0  2V1STO2S  TC     1TO2SUB
0080   REF 759  LAST 1509     22,3570  52 160 1            DXCH   MPAC +3
0081   REF 760  LAST 1509     22,3571  52 155 1            DXCH   MPAC
0082   REF   6  LAST 1509     22,3572  0 3576 0            TC     1TO2SUB
0083   REF 216  LAST 1505     22,3573  54 001 1            TS     L
0084   REF 761  LAST 1509     22,3574  3 0157 1            CA     MPAC +3
0085   REF   3  LAST 1508     22,3575  1 6024 0            TCF    SLOAD2

R0086                SUBROUTINE TO DO DOUBLING AND 1'S TO 2'S CONVERSION:

0087   REF 762  LAST 1509     22,3576  52 155 1  1TO2SUB   DXCH   MPAC           FINAL MPAC +1 UNSPECIFIED.
0088                          22,3577  20 001 1            DDOUBL
0089   REF 431  LAST 1505     22,3600  10 000 0            CCS    A
0090   REF 181  LAST 1509     22,3601  6 5017 1            AD     ONE
0091                          22,3602  1 3604 1            TCF    +2
0092                          22,3603  4 0000 0            COM                   THIS WAS REVERSE OF MSU.

0093   REF 763  LAST 1509     22,3604  54 154 0            TS     MPAC           AND SKIP ON OVERFLOW.
```

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0094	REF 367	LAST 1507	22,3605	0 0002 0	TC	Q	
0095	REF 432	LAST 1509	22,3606	50 000 1	INDEX	A	OVERFLOW UNCORRECT AND IN MSU.
0096	REF 8	LAST 1207	22,3607	3 5000 1	CAF	LIMITS	
0097	REF 764	LAST 1509	22,3610	26 154 0	ADS	MPAC	
0098	REF 368	LAST 1510	22,3611	0 0002 0	TC	Q	

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```
P0099            SUBROUTINE TO INCREMENT CDUS
 0102   REF   1                22,3612  3 3625 0  INCRCDUS CAF    LOCTHETA
 0103   REF 127  LAST 1370     22,3613  54 130 1           TS     BUF          PLACE ADRES(THETA) IN BUF.
 0104   REF 765  LAST 1510     22,3614  30 154 1           CAE    MPAC         INCREMENT IN 1S COMPL.
 0105   REF   1                22,3615  0 3626 0           TC     CDUINC

 0106   REF 128  LAST 1511     22,3616  24 130 0           INCR   BUF
 0107   REF 766  LAST 1511     22,3617  30 157 1           CAE    MPAC +3
 0108   REF   2  LAST 1511     22,3620  0 3626 0           TC     CDUINC

 0109   REF 129  LAST 1511     22,3621  24 130 0           INCR   BUF
 0110   REF 767  LAST 1511     22,3622  30 161 1           CAE    MPAC +5
 0111   REF   3  LAST 1511     22,3623  0 3626 0           TC     CDUINC

 0112   REF   1                22,3624  1 3543 1           TCF    VECMODE

 0113   REF  23  LAST 1424     22,3625   01155 1  LOCTHETA ADRES  THETAD

R0114            THE FOLLOWING ROUTINE INCREMENTS IN 2S COMPLEMENT THE REGISTER WHOSE ADDRESS IS IN BUF BY THE 1S COMPL.
R0116   QUANTITY FOUND IN TEM2. THIS MAY BE USED TO INCREMENT DESIRED IMU AND OPTICS CDU ANGLES OR ANY OTHER 2S COMPL.
R0118   (+0 UNEQUAL TO -0) QUANTITY. MAY BE CALLED BY BANKCALL/SWCALL.

 0119   REF   6  LAST 1366     22,3626  54 142 1  CDUINC   TS     TEM2         1S COMPL.QUANT. ARRIVES IN ACC. STORE IT
 0120   REF 130  LAST 1511     22,3627  50 130 0           INDEX  BUF
 0121                          22,3630  10 000 0           CCS    0            CHANGE 2S COMPL. ANGLE(IN BUF)INTO 1S
 0122   REF 182  LAST 1509     22,3631  6 5017 1           AD     ONE
 0123                          22,3632  1 3636 0           TCF    +4
 0124   REF 183  LAST 1511     22,3633  6 5017 1           AD     ONE
 0125   REF 184  LAST 1511     22,3634  6 5017 1           AD     ONE          OVERFLOW HERE IF 2S COMPL. IS 180 DEG.
 0126                          22,3635  4 0000 0           COM

 0127   REF   7  LAST 1511     22,3636  6 0142 0           AD     TEM2         SULT MOVES FROM 2ND TO 3D QUAD.(OR BACK)
 0129   REF 433  LAST 1510     22,3637  10 000 0           CCS    A            BACK TO 2S COMPL.
 0130   REF 185  LAST 1511     22,3640  6 5017 1           AD     ONE
 0131                          22,3641  1 3643 1           TCF    +2
 0132                          22,3642  4 0000 0           COM
 0133   REF   8  LAST 1511     22,3643  54 142 1           TS     TEM2         STORE 14BIT QUANTITY WITH PRESENT SIGN
 0134                          22,3644  1 3650 0           TCF    +4
 0135   REF 434  LAST 1511     22,3645  50 000 1           INDEX  A             SIGN.
 0137   REF   9  LAST 1510     22,3646  3 5000 1           CAF    LIMITS       FIX IT.BY ADDING IN 37777 OR 40000
 0138   REF   9  LAST 1511     22,3647  6 0142 0           AD     TEM2

 0139   REF 131  LAST 1511     22,3650  50 130 0           INDEX  BUF
 0140                          22,3651  54 000 0           TS     0            STORE NEW ANGLE IN 2S COMPLEMENT.
 0141   REF 369  LAST 1510     22,3652  0 0002 0           TC     Q
```

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P0142 RTB TO TORQUE GYROS, EXCEPT FOR THE CALL TO IMUSTALL. ECADR OF COMMANDS ARRIVES IN X1.

```
0144   REF  41  LAST 1325   22,3653  50 120 1  PULSEIMU INDEX  FIXLOC        ADDRESS OF GYRO COMMANDS SHOULD BE IN X1
0145   REF  98  LAST 1376   22,3654  3 0046 0                  CA     X1
0146   REF 253  LAST 1502   22,3655  0 4662 1                  TC     BANKCALL
0147   REF   7  LAST  759   22,3656   17206 0                  CADR   IMUPULSE
0148   REF  70  LAST 1509   22,3657  1 6030 0                  TCF    DANZIG
```

```
P0149   EACH ROUTINE TAKES A 3X3 MATRIX STORED IN DOUBLE PRECISION IN A FIXED AREA OF ERASABLE MEMORY AND REPLACES IT
R0151   WITH THE TRANSPOSE MATRIX. TRANSP1 USES LOCATIONS XNB+0,+1 THROUGH XNB+16D, 17D AND TRANSP2 USES LOCATIONS
R0153   XNB1+0,+1 THROUGH XNB1+16D, 17D. EACH MATRIX IS STORED BY ROWS.

0154   REF  14  LAST 1508   22,3660   02713 0  XNBEB    ECADR  XNB
0155   REF   5  LAST  287   22,3661   02554 1  XNB1EB   ECADR  XNB1

0156   REF  15  LAST 1513   E5,1713                     EBANK= XNB

0164   REF   1              22,3662   3 3660 1  TRANSP1  CAF    XNBEB
0165   REF  69  LAST 1505   22,3663   54 003 0           TS     EBANK
0166   REF  16  LAST 1513   22,3664   53'716 1           DXCH   XNB +2
0167   REF  17  LAST 1513   22,3665   53'722 0           DXCH   XNB +6
0168   REF  18  LAST 1513   22,3666   53'716 1           DXCH   XNB +2

0169   REF  19  LAST 1513   22,3667   53'720 1           DXCH   XNB +4
0170   REF  20  LAST 1513   22,3670   53'730 0           DXCH   XNB +12D
0171   REF  21  LAST 1513   22,3671   53'720 1           DXCH   XNB +4

0172   REF  22  LAST 1513   22,3672   53'726 1           DXCH   XNB +10D
0173   REF  23  LAST 1513   22,3673   53'732 1           DXCH   XNB +14D
0174   REF  24  LAST 1513   22,3674   53'726 1           DXCH   XNB +10D
0175   REF  71  LAST 1512   22,3675   1 6030 0           TCF    DANZIG

0176   REF   6  LAST 1513   E5,1554                     EBANK= XNB1

0177   REF   1              22,3676   3 3661 0  TRANSP2  CAF    XNB1EB
0178   REF  70  LAST 1513   22,3677   54 003 0           TS     EBANK
0180   REF   7  LAST 1513   22,3700   53'557 0           DXCH   XNB1 +2
0181   REF   8  LAST 1513   22,3701   53'563 1           DXCH   XNB1 +6
0182   REF   9  LAST 1513   22,3702   53'557 0           DXCH   XNB1 +2

0183   REF  10  LAST 1513   22,3703   53'561 0           DXCH   XNB1 +4
0184   REF  11  LAST 1513   22,3704   53'571 1           DXCH   XNB1 +12D
0185   REF  12  LAST 1513   22,3705   53'561 0           DXCH   XNB1 +4

0186   REF  13  LAST 1513   22,3706   53'567 0           DXCH   XNB1 +10D
0187   REF  14  LAST 1513   22,3707   53'573 0           DXCH   XNB1 +14D
0188   REF  15  LAST 1513   22,3710   53'567 0           DXCH   XNB1 +10D
0191   REF  72  LAST 1513   22,3711   1 6030 0           TCF    DANZIG
```

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P0192              THE SUBROUTINE  SIGNMPAC  SETS C(MPAC, MPAC +1) TO SIGN(MPAC).
R0193   FOR THIS, ONLY THE CONTENTS OF MPAC ARE EXAMINED.    ALSO +0 YIELDS POSMAX AND -0 YIELDS NEGMAX.

R0195   ENTRY MAY BE BY EITHER OF THE FOLLOWING:

R0196   1.       LIMIT THE SIZE OF MPAC ON INTERPRETIVE OVERFLOW:
R0197   ENTRY:          BOVB
R0198                          SIGNMPAC

R0199   2.       GENERATE IN MPAC THE SIGNUM FUNCTION OF MPAC:
R0200   ENTRY:          RTB
R0201                          SIGNMPAC

R0202   IN EITHER CASE, RETURN IS TO  THE NEXT INTERPRETIVE INSTRUCTION IN THE CALLING SEQUENCE.

 0204                          22,3712  0 0006 1  SIGNMPAC EXTEND
 0205   REF   2 LAST  359      22,3713  3 4777 1            DCA    DPOSMAX
 0206   REF 768 LAST 1511      22,3714  52 155 1            DXCH   MPAC
 0207   REF 435 LAST 1511      22,3715  10 000 0            CCS    A
 0208   REF 306 LAST 1509      22,3716  3 5021 1  DPMODE    CAF    ZERO          SETS MPAC +2 TO ZERO IN THE PROCESS
 0209   REF   4 LAST 1509      22,3717  1 6026 1            TCF    SLOAD2 +2
 0210                          22,3720  1 3721 1            TCF    +1
 0211                          22,3721  0 0006 1            EXTEND
 0212   REF   3 LAST 1514      22,3722  4 4777 0            DCS    DPOSMAX
 0213   REF   5 LAST 1514      22,3723  1 6024 0            TCF    SLOAD2

R0214        RTB OP CODE NORMUNIT IS LIKE INTERPRETIVE INSTRUCTION UNIT, EXCEPT THAT IT CAN BE DEPENDED ON NOT TO BLOW
R0216   UP WHEN THE VECTOR BEING UNITIZED IS VERY SMALL -- IT WILL BLOW UP WHEN ALL COMPONENTS ARE ZERO.   IF NORMUNIT
R0218   IS USED AND THE UPPER ORDER HALVES OF ALL COMPONENTS ARE ZERO, THE MAGNITUDE RETURNED IN 36D WILL BE TOO LARGE
R0220   BY A FACTOR OF 2(13) AND THE SQUARED MAGNITUDE RETURNED AT 34D WILL BE TOO BIG BY A FACTOR OF 2(26).

 0222   REF 186 LAST 1511      22,3724  3 5017 1  NORMUNX1 CAF    ONE
 02221  REF   1               22,3725  1 3727 1            TCF    NORMUNIT +1
 02222  REF 307 LAST 1514      22,3726  3 5021 1  NORMUNIT CAF    ZERO
 02223  REF  42 LAST 1512      22,3727  6 0120 1            AD     FIXLOC
 02224  REF 769 LAST 1514      22,3730  54 156 1            TS     MPAC  +2
 02225  REF 254 LAST 1512      22,3731  0 4662 1            TC     BANKCALL      GET SIGN AGREEMENT IN ALL COMPONENTS
 0223   REF   3 LAST 1175      22,3732   01010 1            CADR   VECAGREE
 0224   REF 770 LAST 1514      22,3733  10 154 0            CCS    MPAC
 0225   REF   1               22,3734  1 3770 0            TCF    NOSHIFT
 0226                          22,3735  1 3737 0            TCF    +2
 0227   REF   2 LAST 1514      22,3736  1 3770 0            TCF    NOSHIFT
 0228   REF 771 LAST 1514      22,3737  10 157 0            CCS    MPAC  +3
 0229   REF   3 LAST 1514      22,3740  1 3770 0            TCF    NOSHIFT
 0230                          22,3741  1 3743 0            TCF    +2
 0231   REF   4 LAST 1514      22,3742  1 3770 0            TCF    NOSHIFT
 0232   REF 772 LAST 1514      22,3743  10 161 0            CCS    MPAC  +5
 0233   REF   5 LAST 1514      22,3744  1 3770 0            TCF    NOSHIFT
 0234                          22,3745  1 3747 1            TCF    +2
 0235   REF   6 LAST 1514      22,3746  1 3770 0            TCF    NOSHIFT
```

```
0236   REF 773  LAST 1514   22,3747  3 0155 0            CA     MPAC  +1      SHIFT ALL COMPONENTS LEFT 13
0237                        22,3750  0 0006 1            EXTEND
0238   REF  83  LAST 1481   22,3751  7 5002 1            MP     BIT14
0239   REF 774  LAST 1515   22,3752  20 155 1            DAS    MPAC          DAS GAINS A LITTLE ACCURACY
0240   REF 775  LAST 1515   22,3753  3 0160 0            CA     MPAC  +4
0241                        22,3754  0 0006 1            EXTEND
02411  REF  84  LAST 1515   22,3755  7 5002 1            MP     BIT14
02412  REF 776  LAST 1515   22,3756  20 160 1            DAS    MPAC  +3
02413  REF 777  LAST 1515   22,3757  3 0162 1            CA     MPAC  +6
02414                       22,3760  0 0006 1            EXTEND
02415  REF  85  LAST 1515   22,3761  7 5002 1            MP     BIT14
02416  REF 778  LAST 1515   22,3762  20 162 0            DAS    MPAC  +5
02417  REF   5  LAST 1175   22,3763  3 5025 0            CAF    THIRTEEN
02418  REF 779  LAST 1515   22,3764  50 156 0            INDEX  MPAC  +2
02419                       22,3765  54 045 1            TS     370
0242   REF  64  LAST 1500   22,3766  0 4701 0  OFFTUNIT  TC     POSTJUMP
0243   REF   2  LAST 1118   22,3767   01024 0            CADR   UNIT  +1      SKIP THE "TC VECAGREE" DONE AT UNIT


02431  REF 308  LAST 1514   22,3770  3 5021 1  NOSHIFT   CAF    ZERO
02432  REF   1              22,3771  1 3764 0            TCF    OFFTUNIT -2


B0300    RTB  VECSGNAG   ...FORCES SIGN AGREEMENT OF VECTOR IN MPAC.

0301   REF 255  LAST 1514   22,3772  0 4662 1  VECSGNAG  TC     BANKCALL
0302   REF   4  LAST 1514   22,3773   01010 1            CADR   VECAGREE
0303   REF  73  LAST 1513   22,3774  0 6030 1            TC     DANZIG
```

```
P0400   MODULE CHANGE FOR NEW LUNAR GRAVITY MODEL
 0401   REF   1                 13,2000                         SETLOC  MODCHG3
 0402                           13,3770                         BANK
 0403                           13,3770   71214 0  QUALITY1     BOF     DLOAD
 0404   REF  32  LAST 1352      13,3771   00343 0                  MOONFLAG
 0405   REF   4  LAST 1352      13,3772   23220 0                  NBRANCH
 0406   REF   7  LAST 1354      13,3773   00017 1                  URPV
 0407                           13,3774   52116 0          DSQ     GOTO
 0408   REF   1                 13,3775   25754 0                  QUALITY2
 0409   REF   1                 12,2000                         SETLOC  MODCHG2
 0410                           12,3754                         BANK
 0411                           12,3754   63525 0  QUALITY2     PDDL    DSQ             SQUARE INTO 2D, B2
 0412   REF   8  LAST 1516      12,3755   00021 1                  URPV +2         Y COMPONENT, B1
 0413                           12,3756   77625 0          DSU
 0414                           12,3757   74205 0          DMP     VXSC            5(Y**2-X**2)UR
 0415   REF   7  LAST 1343      12,3760   27755 0                  5/8             CONSTANT, 5B3
 0416   REF   9  LAST 1516      12,3761   00017 1                  URPV            VECTOR. RESULT MAXIMUM IS 5, SCALING
A0417                                                                             HERE B6
 0418                           12,3762   65332 0          VSL3    PDDL            STORE SCALED B3 IN 2D, 4D, 6D FOR XYZ
 0419   REF  10  LAST 1516      12,3763   00017 1                  URPV            X COMPONENT, B1
 0420                           12,3764   43342 0          SR1     DAD             2 X X COMPONENT FOR B3 SCALING
 0421                           12,3765   00003 1                  2D              ADD TO VECTOR X COMPONENT OF ANSWER.
A0422                                                                             SAME AS MULTIPLYING BY UNITX. MAX IS 7.
 0423                           12,3766   14003 1          STODL   2D
 0424   REF  11  LAST 1516      12,3767   00021 1                  URPV +2         Y COMPONENT, B1
 0425                           12,3770   44342 1          SR1     BDSU            2 X Y COMPONENT FOR B3 SCALING
 0426                           12,3771   00005 1                  4D              SUBTRACT FROM VECTOR Y COMPONENT OF
A0427                                                                             ANSWER, SAME AS MULTIPLYING BY UNITY.
A0428                                                                             MAX IS 7.
 0429                           12,3772   00005 1          STORE   4D              2D HAS VECTOR, B3.
 0430                           12,3773   74335 1          SLOAD   VXSC            MULTIPLY COEFFIECIENT TIMES VECTOR IN 2D
 0431   REF   2  LAST   87      12,3774   01777 1                  E3J22R2M
 0432                           12,3775   43525 1          PDDL    RVQ             J22 TERM X R***4 IN 2D, SCALED B61
 0433   REF   6  LAST 1344      12,3776   00023 0                  COSPHI/2        SAME AS URPV +4, Z COMPONENT
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*** END OF CHIEFTAN.028 ***

SYMBOL TABLE LISTING, INCLUDING DEFINITION, HEALTH, PAGE OF DEF, # OF REFS, PAGE OF FIRST REF, PAGE OF LAST REF.

SYMBOL	DEF	H	REFERENCES	SYMBOL	DEF	H	REFERENCES	SYMBOL	DEF	H	REFERENCES
.05G	26,3240	880	1 850	-OCT10	6171	1113	3 621 1113	=14MS	17,3313	1053	7 1039 1053
.05GBIT	5015	= 59		-ON	40,2334	320	2 319 359	==========			
.05GSW	0146	= 59	4 850 869	-PHASE1	0752	75	6 185 1412	A	0000	= 39	435 82 1514
.166...	23,3475	1363	1 1359	-PHASE2	0754	75	3 185 201	A-PCHK	13,3176	1320	4 1317 1331
.3D	11,3751	1353	1 1323	-PHASE3	0756	75	3 185 535	ABCLOAD	41,2616	343	1 326
.5SEC	5036	1201	9 131 1446	-PHASE4	0760	75	3 185 696	ABLOAD	41,2703	344	1 326
.6SECTS	24,3062	699		-PHASE5	0762	75	4 185 825	ABORT	7755	= 1496	
==========				-PHASE6	0764	75	4 185 1506	ABORT2	5730	1495	1 1496
+DECSGN	40,2204	318	1 318	-ROLL1	4377	= 998	1 996	ABS	00,3226	1181	2 1180
+DOWN	00,2610	1168	1 1167	-ROLL2	16,3717	998	1 995	ABTCONIC	12,3751	1304	3 1289 1302
+LIMIT	42,3252	339	1 339	-SLOPE	16,3707	998	3 990 992	ABVAL	00,3201	1180	
+MGA	E7,1625	= 122	9 122 638	-T-3	15,3746	1092	1 1087	ABVALABS	00,3176	1180	1 1118
+ON	40,2314	319	3 319 359	-TORQUE	16,3652	995	1 995	ACADN83	24,2455	690	1 691
+ROLL1	5022	= 998	1 995	-TPER	E4,1745	= 90	7 90 523	ACADN85	24,2461	690	2 686 689
+ROLL2	5037	= 998	1 995	-UP	00,2620	1168	1 1167	ACBD2Y	17,3410	1056	1 1056
+TORQUE	16,3631	995	1 995	-VM/360K	15,3753	1092	2 1084 1092	ACBD27	17,3453	1057	1 1056
+2ACTDEG	20,2346	731	2 730	-VMT/180	15,3753	= 1092	1 1084	ACCEPTUP	07,3706	1449	2 1450
==========				-VREL	E7,1525	= 118	3 118 883	ACCEPTWD	41,2027	323	2 323
NBSM	23,3646	1369	1 506	-VT/180	E6,1613	= 112	13 112 1085	ACCOMP	11,2512	1337	1 1345
SMNB	23,3644	1369	5 286 934	-VT/180E	E6,1570	= 113	1 1083	ACCWD	E5,1522	= 99	2 440
==========				-1/KB2	26,3212	880	1 866	ACORBD	E6,1630	= 109	5 109 1057
-AYD	E3,1713	= 86	2 627 1250	-1/12	13,3756	1354	1 1344	ACOS=0	00,3636	1189	4 1189 1191
-BIT10	06,2763	159	1 155	-1/2+2	00,2444	1164	1 1185	ACOSABRT	00,3722	1191	
-BIT14	7705	1203	2 732 946	-1/8	7710	1203	1 1099	ACOSOVF	00,3720	1191	1 1189
-CCSPR	01,3153	1218	1 1219	-1CHK	43,3275	1397	5 1398 1403	ACOSSHR	00,3713	1191	1 1189
-CDUT+1	20,3735	1069	1 1068	-15DEGS	06,2506	148	1 147	ACOSST	00,3624	1189	1 1189
-COMMAX	07,3624	1442	2 1424 1425	-2SEC	10,3774	1494	1 1480	ACOSST2	00,3641	1189	2 1189
-COMMAX-	07,3625	1442	2 1424 1425	-4ACTDEG	20,2345	731	1 730	ACOSZERO	00,3726	1191	1 1189
-COSB	E5,1673	= 95	1 95	-50SC	04,3625	1288	1 1277	ACOS3	00,3651	1190	1 1191
-DELAIG	E6,1676	= 111	5 111 1071	-6.05DEG	26,3012	810	1 809	ACRBDZ	17,3030	1044	2 1044
-DELAMG	E6,1677	= 111	4 111 1071	-70DEGS	06,2505	148	1 147	ACRJETS	17,3147	1048	2 1043 1056
-DELAOG	E6,1675	= 111	3 111 1071	==========				ACROLL	17,2760	1043	
-ELR	05,3176	193	2 189 190	/BUF+	00,2721	1172	2 1171	ACTCENT	E5,1632	= 93	3 93 475
-ENDERAS	7712	1203	1 1110	/BUF-	00,2715	1171	2 1171	ACTIVE	22,3237	498	4 472 669
-ENDVAC	6220	1114	2 1110 1128	/MPAC+	00,2767	1173	2 1173	ACTLIM	20,3137	971	2 964 968
-ERTHRAT	34,2303	540	1 538	/MPAC-	00,2763	1173	2 1173	ACTSAT	20,3471	978	2 972
-FOURDT	17,2002	721	1 720	/NORM	00,2732	1172	1 1172	ACYCHECK	17,3066	1045	
-GYROMIN	07,3403	1434	2 1434 1437	/NORM2	00,2725	1172	1 1172	ACYJETS	17,3163	1049	2 1045 1056
-HSCALED	26,3316	881	1 851	==========				AC2Y	17,3426	1056	2 1056
-KSCALE	26,3320	881	1 851	=.24	21,2624	1015	1 1014	AD8	E6,1655	= 110	7 110 1031
-KVSCALE	37,3766	889	1 883	=+.1SEC	17,3310	1053	5 1050 1057	ADBVEL	E6,1523	= 108	4 1030 1033
-MAXADRS	4364	= 1396	1 1401	=+14MS	21,3050	1019	1 1016	ADDINDRF	33,3266	445	1 444
-MAXDELV	37,3232	830	1 828	=-.1SEC	17,3306	1053	3 1050 1053	ADDRESS	6052	1109	
-MUDT(E)	37,3452	836	1 836	=-2	7715	= 1049	4 1044 1057	ADDRWD	0116	69	79 1107 1370
-MUDT(M)	37,3454	836		=-4	6061	= 1049	2 1044 1045	ADENDEXT	25,3032	863	1 861

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SYMBOL	DEF	H	REFERENCES	SYMBOL	DEF	H	REFERENCES	SYMBOL	DEF	H	REFERENCES
ADERCOMP	33,3353		446	AK1	E6,1477		103 10 545 1074	ALTI	E7,1734	=	120 3 120 546
ADIAX	E3,1463		85 1 299	AK2	E6,1500		103 11 545 1078	ALTIM	E5,1540	=	99 4 436 437
ADIAY	E3,1464		85 1 299	ALARM	5650		1493 41 142 1429	ALTIMS	E5,1541	=	99 2 437 439
ADIAZ	E3,1465		85 1 300	ALARM/TB	06,3653		663 1 652	ALTVAR	1356		83 1 584
ADOT	E6,1533	=	108 9 108 1030	ALARM2	5652		1493 2 1396 1496	ALWAYSG	33,3210		444 2 438 444
ADOTLOOP	21,2311		1006 1 1006	ALARUMS	35,3254		561 2 556 557	ALXXXZ	33,3130		442 1 434
ADOT1	E6,1535	=	108 1 108	ALCGKK	33,2670		439	ALX1S	E5,1454	=	99 4 434 442
ADOT2	E6,1537	=	108 1 108	ALDK	E5,1542	=	99 3 439 440	AM	E6,1764	=	114 4 114 412
ADRPCHN2	5424		1410 1 1410	ALFA/PIP	E6,1673	=	111 2 111 888	AMBGUPDT	22,3447		1037 2 1006 1015
ADRS+1	43,3627		1402	ALFA/180	E6,1665	=	111 9 111 1073	AMG	E6,1663	=	111 6 111 1071
ADRSCHK	43,3576		1401 2 1401	ALFACOM	E6,1603	=	112 4 112 1074	AMG/PIP	E6,1671	=	111 2 111 824
ADRS1	43,3246		1396 1 263	ALFAPAD	E6,1411		102 2 793 818	AMGB1	E6,1640	=	109 5 109 1037
ADSRAX	E3,1466		85 1 299	ALFOK	E4,1422	=	92 1 439	AMGB4	E6,1641	=	109 5 110 1037
ADSRAY	E3,1467		85 1 299	ALFLT	33,2632		438 1 437	AMGB5	E6,1642	=	110 5 110 1037
ADSRAZ	E3,1470		85 1 299	ALFLTI	33,2636		438 1 218	AMGB7	E6,1643	=	110 5 110 1038
ADSUM	43,3565		1401 2 1401	ALFLT3	33,2705		439 1 439	AMGB8	E6,1644	=	110 5 110 1037
ADTIME	35,2470		472 1 472	ALILP	33,2730		439 1 439	AMOONBIT	5016	=	47
ADUPBFM1	27,3654		1505 2 1501 1502	ALINTIME	43,2326		246 1 236	AMOONFLG	0015	=	47 6 519 1330
ADUPBUFF	27,3507		1502 1 1501	ALK	E5,1456	=	99 9 99 445	AMOVED	11,3607		1350 1 1349
ADUPTEMP	27,3506		1502 1 1502	ALKCG	33,2673		439	ANDOUT	13,3205		1320 2 1320
ADVAN	01,3231		1220 2 1215 1397	ALKCG2	33,2676		439 1 439	ANGLTIME	22,3000		412 1 412
ADVANCE	37,2645		675 2 653 658	ALKLP	33,2737		439 1 440	ANGOVCOR	15,2522		1065 5 1073 1089
ADVCSM	36,2226		555 1 555	ALLDC/DC	41,3011		345 2 343 344	ANGX	E5,1510	=	99 2 440 441
ADVORB	14,2215		747 1 569	ALLOOP	33,2574		437 1 436	ANGY	E5,1506	=	99 1 441
ADVTKBIT	5006	=	62	ALLOOP1	33,2602		437 1 217	ANGZ	E5,1502	=	99 1 441
ADVTRACK	26,2000		778 1 776	ALLOOP3	33,2576		437	ANNNNNN	33,3403		446 1 435
ADVTRK	0175	=	62 3 744 776	ALLSET	35,2726		479 1 479	AOG	E6,1661	=	111 40 111 1088
AD14MSP	17,3214		1050 1 1050	ALLSTALL	13,3444		1324 2 1326	AOG/PIP	E6,1667	=	111 3 111 884
AD14MSR	17,3334		1053 1 1053	ALL3DEC	42,3506		354 1 352	AOPTIME	F4,1755	=	91 13 91 779
AD14MSY	17,3260		1052 1 1052	ALM/END	43,2120		238 19 237 266	AOTSTALL	07,3573		1440 1 1441
AEARTH	31,3440		630 1 627	ALMCADR	1363	=	82 14 82 1496	APOPERI	22,2000	=	30 1 496
AERR	E6,1517	=	108 6 108 1033	ALMCYCLE	4161		364 16 324 365	APSESBIT	5013	=	62
AERRVEL	E6,1522	=	108 8 108 1032	ALMXIT	04,3316		652 2 673	APSESW	0202	=	62 2 1301 1302
AFAILP	17,2654		1040 1 1040	ALMXITA	04,3314		652 1 670	APSIDES	12,3703		1303 1 496
AGAIN	30,3651		712 3 641 712	ALOAD	41,2732		344 1 326	ARATE	22,2770		412 3 412
AGAINMM	04,2077		198 1 199	ALOADED	11,2363		1320 2 1319 1320	ARCCOS	00,3611		1189 1 1118
AHEADS	6402		1121 1 1121	ALP	E7,1703	=	119 7 119 865	ARCSIN	00,3607		1189 1 1118
AHENOROT	21,3250		1025 1 1017	ALPHA	0010	=	1305 4 1277 1279	ARCTAN	13,2531		1240 2 1237
AHOOKDV	E7,1657	=	118 4 119 865	ALPHAM	E4,1707	=	89 14 89 1343	ARCTANXX	13,2557		1240 2 1240
AIG	E6,1662	=	111 3 111 1063	ALPHAV	E4,1551	=	89 43 89 1352	ARCTRIG	23,3256		1357 10 287 1360
AIG/PIP	E6,1670	=	111 1 111	ALRM15	5025	=	742 1 740	ARG+	7234		1141 1 1141
AINGOTN	33,2214		426 1 426	ALSIGNAG	7513		1148 4 1171 1174	ARGHI	00,3416		1185 2 1186
AINLA	E5,1444	=	99 49 99 100	ALSK	33,3710		453 1 440	ARGLO	00,3467		1186 1 1186
AK	E6,1476		103 21 113 1022	ALT	1107	=	78 8 78 1239	ARGZERO	7254		1141 1 1141
AKLOAD	34,2477		545 1 545	ALTCALC	22,2123		400 1 400	ARGZERO2	7251		1141 1 1141

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SYMBOL	DEF	H	REFERENCES	SYMBOL	DEF	H	REFERENCES	SYMBOL	DEF	H	REFERENCES
ARG90	5131	1207	1 1207	ATTDISP2	34,2416	544	1 544	BACK	25,3353	870	1 870
AROUT1SE	40,2610	336	1 334	ATTHOLD	21,3322	1027	3 1025 1028	BACK2	25,3376	871	1 871
ARTHINSE	40,2766	350	1 349	ATTINIT	17,2266	939	1 940	BADEND	07,3545	1439	2 588 1438
ARTIN1SE	40,3001	350	1 349	ATTKALMN	E6,1617	= 109	10 109 1040	BADR2	12,3673	1302	2 1301
ARTOUTSE	40,2603	336	1 334	ATTLIM	17,2536	944	2 940	BADVCTOR	24,3741	716	1 716
ARUPT	0010	= 39	11 131 1232	ATTPRIO	1327	= 81	2 418 1442	BADX	12,2320	1280	3 1278
ASCALE	13,3726	1353	1 1339	ATTRATES	15,2665	1073	1 1072	BAILOUT	7755	1495	8 223 1496
ASET	34,3372	593	3 593 596	ATTSEC	E6,1560	= 109	3 109 1006	BANKALRM	0060	= 40	1 1493
ASINEX	00,3706	1190	1 1189	AUGEKUGL	32,2075	644	2 643 903	BANKCALL	4662	1103	255 186 1515
ASKEP	E7,1730	= 119	2 859 860	AUG2	07,3462	1436	1 1435	BANKJUMP	4704	1103	12 325 1481
ASKIENRM	10,2752	1469	1 1469	AUG3	07,3433	1435	1 1436	BANKMASK	4364	= 1204	3 1115 1128
ASMBLWP	17,3357	1055	2 1050 1051	AUTOCK	34,3357	593	1 593	BANKRUPT	0016	= 39	26 133 1450
ASMBLWR	17,3377	1056	2 1053	AUTOCONT	21,3266	1025		BANKSET	0165	72	15 1105 1493
ASMBLWY	17,3523	1058	2 1052	AVECTR	0024	= 1251	7 1246 1248	BARELY1	27,3371	= 879	4 856 865
ASPDWN	E7,1733	= 119	1 860	AVEGBIT	5017	= 49	1 199	BASEOTP	E4,1624	= 89	2 508 509
ASPS	E7,1730	= 119	6 119	AVEGEXIT	1222	= 79	10 79 804	BASEOTV	E4,1640	= 89	2 508 509
ASPS(TM)	E6,1525	= 116	1 860	AVEGFLAG	0035	= 49	2 515 804	BASETEMP	1061	= 205	2 202
ASPUP	E7,1732	= 119	1 859	AVEGOUT	37,3056	826	1 825	BASETHP	E4,1654	= 89	2 508
ASP1	E7,1731	= 119	1 859	AVEMDBIT	5017	= 65		BASETHV	E4,1662	= 89	2 508 509
ASP3	E7,1734	= 119	2 860	AVEMIDSW	0225	= 65	3 289 1328	BASETIME	E4,1742	= 90	3 508 509
ASTNBIT	5004	= 60		AVERAGEG	37,3143	828	1 828	BB	0006	= 1411	5 1410 1418
ASTNFLAG	0154	= 60		AVETOMID	35,3675	1327	1 829	BBANK	0006	= 39	37 131 1493
ASTNV99P	24,3415	706		AVFLAG	0050	= 51	10 493 712	BCDU	E6,1661	= 114	16 111 1442
ASTROMSK	10,3741	1483	1 1479	AVFLAGA	4627	648	7 463 658	BDDV	7552	1149	2 1116 1149
ASTROTIM	41,3744	502	1 504	AVFLAGP	4642	648	7 463 658	BDFAIL	20,2456	733	2 733
ATAN=90	13,2564	1240	1 1240	AVFLBIT	5013	= 51		BDF2Z	17,3504	1057	2 1057
ATDOTCAD	15,2663	1072	1 1072	AVGEND	37,3165	829	1 826	BDOT	26,3646	1251	1 1246
ATERJOB	34,2345	542	2 540 545	AVGEXIT	1222	= 79	3 538 829	BDRACZ	17,3112	1045	2 1045
ATERSET	34,2473	545		AVOUTCAD	37,3062	826	1 826	BDRJETS	17,3150	1048	2 1045 1057
ATERTASK	34,2320	540	2 216 536	AX*SR*T	23,3650	1369	1 1368	BDROLL	17,3046	1045	2 1043
ATIGINC	E4,1421	88	2 468 530	AXC	01,2376	1192	1 1117	BDSU	7031	1134	1 1116
ATOPCSM	13,2705	1314	4 34 1350	AXISCODE	E7,1477	= 122	1 123	BDT	E7,1704	= 124	7 124 724
ATOPLEM	13,2760	1316	4 34 1350	AXISGEN	23,3401	1361	3 451 769	BDZCHECK	17,3004	1043	
ATOPOTH	13,2760	= 34	1 513	AXISGEN1	23,3407	1361	1 1361	BDZJETS	17,3162	1049	2 1044 1057
ATOPTHIS	13,2705	= 34		AXISGEN2	23,3436	1361	1 1362	BECONSTD	25,3226	867	1 857
ATRESET	34,2513	546	2 542	AXISGEN3	23,3461	1362	1 1362	BEE17	04,3602	1288	
ATTACHED	43,3034	264	1 236	AXO	E3,1715	= 86	2 627 1250	BEE19	04,3614	= 1288	1 1296
ATTACHIT	43,3041	264	1 264	AXT	01,2371	1192	1 1117	BEE22	04,3620	= 1288	1 1279
ATTCADR	1325	81	6 81 1442	AZIMUTH	E5,1400	98	6 424 543	BELOW1	10,2474	1412	1 1413
ATTCHBIT	5016	= 61		AZMTHCG1	33,3742	454	2 215 248	BELOW2	10,2511	1412	2 1412
ATTCHFLG	0166	= 61		AZO	E3,1711	86	1 1249	BELOW3	10,2525	1412	1 1412
ATTCK1	43,2455	250	1 249	A0	0327	= 72	8 855 868	BELOW4	10,2530	1412	2 1412
ATTDISP	34,2363	542	2 542 546	AOCALC	25,2406	855	1 855	BESTI	0302	= 72	15 72 783
ATTDISPR	37,2176	543		A1	E7,1663	= 119	4 119 865	BESTJ	0303	= 72	3 72 754
ATTDISP1	37,2155	543	1 542	==========				BESTTRIM	24,3053	699	

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SYMBOL	DEF	H	REFERENCES	SYMBOL	DEF	H	REFERENCES	SYMBOL	DEF	H	REFERENCES
BETA/PIP	E6,1674	= 111	3 111 888	BIT13	5003	1200	57 46 1477	BOTHSGN	40,2300	319	1 319
BETA/180	E6,1666	= 111	7 111 1074	BIT13-14	4371	= 1204		BOTHSHIP	23,2426	516	1 517
BETACOM	E6,1604	= 112	2 112 1074	BIT14	5002	1200	85 46 1515	BOV(B)	01,2504	1195	1 1117
BETADOT	E6,1704	= 111	5 111 1079	BIT14+7	27,2124	392		BPL	01,2530	1196	1 1196
BETAM	E4,1607	= 89	6 89 1352	BIT14COM	10,2523	1412	1 1412	BPL/BMN	01,2521	1196	1 1117
BETAV	E4,1557	= 89	11 89 1339	BIT15	5001	1200	58 46 1494	BRANCH	6672	1130	8 1141 1196
BETA1	E7,1753	= 127	4 127 918	BIT15+6	7703	1203	2 158 1471	BRATE	E6,1710	= 114	5 412 416
BETA12	E7,1764	= 127	8 120 910	BIT15/14	41,3237	355	2 355 357	BRNCHCON	40,2501	322	1 322
BFAILY	17,2710	1041	1 1041	BIT2	5016	1200	50 47 1505	BRNCHCTR	12,2305	1280	1 1281
BHIZ	01,2477	1195		BIT3	5015	1200	40 47 1507	BRUPT	0017	= 39	1 1495
BIAS	E6,1564	= 109	5 109 1028	BIT4	5014	1200	53 47 1477	BSUBO	26,3654	1251	1 1246
BIASAK	E6,1726	= 115	5 115 546	BIT5	5013	1200	44 47 1491	BTRIMR	24,3057	699	2 699
BIASCALE	22,3024	413	1 412	BIT6	5012	1200	55 47 1502	BUF	0130	70	131 70 1511
BIASCOM	40,2532	335	2 335	BIT7	5011	1200	47 47 1492	BUF+	00,2422	1163	3 1162 1165
BIASEDZ	15,3006	1076	3 1079 1079	BIT7-8	04,2407	205	1 200	BUF-	00,2416	1162	3 1162 1165
BIASHI	00,2566	1166	1 1185	BIT8	5010	1200	31 47 1500	BUFBANK	34,3342	585	1 585
BIASLO	00,2270	1159	1 1186	BIT9	5007	1200	39 46 1505	BUFLIM	15,3754	= 1092	4 1083
BIASTEMP	E6,1674	= 114	4 412 416	BLANKCHK	10,3354	1477		BUFNEG	00,2531	1165	1 1162
BIAS1	E6,1565	= 109	5 109 1028	BLANKCON	40,2515	322	2 322 335	BUFNORM	00,2500	1165	1 1165
BIAS2	E6,1566	= 109	5 109 1028	BLANKDSP	41,3516	371	2 371	BUFPOS	00,2516	1165	2 1162 1165
BIGTIME	12,3450	1299	1 1298	BLANKET	5526	1465	14 526 1484	BUFZERO	00,2363	1162	1 1165
BINCON	4377	379	3 359 1204	BLANKRET	0114	= 69		BUF2	0133	70	25 71 1494
BINROUND	40,2776	350	3 349 350	BLANKSUB	4271	374	2 357 1477	BUNKER	E6,1657	= 106	9 106 983
BIS	36,2173	554	1 556	BLAST	E6,1457	= 103	21 103 1062	BUSYMASK	10,3751	1483	
BITSOFF	41,2674	344	1 344	BLAST1	E6,1461	= 103	22 103 1062	BUTTONS	05,2547	186	1 186
BITSOFF1	41,2701	344	1 344	BLAST2	E6,1463	= 103	16 103 1062	BVECTOR	E7,1501	= 121	22 121 1253
BITS15+7	10,3744	1483	1 1470	BLNKBANK	4316	374	1 374	BVECTORS	23,3043	576	2 581 605
BITS2-10	5053	1201		BLNKSUB1	40,3412	375	2 374	BVECTR	0032	= 1251	5 1247
BITS3&4	5771	= 1442	2 1421 1422	BLOAD	41,2743	345	1 326	BVSU	7005	1133	1 1116
BITS4+10	10,3747	1483	1 1482	BMAGX	0042	= 39		BYPASS	27,2536	588	1 588
BITS4&5	5027	1201	4 143 1442	BMAGY	0043	= 39		BYPASS1	27,2542	588	2 588
BITS4&6	5033	= 1442	5 183 1421	BMAGZ	0044	= 39		BZE/GOTO	01,2514	1196	1 1117
BITS4-5	5027	= 1442	1 1427	BNKCHK	43,3720	1403		BZERO	E6,1702	= 107	11 188 998
BITS4-6	31,3474	631	1 621	BNKOPTN	43,3317	1397		B12-1	4372	= 379	
BITS4,5	21,2207	1004		BODYATT	37,2000	= 33	1 883	B12T14	7671	= 1204	1 1119
BITS5+11	10,3746	1483	3 1475 1482	BODYRATE	15,2536	1070	1 1064	B2/A2	13,2523	1239	1 1241
BITS5-6	5035	= 535		BODY1	E6,1706	= 115	1 115	B2XSC	13,2521	1239	1 1239
BITS6,8	40,3575	389		BODY2	E6,1705	= 115	1 115	B3TOB4	01,2623	1199	2 1198 1199
BITS7+4	10,3745	1483	2 1469	BODY3	E6,1704	= 115	8 115 550	B5OFF	5625	1491	8 505 935
BITS7&8	06,2757	159	2 142 154	BOKKEP2	05,3457	954	1 954	B5TOB8	01,2512	1195	
BITS7-9	31,3473	631	1 620	BOOP	33,3016	440	1 441	==========			
BIT1	5017	1200	83 47 1505	BOOSTEMP	E6,1716	= 115	5 115 547	C(30)LIM	26,2644	805	2 804 805
BIT10	5006	1200	49 46 1450	BORTENT	5655	1493	2 1495	C*MM*N1	23,3626	1368	2 1368 1369
BIT11	5005	1200	37 46 1447	BOTHJOBS	10,3107	1472	1 1472	C*MM*N2	23,3630	1368	1 1369
BIT12	5004	1200	37 46 1477	BOTHPAD	23,2473	517	1 517	C*MM*N3	23,3641	1369	2 1369

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C/DO	E7,1705	= 119	3 119 867	CAL53A	14,2770	761	1 740	CDUT	0035	= 39	8 39 744
CA+ECE	07,3023	1425	2 148 187	CAL53RET	15,2116	740	1 762	CDUTCMD	0053	= 40	3 40 168
CADDY	E6,1655	= 106	7 106 983	CAM	E6,1716	= 114	5 114 401	CDUTIMEF	E5,1446	= 98	
CADRFLSH	0372	74	7 172 1481	CANCOARS	06,3140	163	2 162	CDUTIMEI	E5,1444	= 98	
CADRMARK	0373	74		CANDEL	23,2645	520	1 517	CDUTODCM	22,2405	405	3 394 399
CADRMASK	10,3752	1483	1 1473	CANTDO	32,2067	644	2 643	CDUTRIG	23,3477	1365	9 506 934
CADRSTOR	1042	76	13 192 1479	CANTROO	04,2071	198	1 197	CDUTRIGS	23,3507	1365	3 1365 1368
CADRTAB	01,2001	= 212	1 1417	CANV37	04,2124	199	2 199 830	CDUX	0032	= 39	31 172 1424
CAGESUB	06,2717	158	1 142	CANZOPT	06,3070	161	2 161	CDUXCMD	0050	= 39	4 152 1424
CAGESUB1	06,2725	158	1 152	CAPSI	E6,1645	= 110	4 110 1037	CDUXD	E6,1646	= 110	10 110 1008
CAGESUB2	06,2730	158	1 144	CARD	E6,1661	= 106	6 106 983	CDUY	0033	= 39	17 225 1420
CAGETEST	07,3524	1438	7 1422 1435	CATLOG	14,3760	1393	10 631 783	CDUYCMD	0051	= 39	2 152 1011
CAGETSTJ	07,3536	1438	5 1421 1430	CCALL	6575	1128	1 1116	CDUYD	E6,1650	= 110	5 110 595
CAGETSTQ	07,3531	1438	3 1428 1429	CCSHOLE	5747	1496	18 318 1219	CDUZ	0034	= 39	23 147 1420
CALCDIR	E5,1470	= 98		CCSI	7632	1151	1 1204	CDUZCMD	0052	= 40	2 152 1011
CALCDT6	17,3560	1059	2 1060	CD*TR*G	23,3503	1365		CDUZD	E6,1652	= 110	5 110 595
CALCGA	23,3311	1359	3 424 818	CD*TR*GS	23,3515	1366	3 1365 1369	CEARTH	0016	= 750	3 749 755
CALCGA1	23,3351	1359	1 1360	CDELF/2	0016	= 1373	3 643 815	CENTANG	E7,1753	= 126	9 129 666
CALCGRAV	37,3353	835	3 713 836	CDHMVR	05,3230	680	2 658 668	CFAILP	17,2656	1040	1 1040
CALCGTA	23,3205	1355	4 451 759	CDHTAG	05,2000	= 28	2 676 680	CFPA	E7,1756	= 127	4 127 922
CALCLEM	34,3604	596		CDHTAGS	13,2000	= 29	1 679	CG.CORR	16,3054	948	
CALCMAN2	0053	= 51	2 412 414	CDHTAG1	25,2000	= 31		CGOTO	6652	1129	1 1116
CALCN83	24,2511	691	1 690	CDHTAG2	31,2000	= 32	1 677	CHAN	E5,1453	= 98	
CALCN85	24,2401	689	1 690	CDHTAG3	37,2000	= 33	2 662 675	CHANDSP	41,2504	333	1 332
CALCPHI	22,2702	410	1 410	CDRVE	06,2012	134		CHANG1	5164	1208	4 428 1402
CALCRVG	37,3420	836	1 829	CDSEC	35,3127	551	1 556	CHANG2	5170	1208	1 1108
CALCSMSC	16,2612	763	2 752 774	CDU*NBSM	23,3634	1368		CHANJOB	01,2727	1213	4 1208 1219
CALCSXA	23,2034	286	1 777	CDU*SMNB	23,3621	1368		CHANLOAD	41,3161	348	1 348
CALCTFF	27,3067	1382	4 523 810	CDUANG	E5,1553	= 99		CHANTEMP	E6,1633	= 109	4 109 1025
CALCTPER	27,3064	1382	1 523	CDUCHKWD	1341	82	2 233 234	CHAN12	0012	= 41	49 143 1435
CALCUT	30,3704	713	1 712	CDUFLAG	E5,1471	= 98		CHAN13	0013	= 41	15 183 1447
CALC2BIT	5016	= 51		CDUINC	22,3626	1511	3 1511	CHAN14	0014	= 41	18 152 1437
CALFA	E6,1506	= 112	8 112 1090	CDUIND	E3,1474	= 85	23 142 1435	CHAN30	0030	= 41	6 139 542
CALL	6607	1128	1 1196	CDULIMIT	E5,1453	= 98		CHAN31	0031	= 41	12 391 1039
CALL/ITA	01,2534	1196	1 1117	CDULOGIC	22,3513	1508	10 285 1366	CHAN32	0032	= 41	2 136 1025
CALLCODE	5030	1201	1 1120	CDULOOP	34,3402	593	1 593	CHAN33	0033	= 41	5 145 588
CALLCON	26,2657	808	1 810	CDUNDX	E5,1546	= 99		CHAN5	0005	= 1003	8 183 1131
CALLRECT	11,3274	1344	4 1344	CDUREADF	E5,1451	= 98		CHAN6	0006	= 1003	8 183 1062
CALLRPRT	13,2473	1238	1 1238	CDUREADI	E5,1452	= 98		CHAR	0117	= 69	5 315 317
CALLRTRP	13,2403	1236	1 1236	CDUS	0036	= 39	8 39 510	CHARALRM	40,3341	364	17 315 364
CALLR52	30,2062	566	1 566	CDUSCMD	0054	= 40	2 40	CHARIN	40,2000	315	1 1449
CALL40.8	24,3133	700	2 699 701	CDUSPOT	0766	75	14 75 1368	CHARIN2	40,2013	315	2 315
CALOOP	14,3001	761	1 762	CDUSPOTX	0772	= 75	1 705	CHAZFOGC	43,2406	248	1 237
CALOOP1	14,3042	762	2 761	CDUSPOTY	0766	= 75	1 705	CHECKB	5474	1413	1 1410
CALSAM1	15,2415	783	1 783	CDUSPOTZ	0770	= 75	1 705	CHECKCTR	12,2656	1286	2 1280 1298

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CHECKG	33,2321	428	2 425 426	CLEANOUT	43,2710	260	1 266	CMCSTADL	05,2107	= 173	2 170 180
CHECKG1	33,2324	428	1 428	CLEAR	40,2370	321	1 316	CMCSTA01	05,2043	= 173	1 173
CHECKMAX	22,2111	400	1 400	CLEARMRK	5536	1465	7 194 1465	CMCSTA02	05,2052	= 173	2 173
CHECKMM	5364	1404	12 223 773	CLEARW55	30,2400	599	1 600	CMCSTA03	05,2057	= 173	2 173
CHECKNJ	43,3334	1397	3 1397 1402	CLEARW54	30,3437	611	1 612	CMCSTA04	05,2061	= 173	1 173
CHECKTAB	04,2076	198	1 198	CLEAR1	40,2423	321	1 321	CMCSTA05	05,2063	= 173	1 173
CHECKT23	17,3554	1059	1 1060	CLOAD	41,2760	345	1 326	CMCSTA06	05,2072	= 173	1 173
CHEKAVEG	37,3033	825	2 218 824	CLOCKCON	10,3765	1484	1 1469	CMCSTA07	05,2075	= 173	1 173
CHEKAXIS	27,2225	395	1 395	CLOCKJOB	24,3332	705	1 703	CMDAPARM	0135	= 57	
CHKCOMED	33,3406	446	3 436 445	CLOCKON	24,3267	703	1 703	CMDAPMOD	E6,1700	= 111	11 111 1089
CHKCORS	07,2756	1424	1 1425	CLOCPLAY	10,2715	1469	2 705	CMDSETUP	10,2122	168	5 167 168
CHKCTR	37,3077	827		CLOG2/32	23,2213	292	1 291	CMDSOUT	16,3205	959	1 960
CHKFAIL1	5670	1493		CLOKTASK	24,3260	703	5 218 703	CMDTMP	E6,1704	= 106	20 106 973
CHKFAIL2	5674	1493	1 1493	CLPASHI	40,2406	321	1 321	CMENTRDL	05,2207	= 177	2 170 180
CHKLINUS	27,2056	391	2 390 391	CLPASS	1015	76	13 192 372	CMENTR01	05,2043	= 177	1 177
CHKLIST	05,3545	1097		CLRMOON	13,2735	1315	2 1316 1346	CMENTR02	05,2052	= 178	2 177
CHKNOVAC	01,3631	1416	1 1419	CLROVFLW	13,2533	1240	1 1240	CMENTR03	05,2057	= 178	1 177
CHKPOOH	43,2730	261	7 247 385	CLRW67B	30,3131	606	1 606	CMENTR04	05,2061	= 178	1 177
CHKPRIO	10,2654	1467	1 1466	CLR5	40,2426	321	1 321	CMENTR05	05,2257	178	1 177
CHKSAB	14,2717	760		CLSEC	35,3131	551	1 557	CMENTR07	05,2075	= 178	
CHKSB	14,2721	760	1 760	CLUPDATE	35,3060	482	1 481	CMNTOVFL	12,2332	1281	1 1281
CHKSCODE	14,3366	773	2 756 773	CLUPLOCK	07,3760	1450	1 1450	CMOON	0022	= 750	2 749 750
CHKSD	14,2740	760	1 760	CM/ATUP	37,3655	887		CMOONBIT	5004	= 61	
CHKSDA	14,2764	761	1 761	CM/BIAS	15,3174	1079	2 1076	CMOONFLG	0173	= 61	26 34 1328
CHKSDATA	14,2714	760	2 759 769	CM/DAPIC	20,3672	1068	1 792	CMPG22DL	05,2266	= 179	1 180
CHKSTRK	16,3232	959	3 959 960	CM/DAPON	20,3612	1066	1 793	CMPG2201	05,2043	= 179	1 179
CHKSUPR	43,3650	1402	1 1402	CM/DAP2C	20,3675	1068		CMPG2202	05,2052	= 179	2 179
CHKSWTCH	11,3320	1345	2 1320 1344	CM/DSBIT	5016	= 59		CMPG2203	05,2057	= 179	2 179
CHKTEMX	37,3337	834	1 834	CM/DSTBY	0147	= 59	1 829	CMPG2204	05,2061	= 180	1 179
CHOOK	26,3250	880	1 857	CM/DUMPR	15,3711	1090		CMPG2205	05,2332	180	1 179
CHRPRIO	4371	379	7 136 1503	CM/END	15,3736	1091	1 1090	CMPG2206	05,2072	= 180	1 179
CHI	26,3254	881	3 857 865	CM/FDAI	15,3677	1090	1 1075	CMPG2207	05,2075	= 180	1 179
CH31TEMP	E6,1632	= 109	5 109 1017	CM/FDAIR	15,3705	1090	2 1075 1089	CMPOS	34,3241	584	2 580 584
CIRCL	23,3145	668	3 666	CM/FLAGS	0102	= 844	23 800 1089	CMPOWEDL	05,2001	= 171	1 180
CIRCULAR	12,3667	1302	1 1301	CM/GYMDT	E6,1725	= 112	6 112 1068	CMPOWE01	05,2043	171	5 171 179
CKLFTBTS	43,2465	250	2 249	CM/GYMIC	15,2512	1064	2 1063 1064	CMPOWE02	05,2052	171	6 171 179
CKMDMORE	43,3753	1500	1 1499	CM/POSE	37,3470	883	1 796	CMPOWE03	05,2057	172	6 171 179
CKMID2	13,3633	1330	1 1349	CM/POSE2	37,3517	883	1 883	CMPOWE04	05,2061	172	5 171 180
CKMODCAD	43,2271	243	4 239 243	CM/POSE3	37,3753	888		CMPOWE05	05,2063	172	3 171 176
CKNVWRD1	24,3342	705	1 704	CM/RCS	15,3216	1081	1 1075	CMPOWE06	05,2072	172	4 171 180
CKOPTVB	43,2375	247	1 236	CM/SAVE	E6,1623	= 113	3 113 1091	CMPOWE07	05,2075	172	5 171 180
CK1K2	32,2213	646	1 645	CM/SWIC1	20,3734	1069	1 1068	CMPX1	E5,1455	= 99	2 439
CK4V32	27,3500	1502	3 1501 1502	CM/SWIC2	4377	= 1069	1 1068	CMRENDDL	05,2143	= 175	1 180
CLEANDSP	10,2703	1468	8 452 795	CM/TRIO	37,3527	884		CMREND01	05,2043	= 175	1 175
CLEANEND	10,3455	1478	1 1476	CMARMBIT	5004	= 58		CMREND02	05,2052	= 175	2 175

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CMRENDO3	05,2057	= 175	2 175	COMFLAG	5553	1486	1 1486	CONTIWO	20,2526	735	2 735
CMRENDO4	05,2061	= 175	1 175	COMGEOM1	23,2000	= 31	1 285	CONT1	25,3065	864	1 864
CMRENDO5	05,2063	= 176	1 175	COMGEOM2	10,2000	= 28	1 289	CONT3	25,3075	864	1 864
CMRENDO6	05,2072	= 176	1 175	COMMAND	E3,1471	= 85	6 1420 1425	CONUMNOR	41,3071	347	1 346
CMRENDO7	05,2075	= 176	1 175	COMMANDO	1305	80	6 167 169	CONVRNGE	27,2502	587	2 587
CMTMFILE	15,3720	1090	1 1090	COMMFX	43,3527	1400	2 1402	CON1	5443	1410	1 1410
CMTMTIME	0304	= 72	3 72 1091	COMMNOUT	12,2761	1289	1 1302	CON2	10,2537	1412	1 1410
CMTR1	37,3657	887		COMMONLM	12,3440	1298	1 1299	CON2ADR	5460	1410	1 1410
CMTR2	37,3730	888		COMNEG	07,3002	1425	1 1424	COPIES	10,3157	1473	1 1466
CNGL	22,2375	405		COMP	7637	1151	4 1118 1181	COPIES2	10,3160	1473	1 1471
CNTCHK	27,2361	586		COMPAT	15,3300	1082	2 1081 1082	COPINDEX	0164	= 1483	23 1467 1481
CNTNUP30	35,3374	637	3 636 637	COMPDISP	31,2035	505	3 508 510	COPMPAC	0157	= 1483	3 1479 1482
CNTR	E6,1447	103	26 685 949	COMPGS	33,3244	444	1 444	COPYNORM	10,3156	1473	1 1470
CNTRCHK	43,3470	1399		COMPICK	41,2513	333	1 333	COPYPACS	10,2644	1467	1 1476
CNTRCON	5033	= 1396	1 1399	COMPMAT	13,2114	511		COPYTOGO	10,2642	1467	1 1476
CNTRCOPY	16,3132	949	2 947 960	COMPMATX	27,2160	394	1 396	COPY40.9	16,2370	724	
CNTRLOOP	43,3471	1399	1 1400	COMPMFSN	27,2237	395	1 395	CORANGOV	37,3760	888	4 887 888
CNTRTMP	E6,1676	= 106	7 106 949	COMPNUMB	0300	72	11 72 1505	CORCOPY	16,3120	949	1 960
COAALIGN	33,2302	428	3 423 428	COMPOS	07,2735	1424	1 1424	COREINC	01,3054	1216	2 1212 1216
COARFINE	14,3015	761		COMPTBIT	5010	= 56		CORFOUND	01,2661	1212	
COARS	07,2673	1423	1 1423	COMPTEST	41,2424	331	6 331 345	CORPLAN	15,2424	783	2 783
COARSERR	07,2773	1425	2 1424	COMPTGO	35,3304	635	2 481 635	CORSCHK2	07,2770	1425	2 1424 1425
COARSLOK	06,3055	161	1 162	COMPTST1	41,2426	331	1 332	CORSETUP	16,3043	948	2 947 960
COARSTOL	07,3001	1425	1 1425	COMPUTER	0122	= 56	2 493	COSCDU	0744	= 74	5 74 1367
COARSTYP	15,2161	741	1 740	COMPVER	33,2000	422	2 215 247	COSCDUX	0750	= 74	6 544 967
COARS1	07,2700	1423	1 1423	COMP12	22,2203	402	1 401	COSCDUY	0744	= 74	5 763 1372
COARS2	07,2723	1424	2 1424 1425	COMTERM	11,3040	1341	1 1344	COSCDUZ	0746	= 74	7 544 1372
COB	0040	= 1251	4 1246 1247	COMZERO	07,3012	1425	2 1424 1425	COSF	0030	= 1307	4 1301 1302
CODE	0124	= 69	15 316 371	COM52	13,2326	777	3 776 779	COSG/2	E7,1667	= 119	5 119 859
COEFFADR	E6,1722	= 106	11 106 942	CONC+S1	43,3243	1396	1 1400	COSI	26,3636	1251	2 1247
COEFFOLY	34,2621	547	1 542	CONC+S2	43,3244	1396	1 1400	COSINE	00,3516	1187	2 1118 1366
COF	E6,1742	= 114	46 114 412	CONCAUL	36,2214	554	1 554	COSM	E6,1511	= 112	4 112 1070
COFMAXGO	22,2170	401		CONICS	12,2000	= 29	3 1276 1292	COSO	E6,1513	= 112	3 112 1071
COFSKEW	E6,1710	= 114	8 113 403	CONICS1	04,2000	= 27	3 1288 1305	COSOCOSM	E6,1515	= 112	2 1070
COGA	E7,1774	= 126	18 126 1301	CONICX1	E7,1734	= 127	5 127 916	COSPHI/2	0022	= 1354	6 1341 1516
COGAFBIT	5014	= 62		CONSTD	25,3232	867	1 854	COSPHIE	11,3227	1344	1 1341
COGAFLAG	0203	= 62	3 1289	CONSTD1	25,3251	867	1 868	COSTALIN	0000	= 209	6 209
COGAMAX	0016	= 1306	4 1296 1299	CONTBL2	01,3657	1417	2 1419	COSTH	0020	= 73	16 287 1359
COGAMIN	0010	= 1306	3 1297 1299	CONTCHK	27,2363	586	1 586	COSTRIM	15,3200	1079	1 1072
COGAOVFL	12,2776	1289	2 1289 1301	CONTORVE	10,2020	166	1 166	COS15	26,3322	881	1 844
COGLOLIM	04,3635	1288	1 1300	CONTINU	43,3620	1402	5 1401 1402	COS33	14,2512	755	1 753
COGUPLIM	04,3633	1288	2 1297	CONTINU2	25,3134	865	1 865	COUNT	0143	= 70	12 316 363
COLINEAR	04,3732	1291	1 1291	CONTIN33	33,3541	450	1 449	COUNTPL	E5,1552	= 99	
COLREG	1102	= 78	7 78 1350	CONTMANU	20,2131	416	1 415	COVCNV	42,3722	934	1 934
COMADRS	43,3535	1400	2 1402	CONTONE	20,2525	735	2 735	COZY4	E7,1627	= 122	5 123 490

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CPHI	1155	=	78 9 252 1022	CSMCONIC	13,3114		1318 8 552 934	C5/2	5047		1201 1 1207
CPHIBIT	5001	=	46	CSMMASS	E6,1474		103 17 198 954	==========			
CPHIFLAG	0000	=	46 2 818 1360	CSMN10	17,2500		943 1 943	D	E7,1637	=	118 23 118 872
CPHIX	1333		81 10 244 1023	CSMPOS	1206		80 11 80 609	DACLIMIT	21,2542		1013 3 1012
CPSI	1157	=	78 1 419	CSMPREC	13,3071		1318 8 35 905	DACLOOP	21,2477		1012 1 1012
CREWMANU	43,2543		252 1 236	CSMSTORE	22,3243		498 2 498 552	DACNDLS	21,2411		1009 1 1007
CRITCON	40,2216		318 1 317	CSMUPP	34,3152		583 1 580	DAD	6744		1131 1 1116
CRSTOR	34,3641		597 1 597	CSMVEC	43,2716		260 1 237	DANZIG	6030		1108 73 285 1515
CRSTOR1	34,3644		597 1 597	CSS	0016	=	755 1 754	DAPBIT1	0132	=	57 2 734 1066
CRS61.1	34,3343		592 1 574	CSSUN	15,2267		751 1 750	DAPBIT2	0133	=	57 2 734 1066
CRS61.2	34,3435		594	CSS33	14,2520		755 2 754	DAPCK	34,3366		593 1 593
CRS61.2A	34,3516		595	CSS5	15,2265		750 2 749 750	DAPDATR1	E6,1466		103 74 172 1066
CSCDES	06,3125		162 1 160	CSS66	14,2514		755 1 753	DAPDATR2	E6,1467		103 6 280 733
CSCTOMAN	06,3133		162 1 162	CSS6640	14,2516		755 1 753	DAPDISP	43,2552		253 1 236
CSCTOZOP	06,3130		162	CSTEER	E7,1702	=	124 6 124 721	DAPDISP1	42,2000		253 1 253
CSI/A	06,3704		664 1 653	CSTH	E5,1733	=	96 13 96 1302	DAPFIG	42,3606		734 1 251
CSI/B	06,3716		664 1 674	CSTH-RHO	E5,1737	=	96 4 96 1297	DAPINIT	20,3107		971 2 944 978
CSI/B1	06,3756		665 3 670 673	CSUBT	35,3557		932 1 897	DAPINIT5	17,2546		944 1 940
CSI/B2	12,2013		665 2 665 672	CSUN	0020	=	750 1 750	DAPMASS	05,2000	=	28 1 953
CSI/B22	12,2033		665 1 665	CS359+	22,3427		667	DAPROLL	16,2000	=	30 3 946 989
CSI/B23	22,3267		665 2 665	CTHETA	1156	=	78 2 419 1022	DAPS1	20,2000	=	30 1 1066
CSI/B23D	22,3302		666 1 666	CTLIST	0334	=	1099 6 1097	DAPS2	20,2000	=	30 2 962 981
CSI/B3	22,3373		667 1 667	CULTBIT	5011	=	52	DAPS3	21,2000	=	30 3 735 1025
CSI/CDH	35,2000	=	33 6 463 683	CULTED	14,2505		754 4 754	DAPS4	17,2000	=	30 1 1039
CSI/CDH1	04,2000	=	27 3 652 659	CULTFLAG	0065	=	52 8 288 777	DAPS5	17,2000	=	30 1 1061
CSI/CDH2	12,2000	=	29 1 659	CULTRIX	E5,1735	=	95 1 754	DAPS6	20,2000	=	30 3 721 734
CSI/CDH3	14,2000	=	29 1 653	CURTAINS	5757		1496 7 741 772	DAPS7	17,2000	=	30 3 721 937
CSI/SOL	10,2370		673 1 672	CVECTR	0010	=	1251 1 1247	DAPS8	22,2000	=	30 1 1037
CSIALRM	E7,1664	=	129 4 652 673	CXOFF	E5,1745	=	97 5 97 607	DAPS9	6000	=	27
CSINEXT	23,3134		667 1 667	CYCLSHFT	43,3477		1400	DAPT5	20,3474		978
CSINEXT1	11,2256		668 1 668	CYL	0022	=	39 24 317 1400	DAP1	E6,1615	=	105 15 105 975
CSINEXT2	07,2517		669 1 669	CYR	0020	=	39 46 202 1416	DAP1BIT	5001	=	57
CSINEXT3	10,2302		672 1 671	CZERO	E6,1702	=	107	DAP2	E6,1617	=	105 16 105 976
CSINEXT4	31,3610		673 1 673	C001	26,3266		881 1 854	DAP2BIT	5002	=	57
CSIPROG	06,2000	=	28 2 663 664	C1/16	27,3365	=	879 1 859	DAP3	E6,1621	=	105 12 105 976
CSIPROG2	12,2000	=	29 1 665	C1/2	7666		1202 1 1207	DATAPL	E5,1502	=	99 10 425 429
CSIPROG3	22,2000	=	30 1 665	C12	26,3206		880 1 859	DATATEST	E7,1603	=	121 1 132
CSIPROG4	23,2000	=	31 1 667	C16	26,3164		879 1 864	DB	16,3706		998 4 989 992
CSIPROG5	11,2000	=	29 1 668	C20	26,3216		880 1 866	DCDU	E6,1603	=	109 8 109 1372
CSIPROG6	07,2000	=	28 1 669	C21	26,3220		880 1 864	DCDUINCR	21,2365		1007
CSIPROG7	24,2000	=	31 1 670	C3/2	7706		1203 1 1207	DCMTOCDU	22,2655		410 2 395 414
CSIPROG8	10,2000	=	28 1 671	C33JMP	06,2745		159 1 146	DCOGA	0014	=	1306 4 1298 1299
CSIPROG9	31,2000	=	32 1 673	C33TEST	06,2367		145 6 142 144	DCOMP	7654		1151 2 1151
CSISTEP	10,2363		672 1 672	C4RTE	35,3617		932 1 892	DCOMPTST	41,2437		332 2 331
CSMCFADR	17,2531		943 1 938	C45LIM	15,3176		1079 2 1077	DCONSTD	25,3221		867 2 860 861

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SYMBOL	DEF	H	REFERENCES	SYMBOL	DEF	H	REFERENCES	SYMBOL	DEF	H	REFERENCES
DCTSTCYC	41,2452		332 2 347 348	DELAYJOB	00,3732		1488 14 198 1066	DELTEED	E7,1447	=	122 5 122 472
DDV	7546		1149 1 1116	DELAYLOC	1141		78 7 191 1488	DELTEMPX	E6,1515	=	108 5 108 1006
DDV/BDDV	00,2353		1162 1 1149	DELAYNUM	6214	=	35 1 1488	DELTEMPY	E6,1517	=	108 3 108 1005
DDVCALL	00,3004		1173 1 1173	DELAY200	21,2540		1012 1 1012	DELTEMPZ	E6,1521	=	108 2 1005 1006
DE-GR-50	30,2273		569 1 568	DELBARP	20,2656		965	DELTIME	12,2433		1283 3 1279 1298
DEBIT	5564		1486 2 1486	DELBARY	20,3032		968	DELTTIME	E5,1612	=	93 2 528
DEC-12	04,3575		1206	DELBRTMP	E6,1700	=	106 10 106 972	DELV	1162		79 10 79 848
DEC-6	04,3574		1206	DELCDUX	E6,1575	=	109 6 109 1008	DELVCSI	E7,1461	=	129 15 129 673
DECBRNCH	1000		75 18 316 365	DELCDUY	E6,1577	=	109 4 109 596	DELVCTL	E7,1664	=	124 3 691 692
DECDSP	41,2523		333 1 325	DELCDUZ	E6,1601	=	109 4 109 596	DELVEE	E5,1622	=	94 5 94 557
DECDSP3	41,2575		334 2 334	DELCOMP	22,2530		407 3 394 412	DELVEET1	E5,1444	=	101 5 101 666
DECEND	40,2166		317 2 317	DELDEP	E5,1761	=	96 5 96 1286	DELVEET2	E7,1666	=	129 5 171 682
DECON	40,2223		318 1 317	DELDV	E7,1463	=	129 13 129 673	DELVEET3	E7,1645	=	123 15 123 712
DECOUNT	0117	=	69 27 327 351	DELEL	E7,1451	=	122 5 122 472	DELVEO	E5,1632	=	94 3 94 557
DECRET	0115	=	69 2 347 348	DELELO	0032	=	463 3 469 472	DELVIMU	E7,1674	=	124 7 124 692
DECRM61	37,2616		575 3 574 575	DELHITE	E7,1753	=	126 2 281 552	DELVLVC	E7,1404	=	117 22 282 903
DECROUND	40,3166		360 1 359	DELINDEP	0014	=	1307 2 1285 1286	DELVOV	E7,1537	=	122 4 282 512
DECTEM	0122	=	69 3 333	DELLOOP	00,3735		1488 1 1488	DELVREF	E7,1432	=	117 8 691 850
DECTEST	41,2443		332 2 331 332	DELLT4	E7,1422	=	117 11 117 712	DELVSAB	E7,1653	=	123 4 123 710
DECTOBIN	40,2133		317 1 317	DELM	E5,1560	=	99 5 439 440	DELVSIN	E7,1645	=	123 13 123 898
DECTWO	35,3116		485 2 558	DELMAX1	06,3702		663 2 672	DELVSLV	E7,1404	=	117 4 117 640
DEC182	30,3641		614 1 609	DELMLP	33,2707		439 1 439	DELVSUM	E6,1744	=	107 6 107 725
DEC15	5026	=	879	DELOGA	E6,1667	=	106 5 106 992	DELVSUMP	E6,1752	=	107 2 700
DEC17	4375	=	431 2 423 443	DELOGAC	16,3335		990	DELVTPF	E5,1636	=	93 5 93 529
DEC227	15,2430		784 1 783	DELOGART	E6,1665	=	106 7 106 992	DELVTPI	E5,1634	=	93 5 93 529
DEC23	43,2356		246 1 246	DELOK	12,2644		1286 1 1285	DELVX	1162	=	79 13 297 834
DEC409	20,2476		734 1 732	DELOOP	21,2366		1007 1 1008	DELVY	1164	=	79 10 299 834
DEC45	5034		1201 2 1121 1194	DELOPCMD	10,2166		169 2 168	DELVZ	1166	=	79 9 299 834
DEC46	20,2477		734 1 732	DELPBAR	E6,1601	=	105 8 105 966	DELX	E5,1642	=	96 6 96 1281
DEC51	07,3652		1443	DELRDONE	32,2063		644	DELYBAR	E6,1603	=	105 8 105 970
DEC57	4374	=	431 1 425	DELRSPL	32,2017		643 1 520	DEP	0036	=	1307 1 1285
DEC585	33,3107		442 1 426	DELRSPL1	32,2000	=	32 1 643	DEPREV	E5,1763	=	96 2 96 1285
DEGCOM	40,2566		336 1 335	DELSTOR	34,2564		546 1 544	DESOPMOD	1315		81 2 160 163
DEGCON1	40,2761		350 1 349	DELT	E5,1644	=	96 3 96 1279	DESOPTS	1161		79 5 98 745
DEGCON2	40,2763		350 1 351	DELTACSM	E3,1572		86 3 584 630	DESOPTT	1160		79 7 98 745
DEGINSF	40,2716		349 1 349	DELTALEM	E3,1644		86 1 584	DEXDEX	0142	=	71 7 1365 1371
DEGINSF2	40,2727		349 1 351	DELTAQ	E7,1523	=	121 5 121 1254	DEXI	0143	=	71 1 1370
DEGOUTSF	40,2516		335 2 334 335	DELTAR	E5,1610	=	93 5 93 528	DEX1	0143	=	71 5 71 1370
DEGREE1	14,3065		762 1 761	DELTAT	E7,1725	=	127 2 127 128	DEX2	0144	=	71
DEGREE10	34,3660		597 1 593	DELTATOK	27,3614		1504 1 1504	DFAILY	17,2712		1041 1 1041
DEGTAB	40,2576		336 2 335 336	DELTATT	21,2155		1003 1 1021	DFRNT	40,3271		363
DEG359	14,3066		762 1 761	DELTATT2	21,2156		1003 3 1003 1022	DFT	E6,1547	=	108 7 108 1057
DEL	E7,1425	=	121 12 394 414	DELTATT3	17,2634		1040 1 1039	DFTMAX	17,3307		1053 4 1050 1053
DELATT20	17,2635		1040 1 1039	DELTAX	1256	=	80 19 80 1259	DFTMOON	35,3145		552 1 556
DELAYEX	5303		1224 1 1224	DELTEE	E7,1743	=	126 8 126 557	DFT1	E6,1550	=	108 4 108 1051

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SYMBOL	DEF	H	REFERENCES
DET2	E6,1551	=	108 4 108 1052
DHOOK	E7,1655	=	118 5 118 865
DHOOKYQ7	25,3004		862 2 857 862
DIFCHK	10,2220		234 3 234
DIFEQ+0	11,3446		1348 1 1344
DIFEQ+1	11,3452		1348 1 1344
DIFEQ+2	11,3463		1348 1 1344
DIFEQCNT	E3,1500		85 25 85 1350
DIFEQCOM	11,3626		1350 2 1348
DIFEQTAB	11,3235		1344 1 1344
DIFEQQ	11,3305		1345 1 1349
DIFF	E7,1607	=	118 7 119 867
DIFFALT	E5,1632	=	101 5 101 681
DIFFOLD	E7,1611	=	118 5 118 867
DIMOBIT	5017	=	53
DIMOFLAG	0073	=	53 22 210 1350
DIRADRES	6055		1109 2 1123
DISDVLVC	37,2625		662 2 654 678
DISPDEX	0000	=	82 2 481 482
DISPLACE	41,3066		347 2 346
DISPLAYE	35,3070		483 2 463 464
DISPLAYS	10,2000	=	28 2 1465 1494
DISPMGA	35,3264		635 1 638
DISPN5X	31,2013		505 1 505
DISPTARG	27,2651		816 2 808
DISP45	35,3267		635 1 635
DISTEM	0122	=	69 3 331
DIVIDE	31,3365		630 7 627 628
DLAYJOB	00,2000	=	27 1 1488
DLEWD	E7,1641	=	118 4 118 863
DLEWDO	26,3156		879 1 863
DLOAD	6021		1107 1 1116
DLOAD*	7702		1203 1 1111
DLOADCOD	7701		1203 1 1123
DLY2	5256		1223 2 1224 1488
DMENFBIT	5007	=	56
DMENFLG	0121	=	56 12 582 1260
DMODE	7301		1143 1 1182
DMP	7052		1136 15 317 353
DMPINCP2	30,3110		606
DMPINTEG	30,2432		600
DMPNSUB	7265		1142
DMPNTEMP	0135	=	70 2 1142
DMPR	7543		1149 1 1116
DMPSUB	7056		1136 22 1138 1370
DMPSUB2	7075		1136 1 1141
DMP1	7541		1149 1 1116
DNADRDCR	05,3544		1097 1 1099
DNDUMP	05,3735		1101 1 1101
DNDUMP1	05,3722		1101 2 260 1101
DNDUMP1	05,3750		1101 1 1101
DNDUMP2	05,3752		1101 1 1101
DNECADR	0336	=	1099 15 1096 1099
DNEDUMP	43,2721		260 2 236 260
DNLADMM1	04,2521	=	208 1 202
DNLADP00	5021	=	209 1 200
DNLSTADR	0332	=	73
DNLSTCOD	0332		73 9 73 1506
DNPHASE1	05,3530		1096 2 193 1101
DNPHASE2	05,3536		1096 1 1098
DNO	0337		73 1 1099
DNRNGERR	E7,1715	=	119 4 119 871
DNTABLE	05,2335		180 1 1097
DNTMBUFF	0340		73 28 132 1101
DNTMEXIT	05,3714		1099 6 1097 1102
DNTMFAST	06,2653		156 1 159
DNTMGOTO	0335		73 7 190 1101
DNTM1	0034	=	41 1 1099
DNTM2	0035	=	41 1 1099
DOALARM	5217	=	1496
DOBRATE	15,2501		1064 1 1064
DOBRATE?	15,2466		1064
DOBRATE1	15,2502		1064 1 1064
DOCSM	36,3757		1260 1 1259
DOCSM1	36,3762		1260 1 1259
DODELVZ	37,3303		833 1 834
DODLOAD	6427		1123 1 1120
DODLOAD*	6113		1111 2 1120 1123
DODNADR	05,3537		1096
DODNCHAN	05,3605		1097
DODNPTR	05,3624		1098 1 1097
DODOWNTM	05,3521		1096 2 131 132
DOFSTART	05,2365		183 2 189 190
DOGAMDOT	37,3672		887 1 887
DOJET	21,3746		1035 3 1033 1035
DONEADR	37,3352		834 1 833
DONOUN46	42,2004		253 1 253
DONOUN47	42,2022		253 1 254
DONOUN48	42,2046		254 3 254
DOPROC	40,3506		377 2 376 388
DOSPSOFF	24,2774		698 1 216
DOSSHFT	00,2322		1160 1 1160
DOSTORE	6331		1119 1 1108
DOSTRULL	24,2713		696 1 214
DOSUBLST	05,3700		1099 1 1098
DOSWITCH	11,3355		1345 1 1344
DOT	7300		1143 1 1116
DOTERM	40,3504		377 1 376
DOTICK	23,2542		518 1 518
DOTINC	0136		70 7 70 1144
DOTIXBR	01,2451		1193
DOTPER	23,2740		523 1 523
DOTRET	0137		70 8 70 1183
DOTSUB	7125		1138 3 1144
DOTVCON	24,2662		696 1 214
DOTVCRCS	24,3002		698 1 215
DOUBLK	40,2476		322 2 321 322
DOVLOAD	6432		1123 1 1120
DOVLOAD*	6435		1123 1 1120
DOV5N71	30,2100		566 1 569
DOW..	11,3665		1352 2 1345 1350
DOW..1	11,3713		1352 2 1352
DOWNCNTL	25,3260		867 1 864
DOWNENT2	7740		1485 3 1474 1480
DOWNFLAG	5560		1486 68 199 1496
DOWNTELM	05,2000	=	28 2 170 1096
DP(-22)	27,3361		1388 1 1383
DP-.002	35,3147		552 1 553
DP-.01	35,3117		485 3 481
DPADD	21,2054		999 1 1008
DPADD+	21,2074		999 1 999
DPADD-	21,2076		1000 1 999
DPADD2+	21,2101		1000 1 999
DPAGREE	7224		1141 1 701
DPB-14	27,2326		396 2 394 396
DPB-9	17,2010		721 1 720
DPBIT14	01,3476		1234 1 1234
DPFRACIN	40,3032		351 1 349
DPFRACOT	40,2653		337 1 334
DPHALF	26,3332	=	1205 13 401 543
DPINCOM	40,3036		351 1 351
DPINORM	40,3044		351 1 351
DPINSF	40,3021		351 4 349 351
DPINSF2	40,3046		351 1 349
DPINSF4	40,3053		351 1 349

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DPIPAY	E5,1532	= 99	3 439 444	DSPABC	41,2353	331	1 325	DSPTEMX	1051	= 76	5 76 504
DPIPAZ	E5,1536	= 99	1 438	DSPABORT	4243	373	3 373	DSPTEM1	1045	76	36 76 742
DPMODE	22,3716	1514	3 502 928	DSPALARM	40,3325	364	5 325 349	DSPTEM2	1050	76	12 76 431
DPNDX	E6,1507	= 108	25 108 1030	DSPB	41,2373	331	1 325	DSPWDRET	0144	= 70	3 359
DPOSMAX	4776	1200	3 359 1514	DSPC	41,2400	331	1 325	DSP2BIT	41,3416	362	1 365
DPOUT	40,2627	337	3 336	DSPCNT	0776	75	7 135 192	DSP2DEC	40,3200	360	1 342
DPPOSMAX	26,3342	1205	11 428 935	DSPCOM1	41,2371	331	3 331 333	DSQ	00,3174	1180	1 1118
DPTEST	41,2261	327	4 327 348	DSPCOM2	41,2405	331	2 331	DSQSUB	00,3300	1183	5 1180 1188
DPTEST1	41,2301	328	5 328	DSPCOM3	41,2413	331	1 331	DSREL	0141	= 70	4 362 363
DPZERO	04,3565	= 1353	3 753 1345	DSPCOUNT	0777	75	66 136 1449	DSRUPTEM	0073	= 68	5 135
DP1/2	04,3563	= 1239	5 1239 1251	DSPDCEND	41,2566	334	4 334 340	DSRUPTSW	1302	80	11 132 191
DP1/20	37,3460	836	1 835	DSPDCGET	41,2527	333	1 333	DSTORE	25,2162	848	1 851
DP1/4	11,3755	1353	4 680 1353	DSPDCPUT	41,2537	333	1 334	DSU	6754	1133	1 1116
DP1/4TH	26,3324	1205	6 34 1254	DSPDCWD1	40,3140	359	4 360	DT/2	E4,1713	= 89	10 90 1350
DP1/6	26,2104	779	1 778	DSPDC2NR	40,3173	360	3 340 361	DT/2COMP	13,3346	1323	1 1324
DP1MIN	23,3132	617	1 617	DSPDECNR	40,3167	360		DT/2MAX	13,3440	1324	2 1323 1324
DP1OUTSF	40,2614	336	1 334	DSPDECVN	40,3213	361	4 337 376	DT/2MIN	13,3436	1324	1 1324
DP2(-3)	27,3363	1388	1 1385	DSPDECWD	40,3133	359	4 334 338	DTEAROT	E7,1605	= 118	8 118 849
DP2(-4)	27,3365	1388	4 809 1379	DSPDELAY	31,2004	505	1 505	DTHETASM	E6,1611	= 109	11 109 1372
DP2/3	11,3773	1353	3 1334 1353	DSPDPDEC	40,2677	341	1 325	DT21PR	E7,1647	= 127	5 127 911
DP2OUTSF	40,2621	336	2 334	DSPFLG	1067	= 1483	3 1476 1477	DUMMYAD	04,2133	199	1 205
DP3OUTSF	40,2623	336	1 334	DSPFMEM	41,3353	358	1 326	DUMMYJOB	01,3223	1220	2 185 1219
DP9/10	04,3623	1288	4 1280 1286	DSPIN	40,3227	362	5 316 363	DUMPCNIC	27,3025	1377	
DQUARTER	11,3755	= 1353	2 1339	DSPIN1	40,3254	363	2 362 363	DUMPCNT	0333	73	1 1101
DRCON	E7,1665	= 127	6 127 912	DSPLAY	06,2047	135	1 135	DUMPFISH	26,3044	812	
DRFTBIT	5001	= 49		DSPLIST	1043	76	6 192 383	DUMPLOC	0336	= 73	5 1101
DRFTSUB2	06,3461	302	1 306	DSPLOCK	1012	76	12 192 1481	DUMPP61	26,2261	790	
DRHO	E6,1552	= 108	6 108 1006	DSPLV	41,3413	361		DUMPRPRA	27,3063	1379	
DRHOLOOP	21,2216	1004	1 1005	DSPLY58	04,3147	529	1 529	DUMPTFF1	27,3146	1383	
DRHO1	E6,1554	= 108	1 109	DSPLY81	04,3152	529	1 529	DUMPTFF2	27,3243	1384	
DRHO2	E6,1556	= 109	1 109	DSPMM	04,2566	375	1 386	DUMPTRIG	27,2647	816	
DRIFTFLG	0036	= 49	5 741 829	DSPMMJB	40,3441	376	2 375 1404	DUMPVGAM	26,3073	814	
DRIFTI	E5,1514	= 99	1 425	DSPMMJOB	40,3441	= 1404	1 1404	DURATION	16,3301	989	
DRIFTO	E5,1512	= 99	1 427	DSPMMTEM	0140	= 70	2 376	DV	E7,1705	= 127	9 127 929
DRIFTSUB	06,3441	302	3 299 300	DSPMSK	5023	= 362	1 361	DV/SC	7605	1150	2 1150
DRIFTT	E5,1452	= 99	2 423 426	DSPOCTIN	40,3317	363	1 361	DVCALC	32,3660	928	3 923 926
DSALMOUT	0011	= 41	36 149 1507	DSPOCTWD	41,3363	361	3 325 358	DVCNTR	E7,1431	= 117	17 35 828
DSEXIT	0114	= 69	3 362 363	DSPOFF	05,3104	191	1 191	DVECTR	0010	= 1251	1 1247
DSKYBIT	5001	= 55		DSPOUT	06,2063	135	2 134	DVL	E7,1661	= 119	8 119 865
DSKYFLAG	0113	= 55		DSPOUTSB	06,2024	135	2 135 137	DVLOS	E5,1610	= 93	13 93 480
DSLV	40,3303	363	2 363	DSPRND	40,3122	359	1 359	DVMAX1	06,3666	663	1 665
DSMAG	0142	= 70	2 363	DSPSCAN	06,2032	135	2 135	DVMAX2	06,3670	663	1 665
DSMSK	40,3305	363	2 363	DSPSFNOR	41,2562	334	1 334	DVNORM	00,2505	1165	3 1164
DSPA	41,2365	331	1 325	DSPSIGN	40,3105	359	4 359 360	DVNORMCT	0137	= 70	6 1162 1173
DSPAB	41,2360	331	1 325	DSPTAB	1023	76	51 134 1494	DVOK	16,3474	992	1 992

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SYMBOL	DEF	H	REFERENCES	SYMBOL	DEF	H	REFERENCES	SYMBOL	DEF	H	REFERENCES
DVOVF	00,2405		1162 11 1164 1175	EARSPH	11,3350		1345 1 1345	EJSCAN	01,3141		1218 2 1215 1218
DVPREV	E7,1467	=	129 5 129 671	EARTCNTR	14,2243		749	EJ1	01,3206		1219 6 1218
DVSIGN	0136	=	70 10 1162 1179	EARTHALT	34,2560		546 1 546	EJ2	01,3216		1219 1 1219
DVTHRESH	1353		83 1 720	EARTHGON	23,2630		519 1 519	EKPRIME	E6,1414		102 1 939
DVTHRUSH	5024	=	830	EARTHL	26,3625		1250 2 1243 1245	EKTLX/I	E6,1416		102 2 938 941
DVTOTAL	E7,1425	=	117 7 117 828	EARTHMU	16,2421		725 1 724	EK1VAL	E3,1767		87 1 727
DVTOTUP	37,3133		828 1 828	EARTHMX	26,3573		1249 2 1243 1245	EK2VAL	E3,1771		87 1 727
DVXSC	7377		1146 2 1145	EARTHMXX	0051	=	1251 4 1246 1249	EK3VAL	E3,1773		87 1 727
DV47TEMP	E7,1457	=	124 2 691 692	EARTHPAD	23,2463		517 1 517	ELCALC	35,2236		469 1 472
DWNRPTBB	4060		132 1 131	EARTHR	33,2370		430 2 430 537	ELEPS	35,3114		485 1 469
DXCHT12	17,3577		1060 1 1059	EARTHR*	33,2417		430 5 425 445	ELEV	E7,1743	=	126 10 126 669
DXCHT23	17,3603		1060 1 1059	EBANK	0003	=	39 70 186 1513	ELEVEN	5024		1200 10 165 1204
DXCOMP	12,2173		1278 1 1278	EBANKSAV	1067		77 3 1467 1483	ELEX	35,2513		472 1 469
DXITFIX	05,3520		955 1 953	EBANKTEM	1071		77 6 184 1483	ELOOPFIN	43,3441		1399 2 1399
DXTEST	05,3413		953	EBANK3	5051	=	1204 4 188 888	ELRCODE	07,3776		1451 1 1450
DYNDISP	24,3325		704 1 703	EBANK4	5005	=	1204 1 648	ELRCODE1	40,2057		316 1 315
DZCALL	15,3657		1089 2 1083 1084	EBANK5	5056		1202 3 242 571	ELRSKIP	05,2575		187 1 186
DZCALL1	15,3675		1089 1 1082	EBANK6	5057	=	1204 11 188 844	EMATRIX	E5,1570	=	93 3 611 612
DZCOM	15,3033		1076 1 1076	EBANK7	5060		1202 6 258 844	EMDOT	0110		68 4 698 938
DZNOCOM	15,3034		1076 1 1076	EBAOG	5057	=	844 4 887 1068	EMSALT	E4,1417		88 3 808 934
DZ1	15,3364		1084 1 1083	EBDVCNT	34,2000		35 1 536	EMSD	0055	=	40
DZ2	15,3371		1084 1 1084	EBDVCNTR	24,2000		35	ENABL1	16,3163		958 3 958 960
D0	E7,1707	=	119 4 119 867	EBENTRY	5060	=	844 4 804 875	ENABL2	16,3174		958 1 960
D0FQ	25,2316		853 1 853	EBMARKDO	07,2000		35	ENABT6	17,3732		1062 2 1062
D1/1024	04,3617		1288 1 1297	EBMRKBUF	07,2001		35	ENATMA	43,2510		250 1 236
D1/128	04,3605		1288 3 1281 1292	EBP40TMP	24,2001		35	END-DELV	E7,1425		117 2 117 121
D1/16	04,3613		1288 2 1294 1301	EBQPLACE	34,2001		35 1 536	END-E3	E3,1777	=	87
D1/256	04,3621		1288 3 1282 1288	EBRN1	37,2000		35	END-E4	E4,1777	=	92
D1/32	04,3615		1288 8 559 1343	EBUF2	0364		73 10 420 421	END-E5	E5,1777	=	101
D1/4	04,3611		1288 5 34 1301	ECC	E5,1753	=	96 3 96 1303	END-E6	E6,1777	=	116
D1/64	04,3607		1288 5 1277 1303	ECLIPOL	15,2255		750 1 750	END-E7	E7,1777	=	129 2 216 786
D1/8	04,3603		1288 1 1303	ECSTEER	E7,1424	=	117 5 175 891	END-IN/M	E7,1631	=	123 2 123 127
D21	E6,1670	=	114	EDOP	0023	=	39 13 357 1400	END-KALC	E7,1447	=	121 3 117 122
D60R98IT	5016	=	53	EDOT	E6,1515	=	108 16 108 1034	END-P30S	E7,1664	=	124 2 124 125
D60R9FLG	0072	=	53 7 586 1350	EDOTVEL	E6,1520	=	108 7 108 1032	END-SVCR	E7,1451	=	117 2 117 118
==========				EDRIVEX	E6,1503		103 4 115 1012	END-UE	1377	=	83
E(-AT)	20,3500		978 4 965 968	EDRIVEY	E6,1504		103 2 115 1011	END-W	E5,1642	=	93 3 95 97
E/BKCALL	13,2036		420	EDRIVEZ	E6,1505		104 2 115 1011	ENDALL	40,2164		317 2 317 318
E/CALL	13,2055		421	EE	13,2525		1239 1 1239	ENDALM	4167		364 1 370
E/JOBWAK	04,2606		422	EGFLGBIT	5010	=	58	ENDBLFF	4317	=	374 1 378
E/PROG	04,2000	=	28 1 422	EGRESS	E4,1717	=	90 15 90 1328	ENDBSUB1	40,3441	=	375 1 376
E/PROG1	13,2000	=	29 1 420	EGSW	0141	=	58 3 58 870	ENDBUF	0324	=	72 3 72 1091
E/SWITCH	13,2053		420	EIGHT	5014	=	1204	ENDCHKG	33,2355		429
EARROT1	23,2215		294 1 846	EIGHTEEN	20,2064		205 1 204	ENDDAMP	21,3421		1028 1 1028
EARROT2	23,2225		294 3 294 849	EISOI	42,3677		934 2 934	ENDDCM	22,2530	=	407

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ENDDOT	7154		1138 1 1183	ENDRDLO	40,2676		338 1 341	ENGONBIT	5011	=	56 1 187
ENDDPDEC	40,2715		342 1 349	ENDRELDS	40,3412	=	368 1 374	ENGONFLG	0123	=	56
ENDDPUSH	6517		1125 1 1125	ENDREP11	34,2273		539 1 539	ENGREQST	24,3355		705 1 705
ENDECVN	40,3227	=	361 1 362	ENDRET	10,3557		1480 5 1475 1482	ENG2BIT	5005	=	48
ENDEN	36,2427		557 2 556 557	ENDROLL	21,2003		418	ENG2FLAG	0023	=	48 3 684 715
ENDEXIT	25,3576		873 2 794 863	ENDRQDAT	41,2316		328	ENTANSWR	07,2370		232 1 232
ENDEXT	5534	=	1483 35 237 1507	ENDRQWT	41,3515		366 1 370	ENTCADR	26,2430		796 1 795
ENDEXTVB	5534	=	238 7 241 243	ENDRSTRT	05,2477		185 2 189	ENTER	41,2002		323 2 316 364
ENDFIG	42,3646		734 1 734	ENDRTOUT	41,2616	=	334 1 343	ENTERJMP	40,2060		316 1 316
ENDFIND	5222		1210 4 1212 1216	ENDRUTIN	41,3230	=	349 1 355	ENTEXIT	0136	=	323 10 324 365
ENDGTSAL	33,3267		445	ENDR57	37,2445		571 2 570	ENTMASK	25,2113		846 1 844
ENDHMSS	42,3521	=	354	ENDSAM	14,2312		750 1 749	ENTMID1	13,3573		1330 1 1329
ENDIDLE	4223		373 1 1479	ENDSCALE	40,2751		350 5 349 351	ENTMID2	13,3567		1330 1 1329
ENDIGN	24,2723		696	ENDSLECT	17,3737	=	1062	ENTPASHI	41,2012		323
ENDIMU	07,3514		1438 3 1422 1427	ENDSPBIT	5003	=	57	ENTPASO	41,2035		324 3 323 372
ENDINST	4233		373 6 319 1478	ENDSPF	41,3362		358 1 361	ENTRET	0136	=	70 6 319 371
ENDINT	13,2656		1314 1 210	ENDSPMIN	42,3364		341 1 352	ENTRYDSP	0134	=	57 4 793 800
ENDIT	10,3575		1480 1 1477	ENDSPMM	04,2576		376 1 382	ENTRYSW	25,2114		846 1 844
ENDJETS	17,3567		1059	ENDSPOCT	40,3322		364	ENTRYUPD	0001	=	209 1 209
ENDJOB1	01,3124		1218 1 1210	ENDSTATE	11,3557		1349 1 1348	ENTRYVN	1263	=	80 7 80 874
ENDLAMB	16,2325		724	ENDSUMS	43,3011		263 1 1402	ENTSET	41,3570		371 2 371
ENDMANU	21,2006		418 1 411	ENDS40.6	20,2343		731	ENTTIM2	41,3771		504 1 504
ENDMANUV	27,2051		391	ENDS40.9	16,2402		724 1 725	EPC1RTE	35,3575		932 1 906
ENDMANU1	27,2052		391 2 390 392	ENDT(X)	27,3352		1387 1 1387	EPC1ORTE	35,3615		932 1 926
ENDMARK	5534		1465 4 233 1483	ENDTASK	5304		1225 4 190 1231	EPC2RTE	35,3577		932 1 894
ENDMARKS	07,2413		233 1 233	ENDTEST1	33,2267		427 2 431 442	EPC3RTE	35,3601		932 1 894
ENDMASSP	05,3456		954	ENDTFF	27,3240		1384 3 1384 1386	EPC4RTE	35,3603		932 1 908
ENDMAXDV	00,2624		1168 2 1168 1170	ENDTNON	06,2270		142 1 142	EPC5RTE	35,3605		932
ENDMODE	07,3567		1439 1 1439	ENDTNON2	06,2310		143 1 142	EPC6RTE	35,3607		932 1 910
ENDMONDO	41,3346		357 1 357	ENDTPUSH	6521		1125 2 1125 1182	EPC7RTE	35,3611		932 1 911
ENDMRC	17,2170		938	ENDTSLC	00,2212		1157 1 1157	EPC8RTE	16,2715		913 1 912
ENDNMTST	40,2150		317 2 317	ENDTVCIN	17,2350		941	EPC9RTE	35,3613		932 2 925 927
ENDNUM	40,2160		317 1 317	ENDVLOAD	6460		1124 2 1126	EPHEM	26,2000	=	31 1 786
ENDNVBSY	04,2605		382	ENDVPUSH	6507		1125	EPREMM1	04,2520	=	208 1 208
ENDNVSB1	41,3612		372 1 385	ENDVXV	6747		1131 4 1131 1148	EPSFOUR	35,3121		485 2 475 555
ENDOFJOB	5217		1210 116 199 1503	ENDV97E	24,3573		709	EPSILN1	06,3676		663 1 672
ENDOUT	10,3534		1479 2 1481	ENDV97P	24,3513		708	EPSILONL	E7,1776	=	126 2 1296 1298
ENDPASTE	4157		357	ENDV97T	24,3464		707	EPSILONT	1347		82 2 1279
ENDPINBF	4526	=	383	ENDV99P	24,3431		706	EP4(10)H	30,3647		712 1 712
ENDPINS1	40,3600	=	389 1 632	ENDV99PI	24,3423		706	EP4(10)L	16,2425		725 1 723
ENDPINS2	41,3727	=	387	ENDZOPT	06,3172		163 1 163	EP4(45)H	30,3645		712 1 712
ENDPLAC	14,2156		746 2 586	END2DEC	40,3212		360	EP4(45)L	16,2423		725 1 723
ENDPRCHG	01,3006		1214 2 1213 1219	END45	35,3300		635 1 635	ERAD	13,2527		1239 1 1242
ENDP505	15,2145		740 2 758 769	ENEMA	05,2651		188 3 189 1495	ERADFBIT	5003	=	48
ENDP76	13,2212		513 2 511	ENGINOFF	24,2766		697 3 213 702	ERADFLAG	0021	=	48 13 458 1242

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ERADM	E4,1640	= 89	10 89 1242	ESTROKER	E6,1413	102	5 208 981	FAZAB	36,3671	1259	1 1260
ERASCHK	43,3341	1398	1 1397	ETDECAY	E6,1412	102	1 720	FAZAB1	36,3717	1259	1 1259
ERASCON1	43,3234	1396	1 1398	ETPIFLAG	0046	= 50	7 50 472	FAZAB2	36,3723	1259	1 1259
ERASCON2	43,3235	1396	1 1398	ETRYDAP	15,2000	= 29	3 1063 1070	FAZAB3	36,3732	1259	1 1259
ERASCON3	43,3236	1396	1 1398	EXDAP	15,3037	1077	1 1074	FAZAB4	36,3742	1259	1 1260
ERASCON4	43,3237	1396	1 1398	EXDAPIN	15,2770	1074	1 1078	FAZAB5	36,3751	1260	2 1260 1328
ERASCON5	43,3245	1396	1 1399	EXDAPOFF	43,2734	261	1 247	FAZA1	36,3520	1257	
ERASCON6	5051	= 1396	3 1398 1399	EXDAP1	15,3101	1078	3 1078 1079	FAZB	36,3613	1258	1 1257
ERASER	10,3713	1482	1 1476	EXDAP2	15,3126	1078	1 1077	FAZB1	36,3616	1258	
ERASFILL	0112	69		EXDAP3	15,3073	1078	2 1078	FAZB2	36,3644	1258	1 1258
ERASID	5054	= 35	1 1101	EXDAP4	15,3064	1078	2 1077	FAZB5	36,3651	1258	1 1258
ERASLOOP	43,3371	1398	4 1398 1399	EXDSPRET	10,3042	1471	3 241 243	FAZC	36,3657	1258	2 1258
ERASTAL1	13,3523	1326	1 1326	EXECBANK	5225	1210	8 1208 1210	FBANK	0004	= 39	32 373 1488
ERASTAL2	13,3526	1326	1 1326	EXECCOPY	16,3002	947	2 947 960	FBANKMSK	4364	= 1115	2 1216
ERASWAK1	13,3531	1326		EXECPHS	16,3143	958		FBIASSUB	06,3617	306	3 304
ERASWAK2	13,3533	1326		EXECTEM1	0061	= 68	4 1208 1216	FBR3	11,2472	1336	1 1350
ERASZERO	0007	= 170	1 170	EXECTEM2	0062	= 68	4 1211 1216	FCADDY	20,3522	982	1 981
ERCNT	0117	= 69	7 385 389	EXIT	6712	1130	1 1108	FCADRMM1	04,2416	= 206	1 202
ERCOM	40,3561	389	1 388	EXITEM	0114	= 69	7 346 347	FCARD	20,3524	982	3 981 983
ERCOMP	E5,1647	= 100	4 446 537	EXRSTRT	16,3253	960	1 958	FCARD1	20,3525	982	
ERCOMPPL	33,3434	447	1 446	EXTENTST	16,3607	994		FCARD2	20,3526	982	
ERCOMP1	E5,1647	= 100	12 426 451	EXTVBACT	1044	76	22 184 1491	FCARD3	20,3527	982	
ERCON	40,3574	389	1 388	EXTVBS	42,2000	= 34	2 253 733	FCARD4	20,3530	982	
ERCOUNT	1365	= 82	3 82 1396	EXTVERBS	43,2000	= 34	4 236 1499	FCARD5	20,3531	982	
ERECTIME	E5,1646	= 100	1 434	E134567B	43,3352	1398	1 1399	FCARD6	20,3532	982	
ERECTIM1	E5,1646	= 100	3 444 446	E2	E7,1645	= 123	4 552 553	FCORFRAC	16,3137	949	1 948
EREPFRAC	E6,1421	102	2 720 939	E3J22R2M	E3,1776	= 87	2 87 1516	FCSTART	30,2000	= 32	
ERESTORE	1360	= 82	11 82 1399	E3RTB	35,3633	933	1 894	FDAIDSP1	21,2415	1009	
ERMINUS	40,3553	388		E32C31RM	E3,1777	= 87	2 87 1343	FDAIDSP2	21,3160	1022	1 1009
ERPLUS	40,3556	389	1 388	E6SETTER	24,3371	705	3 697 708	FDAITOTL	21,3175	1022	1 1022
ERRBTMP	E6,1702	= 106	25 106 974	E7SETTER	24,3366	705	3 685 701	FDOT	26,3644	1251	1 1246
ERRLIM	5003	= 978	2 971	==========				FENG	24,2410	689	1 684
ERROR	40,3510	388	1 315	F	E7,1726	= 124	4 124 713	FETCH2WD	05,3666	1099	2 1096 1097
ERRORLIM	20,3124	971	2 964 967	FACEREG	0154	= 1484	8 1474	FFTAG1	4000	= 27	5 221 1486
ERRORS	43,3261	1396	1 1396	FACTOR	E7,1613	= 118	5 118 866	FFTAG10	4000	= 27	2 194 197
ERRORX	E6,1567	= 109	13 109 1030	FACT1	E7,1615	= 118	5 118 865	FFTAG12	4000	= 27	2 133 662
ERRORY	E6,1570	= 109	9 109 1028	FACT2	E7,1617	= 118	4 118 864	FFTAG13	6000	= 27	1 1495
ERRORZ	E6,1571	= 109	9 109 1082	FAILDSP	24,3347	705		FFTAG2	4000	= 27	3 632 1417
ERTHR	33,2401	430	1 430	FAILREG	0375	74	15 183 1494	FFTAG3	4000	= 27	1 1420
ERTHRVSE	32,2000	430	2 434 442	FAIL3	5700	1493	1 1493	FFTAG4	4000	= 27	2 1465 1490
ERVECTOR	E5,1404	98	4 426 430	FAKEPRET	5226	1210	2 1208 1218	FFTAG5	6000	= 27	
ESCAPE	0136	= 70	4 1189 1190	FALTOF	4404	379		FFTAG6	6000	= 27	2 1225 1485
ESCAPE2	0137	= 70	2 1189 1190	FALTON	4400	379	15 202 1507	FFTAG7	4000	= 27	2 1493 1495
ESTICADR	33,2121	424	2 424	FANG	E3,1774	87	2 87 727	FFTAG8	4000	= 27	1 357
ESTIMS	33,2453	434	3 424 446	FAZA	36,3514	1256	1 1258	FFTAG9	4000	= 27	

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FIFPSDP	06,3700		663 1 672	FLAGWRD8	0104	=	61 2 185	GAINCHNG	16,2771		947 1 947
FIFTYFPS	10,2314		672 1 671	FLAGWRD9	0105	=	63 13 203 1022	GAIN1	21,3077		1021 1 1004
FIGTIME	35,2300		470	FLASHMGA	35,3433		638 1 638	GAIN2	21,3115		1021 1 1006
FIG2EXIT	30,2356		599	FLASHOFF	4447		380 6 244 1476	GAMA	E6,1722	=	112 3 112 887
FILDELV	E5,1474	=	99 1 99	FLASHON	4443		380 4 324 1479	GAMCOMP	11,2636		1338 3 1337 1338
FILDELV1	E5,1474	=	100 8 100 444	FLASHSUB	10,3502		1479 3 1477 1478	GAMDIFSW	0136	=	58
FINALBIT	5012	=	51	FLGWRD10	0106	=	65	GAMDOT	E6,1723	=	112 7 112 1072
FINALDV	00,2625		1169 3 1162 1168	FLGWRD11	0107	=	66	GAMDVX	32,3656		927 3 925 927
FINALFLG	0047	=	51 9 480 898	FLUSHJET	6000		1065 3 1063 1066	GAMDV10	32,3457		925 3 921 922
FINCOPY	16,3240		959 1 958	FORCEV25	42,3516		354 2 354	GAMDV15	32,3504		925 1 925
FINDGIMB	27,2246		395 2 394 395	FOREHUNT	25,3022		863 2 854 863	GAMDV20	32,3510		925 2 925
FINDTIME	01,3573		1415 2 1415	FORTYONE	13,3507		1325 1 1317	GAMDV25	32,3513		925 1 927
FINDVAC	5147		1208 33 183 1503	FOUR	5015	=	1204 23 297 1475	GAMDV30	32,3523		925 1 925
FINDVAC2	01,2626		1211 2 1208 1210	FOURSEC	17,2006		721 1 721	GAMDV32	32,3543		926
FINEK2	43,2257		243	FOURTEEN	4333	=	1178 1 1175	GAMDV33	32,3547		926 1 926
FINFONLY	14,3044		762 1 762	FOURTH	26,3324	=	881 2 848 880	GAMDV35	32,3552		926 1 926
FINETIME	4553		431 3 428 1447	FPX2	17,3366		1055 2 1055	GAMDV40	32,3556		926
FIRELOOK	16,3577		994	FRANDRES	05,2000	=	28 1 183	GAMDV45	32,3563		926
FIREPLUG	16,3603		994 1 994	FRCS2	24,2412		689 2 688	GAMDV47	32,3611		927 1 926
FIRSTBIT	5011	=	50	FREECHK	21,2175		1004	GAMDV50	32,3615		927 2 926
FIRSTFLG	0046	=	50 4 700 724	FREECONT	21,3272		1025 1 1025	GAMDV55	32,3634		927 1 927
FIRSTIME	12,2620		1285 1 1285	FREEFBIT	5015	=	47	GAMDV60	32,3642		927 1 927
FIRSTIME	16,2345		724 1 724	FREEFLAG	0014	=	47 7 757 769	GAMDV65	32,3647		927 2 927
FIRST3	7707	=	564	FREEFUNC	21,3051		1019 1 1018	GAMMA	E7,1455	=	121 5 121 1256
FISHCALC	26,3030		812 3 808 810	FREERET	0144	=	70	GAMMAEI	E7,1770	=	120 9 119 903
FIVE	5022		1200 28 193 1502	FREETAU	21,3063		1020 3 1020	GAMMAL	E7,1770	=	119 4 857 860
FIXCLPAS	40,2303		319	FREPFRAC	17,2543		944 1 941	GAMMAL1	0026	=	119 6 856 859
FIXCW	05,3422		953 3 947 953	FRESHDAP	21,2544		1014 1 1003	GAMMASB	E4,1722	=	90 2 280 935
FIXDELAY	5267		1223 14 696 1424	FREVS	20,3523		982 1 981	GAMPREV	E7,1465	=	129 7 129 672
FIXLOC	0120		69 42 265 1514	FRSTPAS	24,2065		671 1 671	GAMRP	0010	=	1241 3 1237 1241
FIXRANGE	40,2555		335 1 335	FSUBO	26,3652		1251 1 1246	GBIASX	E3,1460	=	84
FIXROOT	00,3452		1185 3 1184	FT99999	40,3764		634 2 633	GCOMP	E3,1471		85 20 85 768
FKPRIMOT	17,2542		944 1 941	FULLDSP	41,3654		385 1 385	GCOMPSUB	06,3412		301 6 299 300
FLAGGON	23,2400		516 1 516	FULLDSP1	41,3655		385 1 385	GCOMPSW	E3,1477		85 9 297 434
FLAGOFF	35,2772		480 1 480	FURST3	7707	=	597 2 564 593	GCOMPVER	33,3436		449 1 422
FLAGON	35,2750		480 1 480	FV	E4,1601	=	89 15 89 1352	GCOMP1	06,3525		303 1 303
FLAGTABL	04,2367		203 1 203	FVACCADR	01,3765		1419 1 1416	GCOMP4	33,3604		451 1 451
FLAGWRD0	0074	=	46 17 200 1487	FWDFLTR	20,3156		972 2 964 968	GCOMP5	33,3620		451 4 449 453
FLAGWRD1	0075	=	47 29 184 1426	FX	E7,1652	=	118 8 118 872	GDESELCT	07,3511		1437 1 1432
FLAGWRD2	0076	=	49 20 190 1426	FXADRS	43,3561		1401 2 1402	GDT/2	1206	=	79 4 79 836
FLAGWRD3	0077	=	51 5 184 1426	FXFX	43,3545		1401 1 1402	GDTSETUP	20,2277		730
FLAGWRD4	0100	=	53 30 192 1482	FYX2	17,3532		1058 2 1058	GDT1/2	1247	=	79 2 79 836
FLAGWRD5	0101	=	55 13 135 1500	F2RTE	0012	=	47 3 918 926	GEADDR	6105		1110 1 1110
FLAGWRD6	0102	=	57 27 187 1037	F2RTEBIT	5013	=	47	GENDDV	00,2570		1167 2 1166 1170
FLAGWRD7	0103	=	59 26 199 1503	==========			==========	GENMARK	10,3243		1475

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SYMBOL	DEF	H	REFERENCES	SYMBOL	DEF	H	REFERENCES	SYMBOL	DEF	H	REFERENCES
GENMASK	0162	= 1483	4 1467 1480	GETPRIO	5461	1410	2 1410 1413	GODSPR2	10,2700	1468	2 1466 1469
GENPL	E5,1444	98	27 98 99	GETRPSV	11,2610	1338	1 1338	GODSP2	10,2671	1468	
GENRET	E6,1770	= 115	5 115 575	GETRVN	31,2273	510	2 508 509	GOESTIMS	33,2116	424	1 424
GENSCI	00,2346	1161	2 1161	GETRVN5	31,2256	509	1 508	GOEXTVB	43,2000	236	1 325
GENSCR	00,2277	1160	4 1159 1181	GETRVN6	31,2267	510	2 509	GOFLASH	10,2720	1469	45 194 900
GENSHFT2	00,2224	1158	1 1158	GETTF	31,2351	610	6 600 608	GOFLASHR	10,3057	1471	14 526 898
GENSHIFT	00,2214	1158	1 1149	GETUM	23,3104	578	2 581 600	GOFLASH2	10,2722	1469	15 1466 1471
GENTRAN	5606	1490	14 204 1490	GETUNITV	25,2137	848	1 848	GOGOMARK	10,2632	1467	
GEOCOMPS	E5,1643	= 100		GETVEL	25,2133	848	1 848	GOGOPROG	04,2215	201	1 201
GEOCOMP1	E5,1643	= 100	5 423 443	GETX	12,3001	1292	3 1289 1302	GOINT	35,2701	479	2 472
GEOCONS1	33,3716	453	1 444	GET45	35,3030	481	3 481	GOLOADLV	43,2275	244	6 236 237
GEOCONS2	33,3720	453	1 444	GIMDTEST	20,2301	730	1 731	GOLOC	0705	= 1419	30 1414 1419
GEOCONS3	33,3722	453	2 444	GIMLOCK1	23,3371	1360	1 1359	GOMANUR	07,3627	1442	1 391
GEOCONS4	33,3724	453	1 444	GIMTRIM	20,2330	731	3 730 731	GOMARK	10,2555	1466	1 1483
GEOCONS5	26,3332	= 447	1 444	GL+NOATT	40,3576	389	1 388	GOMARKF	10,2561	1466	6 246 1483
GEOIMUTT	33,2030	423	1 443	GLAMPTST	06,2502	148	1 148	GOMARKFR	10,2600	1466	4 570 1483
GEOM	04,3702	1291	2 1289 1296	GLIMITER	25,3476	872	1 872	GOMARKR	10,2575	1466	1 1483
GEOMSGN	E5,1674	= 96	7 96 1297	GLINVERT	06,2473	148	1 148	GOMARK2	10,2564	1466	3 573 782
GEORGEJ	33,3714	453	2 440 441	GLOCKCHK	06,2434	147	2 147	GOMARK2R	10,2603	1466	
GEOSAVE0	E5,1631	= 99		GLOCKMON	06,2427	147	1 145	GOMARK3	10,2567	1466	
GEOSAVE1	E5,1631	= 100	5 437 446	GLOCKOK	5333	= 159	4 148	GOMARK3R	10,2606	1466	
GEOSTRT4	5217	= 448	1 218	GLOKFAIL	0056	= 51	2 424 1360	GOMARK4	10,2572	1466	1 232
GET.LVC	04,2672	493	1 493	GLOKFBIT	5002	= 51	1 424	GOMARS	10,2556	1466	
GET+MGA	04,2654	493	3 481 638	GMAX	E7,1721	= 119	3 119 809	GOMAXL/D	25,3472	872	4 866 872
GETAKS	21,3205	1022	1 1023	GMAX/2	26,3160	879	2 872	GOMOD	04,2213	201	1 202
GETANGLE	25,2217	849		GMDIFBIT	5005	= 58		GOMOVE	27,2336	398	1 398
GETARG	32,2036	643	1 644	GMERGE	07,3363	1434	1 1437	GONEBIT	5006	= 58	
GETCADR	01,3515	1235	1 1234	GMODE	E4,1613	= 89	1 89	GONEBY	0160	= 60	4 849 871
GETCOMP	41,2515	333	5 331 333	GN/CCODE	5043	1201		GONEGLAD	25,3470	872	3 871 872
GETDHOOK	25,2533	857	1 857	GOAGIN	10,3272	= 1483		GONEPAST	0137	= 58	4 853 873
GETDLEWD	25,2677	860	1 860	GOALMCYC	41,2350	329	1 349	GONXTBNK	43,3664	1402	3 1402
GETDOWN	34,2334	540	1 537	GOANIDLE	10,3363	1477	1 1477	GOODEND	07,3550	1439	4 233 1439
GETECC	12,3717	1303	1 1303	GOBAC	13,3521	1325	2 1325	GOPERFRS	10,3127	1473	
GETERAD	13,2505	1239	4 627 1242	GOBAQUE	11,2762	1340	3 1342 1349	GOPERFS	10,3047	1471	
GETETA	26,3074	851	1 849	GOBB	4054	132	1 131	GOPERF1	10,3045	1471	8 621 1446
GETINREL	40,2225	318	4 316 321	GOBKCALB	33,3426	447	1 446	GOPERF1R	10,3125	1473	1 792
GETLCX	15,3240	1082	1 1081	GOBL/2	1214	= 79	3 79 831	GOPERF2	10,3052	1471	
GETMAXDT	13,3373	1324	1 1323	GOBLI/2	1255	= 79	3 80 835	GOPERF2R	10,3132	1473	1 390
GETNEWNM	5465	1410	1 1410	GODSP	10,2670	1468		GOPERF4	10,3055	1471	1 457
GETOFF	15,3457	1085	1 1085	GODSPALM	41,2351	329	20 323 371	GOPERF4R	10,3135	1473	1 739
GETOFF2	15,3503	1086	1 1085	GODSPR	10,2676	1468	4 391 805	GOPIN	43,2121	238	28 239 734
GETON1	15,3420	1084	1 1084	GODSPRET	10,2673	1468	3 449 767	GOPLAY	10,3312	= 1483	1 1471
GETON2	15,3443	1085	1 1085	GODSPRS	10,3061	1472	7 1466 1473	GOPOOFIX	04,2000	194	1 194
GETOPCMD	10,2047	167	1 168	GODSPRS1	10,3063	1472	1 1468	GOPOSLAD	25,3523	872	1 872
GETPART2	01,3533	1414	1 1419	GODSPR1	10,2677	1468		GOPROG	05,2526	186	2 131 132

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GOPROG2	05,2651	= 189	1 201	GWAKE	07,3257	1431	1 1431	HBN21/2	E6,1433	102	
GOPROG3	05,2667	188	3 187 188	GWAKE2	07,3217	1430	1 1431	HBN22	E6,1434	102	
GOQ	41,3025	346	1 347	GYCRS	15,2167	741		HBN30	E6,1437	102	
GOREDO20	27,2111	392	1 391	GYMDIBIT	5017	= 59		HBN31/2	E6,1440	102	
GOSHOSUM	43,2762	= 263	1 237	GYMDIFSW	0150	= 59		HBN32	E6,1441	102	
GOSLEEPS	10,3176	1474	3 1471 1482	GYROAGRE	07,3231	1430	1 1430	HCRUPTBB	4062	132	1 132
GOTO	6615	1128	13 1129 1196	GYROBUSY	07,3252	1431	1 1430	HDISP	E6,1712	= 115	1 115
GOTOADDR	E7,1645	= 118	14 118 875	GYROCMD	0047	= 39	6 152 1436	HDOT	E7,1736	= 120	2 281 546
GOTOERS	6631	1128	1 1128	GYROCTR	0047	= 39		HDOTDISP	E6,1714	= 115	1 115
GOTOGE	6644	1129	1 1128	GYROEXIT	07,3422	1435	1 1435	HEADSUP	E6,1726	= 112	6 112 845
GOTOPOOH	4106	194	74 189 1448	GYROFRAC	07,3512	1437	2 1434 1437	HIDPHALF	26,3332	= 34	12 294 1357
GOTOR21	43,2607	257	1 236	GYTOBETQ	E5,1472	= 98		HIDP1/4	26,3324	= 34	4 816 1388
GOTOR23	43,2612	257	1 236	GONBYBIT	5010	= 60		HIENERGY	12,3434	1298	1 1298
GOTOUPSY	25,3033	864	1 860	G21	E6,1672	= 114		HIGHGAIN	20,2105	416	1 416
GOTOV56	4622	631	2 392 585	==========	==========	==========	==========	HIGH4	7711	1203	4 133 1128
GOVNUPDT	40,3224	361	1 329	H	E4,1611	= 89	8 89 1350	HIGH9	7713	1203	5 484 1111
GOXDSP	10,2555	= 1483		HACK	20,3533	982	4 963 967	HIMINCON	42,3311	340	1 340
GOXDSPF	10,2561	= 1483	16 240 1502	HACKWLST	20,3542	982	1 982	HIND	0143	= 58	3 860 863
GOXDSPFR	10,2600	= 1483		HAFPA1	E7,1471	= 129	3 666 668	HINDBIT	5012	= 59	
GOXDSPR	10,2575	= 1483		HALF	5002	= 1204	26 424 1508	HIPRIO	10,2744	1469	1 1469
GRABANG	21,3376	1028	1 1025	HALFDP	04,3563	= 1206	1 1339	HISCALAR	0003	= 41	2 431 1131
GRAD	E7,1651	= 118	3 118 871	HALFNFLT	23,2267	295		HISECON	42,3310	340	1 339
GROUPKIL	04,2205	200		HALFPR	5001	= 1081	1 1082	HITEMIN	0123	= 69	3 352 353
GRP2PC	27,2750	1333	28 563 1349	HALFREV	04,2645	493	2 493	HITEMOUT	1007	= 75	4 338 341
GRP2SVQ	E7,1536	= 121	4 121 1333	HALFSAFE	36,2365	557	1 556	HIUNITX	26,3332	= 34	4 286 935
GRRBKBIT	5013	= 56	2 250 447	HALFY	1075	77	1 77	HIUNITY	26,3330	= 34	2 286 935
GRRBKFLG	0125	= 56	1 260	HALVE	26,3332	= 881	7 857 881	HIUNITZ	26,3326	= 34	3 286 935
GSELECT	07,3316	1433	3 1432	HANG20	06,2071	135	1 134	HI10	07,3773	1451	1 1450
GSHIFT	7570	1149	1 1116	HAPO	E4,1763	= 91	4 91 641	HI5	4364	379	9 135 1402
GTSCPSS	33,3131	442	1 422	HAPOX	E4,1751	= 91	5 91 522	HI6ZEROS	26,3334	= 34	31 523 1388
GTSCPSSA	33,3137	443	1 443	HAVDNRNG	25,3453	871	1 871	HMSIN	42,3365	352	1 349
GTSCPSS1	33,2001	422	1 206	HAVEBASE	31,2171	508	1 505	HMSOUT	42,3143	338	1 334
GTSFIN	42,2126	271	1 348	HAVEGUES	11,2002	487	1 723	HOLDATT	34,3577	596	
GTSFINLC	41,3157	348	1 348	HAVENORM	04,3734	1291	1 1291	HOLDFLAG	1332	81	17 400 1030
GTSFOUT	42,2120	271	1 334	HBCFADR	17,2532	943		HOLDFUNC	21,3372	1028	1 1025
GTSFOUTL	41,2564	334	1 334	HBD11/2	E6,1430	102		HOLDW	E5,1664	= 97	7 97 1258
GTSOPNDZ	E5,1655	= 100		HBD12	E6,1431	102		HORIZ	31,3136	627	1 624
GTSOPTCS	33,3632	451	1 453	HBD21/2	E6,1435	102		HORIZ.1	31,3174	627	1 630
GTSOPTSS	33,3633	451		HBD22	E6,1436	102		HORIZ.2	31,3344	629	1 629
GTSWTLST	E5,1645	= 100		HBD31/2	E6,1442	103		HORIZ.3	31,3347	629	1 629
GTSWTLT1	E5,1645	= 100	3 434 437	HBD32	E6,1443	103		HORIZ.4	31,3353	629	2 629
GUESS.	33,2016	423		HBN10	E6,1425	102	1 943	HORIZ.5	31,3355	629	1 629
GUESSBIT	5016	= 49		HBN11/2	E6,1426	102		HORIZ.6	31,3361	629	1 627
GUESSW	0034	= 49	4 487 1297	HBN12	E6,1427	102		HORIZALT	1354	83	2 627
GUESS1	33,2254	426		HBN20	E6,1432	102		HORIZON	E5,1752	= 97	6 97 621

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HP	E5,1624	=	94 8 94 558	IMODES30	1320		81 63 139 1443	IMUZERO2	07,2642		1422 1 1421
HPE	35,3123		551 1 560	IMODES33	1321		81 38 136 1428	IMUZERO3	07,2651		1422
HPER	E4,1765	=	91 3 279 641	IMPLBURN	24,2733		697 1 695	IM30INIF	05,3177		193 1 184
HPERMIN	E4,1720	=	90 12 90 560	IMPLCONT	24,2757		697 1 697	IM30INIR	05,3200		193 1 187
HPERX	E4,1753	=	91 4 91 523	IMPULBIT	5007	=	50	IM33INIT	5070	=	193 2 184 187
HPL	35,3125		551 1 560	IMPULCHK	24,2640		695	INBOUND	27,3147		1383 1 1382
HPO	E5,1630	=	94 4 94 557	IMPULSW	0044	=	50 5 203 727	INCORBIT	5005	=	56
HRCON	42,3451		353 2 352	IMU/OPT	E5,1450	=	98	INCORFLG	0117	=	56 9 580 606
HRCON1	42,3212		339 1 338	IMUAOK	21,2612		1015 1 1015	INCORPEX	E4,1642	=	89 5 540 1239
HUNTEST	25,2373		855 4 855 867	IMUATTCK	43,2420		249 1 236	INCORP1	36,3254		1252 3 582 626
HUNTEST1	25,2442		856 1 855	IMUBACK	33,2033		423	INCORP2	36,3466		1256 3 583 626
HUNTEST3	25,2561		857 1 862	IMUBAD	07,3522		1438 5 143 1438	INCOR1	36,3310		1253 1 1253
==========				IMUCADR	1322	=	81 3 192 1438	INCOR1A	36,3317		1253 1 1253
I	E6,1670	=	106 14 106 995	IMUCAGE	06,2555		152 1 159	INCOR1B	36,3346		1253 1 1253
IAVG	E6,1471		103 2 735	IMUCAL	33,2000	=	33 6 423 453	INCOR1C	36,3354		1253 2 1253
IAVG/TLX	E6,1472		103 1 943	IMUCAL1	04,2000	=	27 1 451	INCOR2	36,3415		1254 2 1254 1261
IBNKCALL	4740		1105 42 137 1429	IMUCAL2	06,2000	=	28	INCOR2AB	36,3445		1255 1 1255
ICDUFAIL	06,2665	=	158 1 159	IMUCAL3	32,2000	=	32 1 430	INCOR3	36,3451		1255 1 1255
ICORK2	43,2162		241	IMUCOARK	43,2153		240 1 240	INCR	01,2433		1193 1 1117
IDADDTAB	42,2563		279 2 270	IMUCOARS	07,2663		1423 5 241 767	INCRCDUS	22,3612		1511
IDADDTEM	0142	=	70	IMUCOARV	43,2174		241 2 241 242	INCRDCDU	22,3057		414 2 415 416
IDAD1TEM	0150		71 4 270 347	IMUCOMP	06,2000	=	28 1 297	INCRSVG	20,2214		722 1 720
IDAD2TEM	0151		71 2 270	IMUFAIL	06,2665	=	158 1 159	INDEP	E7,1774	=	126 4 1285 1286
IDAD3TEM	0152		71	IMUFINE	07,3073		1427 3 243 1442	INDERASE	6155		1111 1 1111
IDLEBIT	5012	=	49	IMUFINED	07,3115		1427 2 1427 1432	INDEX	6115		1111 1 1109
IDLECADR	43,2743		261 1 261	IMUFINEK	43,2240		243 1 236	INDEXI	23,3736		1371 1 1370
IDLEFAIL	0030	=	49 3 707 722	IMUFINEV	43,2270		243 1 243	INDEXLOC	0130	=	70 12 1111 1194
IDLEMASK	10,3232		1474 1 1479	IMUFIN20	07,3073	=	1442 2 762 767	INDEX2	6133		1111 1 1111
IDLERET1	10,3523		1479	IMUGOOD	07,3521		1438	INDJUMP	6243		1116 6 1110 1113
IDLESLEP	10,3756		1484 1 1474	IMUMON	06,2174		139 2 137	INDWORK	6153		1111 1 1111
IDOFLMK	E5,1753	=	97 1 97	IMUOP	06,2604		154 1 159	INFINAPO	12,3746		1303 2 1303
IERASTST	6074		1110 1 1110	IMUOP2	06,2625		154 1 154	INFINBIT	5011	=	62
IFAILINH	05,3165		193 1 187	IMUPULSE	07,3206		1430 7 243 1512	INFINFLG	0200	=	62 4 1289 1298
IFAILJMP	06,2737		159 1 140	IMUSE	0007	=	46 5 202 1446	INFINITY	12,3217		1295 5 1292 1295
IFAILOK	07,3117		1428 1 1427	IMUSEBIT	5010	=	47	INFLIGHT	23,2000	=	31 1 1355
IFLAGC	13,3122		1318 1 1319	IMUSEFLG	5010	=	1442 3 143 154	INHOLD	21,3463		1030 1 1030
IFLAGP	13,3077		1318 1 1318	IMUSTALL	07,3577		1441 13 239 767	INITA	27,2573		589 1 589
IFLEGAL	10,3003		1470 1 1470	IMUSTLLG	33,2316		428 5 423 441	INITB	27,2577		589 1 589
IGC	E5,1761	=	95 4 95 1360	IMUSUPER	30,2000	=	32 1 247	INITDSP	10,3261		1475 1 1414
IGNFLAG	0153	=	60	IMUTEST	33,2004		423	INITIALW	27,2565		588 2 580 623
IGNFLBIT	5003	=	60	IMUVAR	34,3337		585 2 581 584	INITLOC2	17,2550		944 1 938
IGNITION	24,2625		695 2 216 706	IMUVARR	30,3637		614 1 605	INITRL1	25,2362		854 1 853
IGSAMEX	27,2213		395 1 395	IMUZERO	07,2577		1421 2 239 423	INITROLL	25,2260		853 1 845
IMEDIATE	01,3612		1416 4 1415 1418	IMUZEROA	07,2607		1421 1 1421	INITST	06,3664		663 1 665
IMMEDRET	10,3611		1481	IMUZEROK	43,2127		239 1 239	INITST1	35,3451		664 1 671

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SYMBOL	DEF	H	REFERENCES	SYMBOL	DEF	H	REFERENCES	SYMBOL	DEF	H	REFERENCES
INITSUB	04,2330		203 2 194 199	INTPRET	6006		1107 246 199 1503	ISITPOO	04,2062		198 1 197
INITV	12,3515		1300 2 1298 1299	INTPRET1	26,2000	=	31 1 1205	ISITPRIO	10,3462		1478 2 1479
INITVEL	11,2000		487 3 476 712	INTPRET2	04,2000	=	27 1 1206	ISLIST+0	4240		373 2 373 382
INITVELX	11,2251		491 1 491	INTRPVP	04,3247		531 2 528	ISSERVON	04,2113		199 1 198
INITVEL1	11,2022		487 1 487	INTRSM	6017		1107 1 1215	ISSUP	06,2323		143
INITVEL2	11,2056		488 1 490	INTSTALL	13,3442		1324 33 199 1503	ISSWOFF	06,2700		157
INITVEL3	11,2101		488 2 488	INTTEMP	E6,1506		104 2 104 108	ISSWON	06,2710		157 1 157
INITVEL4	11,2133		489 1 489	INTVAL	33,3117		442 2 434 438	ISSZERO	06,2354		144 1 152
INITVEL5	11,2157		489 1 489	INTVALUE	05,3473		955 1 953	ISWCALL	4744		1105 1 959
INITVEL6	11,2221		490 1 490	INTVAR	E4,1777	=	92 2 92 582	ISWRETRN	4753		1105
INITVEL7	11,2224		490 1 489	INTVEC	E5,1476	=	99	IT	E5,1610	=	94 3 94 554
INITZOPT	06,3216		164 3 162 163	INTVEC1	E5,1476	=	100 3 444	ITCTR	E7,1504	=	123 4 487 490
INLINK	0045	=	39 2 192 1450	INTVEL	11,2000	=	29 1 487	ITEMP1	0061		68 49 68 1494
INREL	0137	=	70 23 317 322	INTWAKE	13,3457		1325 4 265 1321	ITEMP2	0062		68 31 68 1487
INRELTAB	40,2231		318 2 318 321	INTWAKEC	27,2722		1332 1 1332	ITEMP3	0063		68 7 68 1486
INRLBIT	5013	=	59	INTWAKEM	27,2717		1332 1 1332	ITEMP4	0064		68 8 68 1437
INRLSW	0144	=	59 2 853 854	INTWAKEU	27,2671		1332 1 1506	ITEMP5	0065		68 2 68 1411
INROLOUT	25,2351		854 3 853 854	INTWAKEX	27,2734		1332 1 1332	ITEMP6	0066		68 3 158 1411
INT-ABRT	11,3005		1340 1 1340	INTWAKE0	13,3455		1325 2 644 1333	ITERATOR	12,2550		1285 1 1298
INT/W	35,3753		1328 2 1327	INTWAKE1	13,3477		1325 3 513 1325	ITERCTR	0026	=	1307 4 1277 1296
INTBANK	13,3070		1317 1 1317	INTWAKLM	27,2732		1332 1 1332	ITISMASK	10,3510		1479 1 1478
INTBITAB	13,3540		1326 2 1325	INTWAKUP	27,2736		1332 1 1332	ITISMOON	37,3407		835 1 835
INTBIT15	0115		69 7 69 1111	INTWAKUQ	0330	=	1332 3 1331 1333	ITRO	6337		1119
INTB15+	0114		69 3 69	INTWAK1Q	0330	=	72 1 1332	ITR1	6326		1119
INTEGRV	13,3162		1320 14 210 1330	INTY	E5,1500	=	99 6 439 440	ITR10	6111		1110
INTEGRVS	13,3135		1319 7 458 916	INTYBIT	5014	=	53	ITR11	6151		1111
INTEGRV1	13,3164		1320 2 1318	INTYPFLG	0070	=	52 19 457 1330	ITR12	6103		1110
INTEGRV2	13,3167		1320 1 1350	INTZ	E5,1504	=	99	ITR13	6162		1112 1 1111
INTERCEP	16,3711		998 1 991	INVC100	32,2450		905 1 892	ITR14	6206		1113
INTERP	36,2344		556 2 556 557	INVC107	32,2470		906	ITR15	6072		1110
INTEXIT	13,3253		1321 3 1323 1324	INVC109	32,2473		906 1 906	ITR7	6230		1114
INTFLAG	0227	=	65	INVC115	32,2520		906 1 906	ITSAJOB	01,3627		1416 1 1415
INTFLBIT	5002	=	65 2 187 1325	INVC120	32,2524		906 1 906	ITSAJOB2	01,3740		1419 1 1417
INTGRATE	11,3276		1344 2 1344 1345	INVC125	32,2533		906 1 906	ITSATBL	01,3643		1416 1 1414
INTIME	E7,1502	=	123 8 123 555	INVRSEQN	12,3141		1294 1 1294	ITSAVAR	01,3543		1414 1 1414
INTINIT	13,2000	=	29 4 209 1329	IOGARATE	E6,1671	=	106 3 106 991	ITSAWAIT	01,3562		1415 1 1415
INTINIT1	11,2000	=	29 1 1320	IRETURN	E4,1614	=	89 8 89 1321	ITSEVEN	01,3744		1419 1 1416
INTINIT2	35,2000	=	33 1 1327	IRETURN1	1127		78 6 78 1331	ITSINDIR	5500		1415 1 1415
INTINT	35,2705		479 6 475 677	IRIGCOMP	06,3331		299	ITSLGCL1	5507		1417 2 1417 1418
INTINT2C	31,3662		677 2 668	IRIGX	06,3333		299	ITSLGCL2	01,3701		1418 1 1418
INTINT3P	31,3671		677 2 658	IRIGY	06,3347		299	ITSLIKEB	01,3614		1416 1 1414
INTLOOP	35,2036		464 1 464	IRIGZ	06,3363		299	ITSLNGCL	01,3726		1418 1 1414
INTMASK	05,3172		193 1 188	IRIGI	06,3407		301 2 297 301	ITSNOVAC	01,3637		1416 1 1416
INTMCTBS	41,2116		325 2 324	ISCADR+0	4234		373 2 373 382	ITSWBIT	5002	=	60
INTOTHIS	13,2155		512	ISITNOO	10,3377		1477 1 1477	ITSWICH	0152	=	59 8 463 658

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SYMBOL	DEF	H	REFERENCES
ITSWTLST	01,3733		1418 1 1417
ITURNON	06,2526		150 1 159
ITURNON2	06,2551		151 2 150 154
IXX	E6,1470		103 4 735 954
==========	==========		==========
J/M	E6,1623	=	109 3 109 1035
J/M1	E6,1624	=	109 2 109 735
J/M2	E6,1625	=	109 2 109 735
JAMIT	07,2403		233 1 233
JAMPROC	4257		374
JAMTERM	4245		373 1 1478
JCAXIS	31,3463		631 1 622
JETACTN	15,3642		1088 2 1088 1089
JETADDR	21,3763		1036 1 1036
JETAG	E6,1711	=	111 10 111 1089
JETCALL	15,3650		1089 1 1088
JETCALL1	15,3610		1088 1 1088
JETCALL2	15,3633		1088 3 1088
JETCALL3	15,3617		1088 1 1089
JETEM	E6,1720	=	112 23 112 1078
JETEM2	E6,1624	=	113 3 1076
JETROLL	16,3614		994 2 994
JETS	21,3441		1030 4 1019 1028
JETSLECT	17,2552		1039 1 1036
JJ	E7,1771	=	119 8 870 871
JLOOP	21,3445		1030 1 1035
JN	21,3655		1033 5 1032 1033
JNDX	E6,1617	=	112 9 112 1087
JNDX1	E6,1620	=	112 6 113 1088
JOBSLEEP	5175		1210 8 373 1488
JOBSLP1	01,3017		1215 1 1210
JOBSLP2	01,3030		1215 1 1217
JOBWAKE	5201		1210 13 376 1489
JOBWAKE2	01,3044		1216 1 1210
JOBWAKE3	01,3056		1216 2 1216
JOBWAKE4	01,3050		1216 1 1216
JOBXCHS	10,3216		1474 2 1469 1470
JP	21,3664		1033 6 1032 1033
JSWCHBIT	5002	=	46
JSWITCH	0001	=	46 5 1345 1350
JTAGTIME	37,3233		830 1 825
JTIME	21,3727		1035 4 1032 1033
JUNCTN1	04,3042		527 1 527
JUNCTN2	04,3075		528 1 528
JUNCT1	36,2333		556 1 557
JUNCT2	36,2337		556 3 557
JUNCT3	36,2230		555 1 555
JZERO	E6,1704	=	107
J18	21,3630		1032 2 1031 1033
J2REQSQ	13,3750		1354 1 1342
J20	21,3634		1032 1 1031
J21	21,3645		1032 1 1031
J22	21,3673		1033 5 1031 1032
J23	21,3704		1033 7 1031 1032
J24	21,3716		1033 2 1032
J4REQ/J3	13,3740		1354 2 1342
J6.	21,3516		1030 1 1030
J7	21,3542		1031 1 1031
J8	21,3551		1031 1 1031
==========	==========		==========
K.01	37,2153		459 1 458
KACOS	26,3246		880 1 852
KALCMAN3	22,2000		399 1 1442
KALCMON1	22,2000	=	30 5 399 419
KALCMON2	22,2000	=	30 1 405
KALCMON3	21,2000	=	30 1 418
KALEBCON	07,3651		1442 1 1442
KALIM	26,3314		881 2 853
KALUPDT	21,3146		1021 1 1016
KASCALE	26,3232		880 1 848
KAT	E7,1717	=	119 4 119 854
KATEST	25,2354		854 1 854
KA2	26,3306		881 1 853
KA3	26,3310		881 1 854
KA4	26,3312		881 2 854 881
KBIT	5017	=	47
KC3	26,3256		881 1 860
KOPNDX	E6,1665	=	114 4 114 415
KEEPPRIO	10,2766		1470 2 1476 1480
KEP	25,3313		869 1 864
KEPCONVG	12,2346		1281 3 1279 1280
KEPC1	0042	=	1306 3 1277 1293
KEPC2	0044	=	1306 3 1277 1293
KEPLERN	12,2042		1277 2 1335
KEPLOOP	12,2204		1279 1 1280
KEPPREP	11,2372		1334 3 1321 1340
KEPRTN	E4,1670	=	89 3 1281 1335
KEPZERO	04,3565	=	1288 3 1278 1302
KEP2	25,3317		869 2 853 869
KEYCALL	07,2141		226
KEYCOM	07,3702		1449 1 226
KEYRPTBB	4056		132 2 131 132
KEYRUPT	07,2000	=	28 1 1449
KEYRUPT1	07,3673		1449 2 131 132
KEYTEMP1	0073	=	68 6 132 1450
KEYTEMP2	0734	=	74 2 1450
KFLAG	0016	=	47 9 552 560
KILCLOCK	35,3045		481 2 481 482
KILLGRP4	26,2506		800 1 867
KILLJETS	16,3702		997
KILLMON	41,3314		356 2 356
KILL20	04,2240		201 1 201
KILMONON	4220		372 4 364 386
KLAT	E7,1631	=	118 3 118 873
KLEENEX	10,2560		1466 3 232 747
KMATRIX	21,2350		1006 2 1003 1004
KMJ	E6,1620	=	109 3 109 1006
KMJ1	E6,1621	=	109 2 109 735
KMJ2	E6,1622	=	109 2 109 735
KMPAC	E6,1510	=	108 38 108 1059
KMPTEMP	E6,1512	=	108 3 108 999
KNOWNBIT	5010	=	58
KNOWNFLG	0141	=	58 6 58 600
KPIP	37,3446		836
KPIP1	37,3450		836 2 828 836
KPRIMEDT	E6,1634	=	105 6 105 941
KRESUME1	21,2417		1009 1 1004
KRESUME2	21,3155		1022
KR1	26,3010		810 1 809
KR2	26,3014		810 1 809
KR3	26,3016		810 1 809
KR4	26,3024		811 1 809
KSPNDX	E6,1664	=	114 7 114 415
KT	E4,1763	=	91 10 91 530
KTETA	26,3234		880 1 851
KTETA1	26,3002		810 1 816
KTLX/I	E6,1636	=	105 4 105 943
KTRCS	5002	=	1092 1 1084
KT1	26,3236		880 1 851
KVSCALE	26,3230		880 1 848
KV1	E6,1666	=	114 3 114
KV2	E6,1674	=	114
KV3	E6,1702	=	114
KWE	26,3244		880 1 883
K1D	26,3224		880 1 867

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K1K2LOOP	32,2135		645 1 645	LASTYCMD	0035	=	81	LEQ	E7,1653	=	118 7 118 872
K1ORK2	07,2557		670 1 670	LAT	1103	=	78 14 78 1238	LESCHK	05,3167		193 1 192
K1RTE	35,3621		932 2 892 893	LAT(SPL)	E7,1400		117 11 117 904	LEWD	E7,1724	=	118 11 855 866
K1VAL	E3,1767	=	727 1 726	LAT-LONG	13,2370		1236 6 458 904	LEWDOVFL	25,2741		861 1 861
K2.	24,2002		670 2 670	LATANG	E7,1675	=	119 7 119 873	LEWDPTR	25,2745		861 1 861
K2CALC	32,2133		645 1 645	LATAZCHK	04,2613		452 1 423	LEWD1	26,3150		879 1 863
K2D	26,3226		880 2 867 868	LATBIAS	26,3242		880 1 873	LFTFLGON	43,2725		260 1 236
K2ROLL	E7,1643	=	118 7 118 873	LATITUDE	E5,1402		98 6 423 537	LGCLCADR	01,3764		1419 1 1418
K2RTE	35,3623		932 1 892	LATLONG	13,2000	=	29 1 1236	LGCL2CDR	5352		1234 1 1234
K2VAL	E3,1771	=	727 1 727	LATSLOPE	26,3145	=	881 1 844	LGCOMP	06,3516		303 2 297 303
K3RTE	35,3625		932 1 893	LATSW	0145	=	59 1 866	LGWAKE	07,3267		1431 2 1431 1432
K3S1	22,2371		405	LATSWBIT	5014	=	59	LGYRO	1304		80 10 192 1435
K3VAL	E3,1773	=	727 1 727	LAUNCHA7	E5,1633	=	99 8 173 543	LGYROBIN	43,2266		243 1 243
K4	22,2372		405	LBCFADR	17,2533		944 1 941	LIFTTEMP	1265	=	80 5 80 539
K4RTE	35,3627		932 1 893	LBN10	17,2512		943 1 944	LIGHTON	27,2464		587 2 587
K4SQ	22,2373		405	LBUF2	00,2470		1164 2 1188 1190	LIGHTSET	05,2753		189 2 186 188
==========	==========		==========	LCHAN	0001	=	41 16 136 1503	LIM(-22)	27,3357		1388 1 1383
L	0001	=	39 216 41 1509	LCX/360	E6,1614	=	112 18 112 1085	LIMITCOM	42,3247		339 1 339
L/D	E7,1633	=	118 13 118 875	LDANZIG	00,3712		1190 1 1189	LIMITL/D	25,3526		873 8 853 872
L/DCALC	E7,1726	=	119 1 850	LDATALST	0334		73 1 1099	LIMITS	5000	=	1200 9 889 1511
L/DCMINR	E7,1627	=	118 4 118 875	LDLOOP72	27,3665		1505 1 1506	LIMVEL	35,3143		552 1 557
L/D1	E7,1635	=	118 5 118 875	LDNDUMP	05,3733		1101 1 1101	LINUS	5526	=	1484 1 391
LAD	E7,1623	=	118 17 118 873	LDNDUMP1	43,2724		260 1 260	LINUSCHR	10,3616		1481 2 1469 1470
LADPAD	E6,1407		102 1 844	LDNDUMP1	05,3734		1101 1 1101	LITTLSUB	33,3726		454 2 450 451
LALOTORV	13,2441		1238 8 537 846	LDNPHAS1	05,3166		193 1 190	LLASRD	31,2365		610 2 608 743
LAMBERT	12,3224		1296 1 489	LDNPHAS2	05,3653		1098 1 1096	LLASRDA	31,2374		610 2 567 743
LAMBLOOP	12,3343		1297 3 1298 1299	LDPLANET	16,2000		631 1 621	LMCRATE	16,3710		998 2 991 992
LAMENTER	12,2713		1287 1 1300	LDPOSMAX	04,3576	=	1305 1 1303	LMKLMCOM	13,2302		776 1 776
LAMPTEST	06,2750		159 2 148 149	LEFT	00,2342		1161 1 1158	LMK52	13,2272		776 1 776
LANDALT	E4,1761	=	91 4 91 610	LEFT-	00,2336		1161 1 1158	LMOONBIT	5005	=	61
LANDBANK	43,3200		267 1 266	LEFTNCOM	40,3063		351 1 352	LMOONFLG	0174	=	61 5 35 1316
LANDLAT	1103	=	78 2 282 567	LEFT5	4345		378 5 331 1402	LMPOS	34,3250		584 2 580 583
LANDLONG	E4,1757	=	91 5 91 610	LEGALTST	40,2430		321 2 321	LMTOCM	43,3107		265 1 265
LANDMARK	E5,1751	=	97 22 97 778	LEMCONIC	13,3126		1318 4 552 776	LMTOCMSV	43,3102		265 1 236
LARGE	00,3065		1175 1 1175	LEMMASS	E6,1473		103 5 172 954	LNG(SPL)	E7,1402	=	117 5 117 904
LARGE2	00,3112		1177 2 1175 1176	LEMNO	05,3374		953	LNGCALL2	01,3461		1234 1 1234
LARGE3	00,3074		1177 1 1175	LEMONM	0056	=	40	LOADCDUD	22,3142		419 1 400
LARMENT	5662		1493	LEMPOS	1214	=	80 5 80 614	LOADCOEF	17,2422		942 2 938 942
LASINEX	00,3630		1189 1 1189	LEMPREC	13,3105		1318 5 34 532	LOADDAP	24,2000	=	31
LASTBIAS	06,3636		306 1 822	LEMSTORE	22,3233		498 2 498 552	LOADITIS	10,3703		1482 1 1479
LASTGTS	33,3274		445	LEMTEST	05,3370		953	LOADLV	41,2775		345 10 323 353
LASTMASP	E6,1522	=	104 1 104	LEMVEC	43,2713		260 1 237	LOADLV1	41,2001		323 1 244
LASTSEG	07,3413		1435 1 1435	LEMYES	05,3377		953 1 953	LOADSTAT	1014		76 4 345 376
LASTTIME	01,3500		1234	LEM52	13,2262		776 1 776	LOADSTDT	33,2563		436 2 437 438
LASTXCMD	0035	=	81	LENGTHOT	E5,1412		98 14 423 446	LOADTIME	22,3510		1508 30 430 1331

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LOADY7	22,3144		419 1 418	LOTEMIN	0124	=	69	LWDSTORE	25,2706		861 1 861
LOC	0164		72 45 204 1493	LOTEMOUT	1010	=	75 1 341	LXA	01,2401		1192 1 1117
LOCALARM	0057	=	40 1 1493	LOTHRUST	20,2222		722 1 720	LXC	01,2405		1192 1 1117
LOCCTR	0064	=	68 31 376 1478	LOUNITX	04,3563	=	34	L14/OUT	40,2615		336 1 336
LOCSAM	14,2225	=	749 2 740 782	LOUNITY	04,3561	=	34	L350	25,3540		873
LOCSKIRT	22,2737	=	412 7 400 403	LOUNITZ	04,3557	=	34	L353	25,3553		873 1 873
LOCTHETA	22,3625		1511 1 1511	LOWIDCOD	05,2000		170 1 1102	L355	25,3566		873 4 873 875
LOD	E7,1625	=	118 3 118 872	LOWLOAD	10,3750		1483 1 1479	L357	25,3632		875 1 873
LODMIXNN	42,2100		270 1 270	LOWMEMRY	14,2000		631 1 621	==========			
LODNLV	42,2116		270 1 270	LOWSUPER	30,2000	=	32 13 34 1500	M,6RTE	35,3533		931 1 911
LODNNLOC	41,2113		325 8 324 345	LOWVERB	41,2034		324 1 324	M/SCON1	42,3312		340 1 339
LODNNTAB	42,2062		270 1 325	LOW10	5054		1201 20 35 1401	M/SCON2	42,3313		340 1 339
LODPAD	E6,1410		102 1 844	LOW11	4372		379 7 134 1119	M/SCON3	42,3315		340 4 339
LODPHALF	04,3563	=	34 2 720 1302	LOW2	6214	=	1204 1 1158	M/SLIMIT	42,3241		339 2 339
LODPMAX	04,3576		1206 1 1305	LOW3	5023	=	1204 3 202 1155	M/SNORM	42,3255		339 7 339 340
LODPMAX1	04,3600		1206	LOW4	5026		1201 4 879 1486	M/SOUT	42,3216		339 1 334
LODP1/4	04,3611	=	34 1 1240	LOW5	4362		379 14 233 1450	MAGVEC2	E5,1721	=	96 6 96 1300
LODSAMPT	4414		380 3 356 1450	LOW7	6043		1108 14 198 1482	MAGVTPI	E5,1634	=	94 2 94 555
LOENERGY	12,3453		1299 1 1298	LOW7+2K	5055		1202 1 1114	MAINRTNE	04,3101		528 1 531
LOG	23,2155		291 1 859	LOW8	4373		379 18 378 1505	MAINRTN1	04,3125		529 1 529
LOLIM	12,3512		1300 2 1297	LOW9	5046		1201 10 224 1218	MAJ+	07,3352		1434 1 1433
LOMAT	35,2666		479 3 476 640	LOSZEROS	04,3565	=	34 5 710 1288	MAJ-	07,3472		1437 1 1433
LONG	1105	=	78 10 78 1238	LREGCHK	41,3764		504 1 502	MAKECADR	4711		1104 7 390 1488
LONGBASE	1135		78 2 1412 1418	LRGROVO	36,2410		557 1 557	MAKEGEN	10,3761		1484 1 1472
LONGCADR	1133		78 2 1234 1235	LRUPT	0011	=	39	MAKEMARK	10,2611		1466 1 1470
LONGCALL	5342		1233 4 424 1419	LSDISP	16,2556		743 1 743	MAKEPLAY	10,2770		1470 3 1469 1484
LONGCLCL	01,3721		1418 2 1418	LSPOS	26,2110		786 2 749 1337	MAKEPRIO	10,2734		1469 1 1470
LONGCYCL	01,3465		1234 1 1235	LSTBNKCH	43,3725		1403 1 1402	MAKESERV	37,3043		825 1 826
LONGEXIT	E3,1434		84 3 1234 1235	LSTIME	26,2126		787 3 786 787	MAMAX1	E7,1651	=	127 3 127 919
LONGGYRO	07,3426		1435 1 1434	LSTPTR	0144	=	70	MAMAX2	E7,1653	=	127 3 127 919
LONGRTRN	01,3505		1234 1 1235	LST1	E3,1400		84 48 132 1414	MANROT	21,3036		1019 3 1017 1025
LONGTIME	1137		78 11 1233 1418	LST2	E3,1410		84 36 190 1231	MANTABLE	21,3040		1019 2 1018 1019
LOONE	34,3711		597 1 596	LST2CON	41,2145		325 1 325	MANTOCSC	06,3112		162 3 161 162
LOOPCT	E7,1763	=	129 6 129 674	LST2FAN	43,2002		236 2 236 384	MANTOMAN	06,3107		162 1 162
LOOPMX	06,3662		663 1 665	LTHVACA	05,3171		193 4 191	MANUCALL	20,2141		416 1 416
LOOPSET	32,2130		645 4 644 645	LUNABIT	5004	=	52	MANUDES	06,3077		162 1 160
LOOPSIN	22,2414		405 1 405	LUNAFLAG	0060	=	52 24 458 1242	MANUEXIS	34,3563		596 1 594
LOOP1	23,3671		1370 1 1370	LUNCHAZ1	E5,1633	=	100 5 100 443	MANUEXIT	34,3564		596
LOOP2	23,3670		1370 1 1370	LUNENT	26,2775		810 1 808	MANUOFF	22,3133		415 1 415
LOOSE	33,2771		440 1 440	LUNPOS	26,2115		786 3 624 1345	MANUSTAL	22,3110		415
LOPC	30,2000	=	32	LUNVEL	26,2120		787 1 1346	MANUSTAT	20,2065		416 1 414
LOSCALAR	0004	=	41 3 431	LV	0044	=	40 2 1175 1177	MANUSTOP	21,2000		418 1 415
LOSVEC	E5,1413		98 5 98 451	LVBUF	6242		1115 1 1139	MANUSTUF	20,2000	=	30 2 415 418
LOS1	E5,1454	=	98	LVSQUARE	0042	=	40 2 1175 1180	MANUVER	27,2000	=	31 2 390 397
LOS2	E5,1462	=	98	LVWTLIST	5263		1223 1 1227	MANUVER1	27,2000	=	31 1 396

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SYMBOL	DEF	H	REFERENCES
MANYFEET	35,3141		552 1 554
MARKCONT	07,2153		228 1 234
MARKCOP	10,2640		1467 1 1467
MARKCTR	1126	=	78 1 513
MARKDATA	1242	=	80 8 80 623
MARKDIF	10,2203		234 1 234
MARKDISP	37,2426		571 1 228
MARKDOWN	E7,1674	=	125 11 35 771
MARKEBAN	1070		77 1 1483
MARKEND	10,2553		1465 1 1465
MARKET	07,2170		228 1 228
MARKET3	07,2217		228 2 228
MARKFLAG	1070	=	1483 1 1467
MARKFMSK	10,3253		1475 2 1466
MARKFORM	10,2565		1466
MARKINDX	0301	=	72 8 72 772
MARKIT	07,2430		233 1 226
MARKIT1	07,2157		228
MARKNV	0370		74 5 1467 1476
MARKOCT	10,3754		1483 1 1474
MARKOK	07,2015		223 1 223
MARKOVER	10,3643		1481 1 1465
MARKPERF	10,2665		1468 1 1477
MARKPLAY	10,2624		1467 4 1467 1483
MARKRET	10,3635		1481 1 1480
MARKRUPT	07,2104		225 2 131 132
MARKSTAT	1330		81 42 192 782
MARKTIME	1224	=	80 11 80 624
MARKWAKE	10,3245		1475 1 1482
MARK2	07,2225		229 1 228
MARK2DWN	E7,1502	=	117 2 173 771
MARK2PAC	1072		77 2 1475 1476
MARK3MSK	10,3727		1483 2 1466
MARK4MSK	10,3730		1483 1 1466
MARSDP	35,3437		638 1 638
MARSLEEP	10,3676		1482 1 1467
MASKREG	E5,1544	=	99
MASS	E6,1475	=	103
MASSBACK	24,3033		698
MASSPROP	05,3366		953 5 198 953
MASSTMP	E6,1652	=	106 11 106 947
MATINC	0140		70 8 70 1144
MATMOVE	14,3053		762 4 742 774
MATRXJOB	34,2117		537 2 213 431
MAT181	34,3665		597
MAX	0016	=	1307 4 1285 1286
MAXANG	22,2367		405 1 400
MAXCHECK	12,2637		1286 1 1286
MAXCHK	23,2754		523 6 522 641
MAXCOGA	12,3315		1297 2 1297
MAXDB	24,2302		687 1 687
MAXDBBIT	5004	=	63 1 203
MAXDBFLG	0212	=	63 2 253 254
MAXDT	13,3367		1324 2 1323
MAXDV	00,2642		1170 1 1166
MAXDVSW	0140	=	70 6 1162 1177
MAXIN	42,2054		254 1 253
MAXLIM	16,3714		998 2 990 992
MAXNM	23,2763		523 3 523
MAXOUT	42,2020		253 1 254
MAXPHI	32,2173		645 3 645
MAXPHIC	32,2177		645 2 645
MAXPLS	10,2201		169 2 168
MAXPLS1	10,2202		169 2 168
MAXRA	27,3060		1379 2 1379
MAXRNG	25,3772		879 1 871
MAXTEST	00,2565		1166 4 1165 1179
MAXTFF	27,3250		1385 1 1384
MAXTFF1	27,3247		1385 1 1382
MAXTFIRE	16,3553		994 1 993
MAXTST	16,3557		994
MAXVTEST	15,3376		1084 1 1084
MAXVTIM1	15,3415		1084 1 1084
MAXVTIM2	15,3433		1085
MAX250	35,3110		485 1 469
MBDYTCTL	34,3667		597 2 547 595
MCDUYDOT	E6,1647	=	105 4 105 967
MCDUZDOT	E6,1650	=	105 4 106 967
MCLEANJR	17,2365		941
MCOS22.5	35,3567		932 1 897
MCOS7.5	35,3563		932 1 897
MDOTFAIL	37,3235		830
MDOTRCS	35,3555		932 1 896
MDT	E6,1626	=	105 1 105
MD1	4376		379 3 376 1502
MEASINC	36,2000	=	33 1 1252
MEASINC1	36,2000	=	33 1 1256
MEASINC2	14,2000	=	29 1 1260
MEASINC3	35,2000	=	33 1 1260
MERRORX	E6,1541	=	108 5 108 1019
MERRORY	E6,1543	=	108 1 108
MERROR7	E6,1545	=	108 1 108
MERUPDAT	21,3015		1019 1 1018
METHOD1	22,2234		402 1 402
METHOD2	22,2210		402
METHOD3	22,2260		402 2 402
MFI	E7,1425	=	121 12 399 401
MFISYM	E6,1666	=	114 12 401 403
MFS	E7,1425	=	121 5 121 399
MGC	E5,1763	=	95 4 95 1359
MGLVFBIT	5016	=	57
MGLVFLAG	0130	=	57 2 493
MG2	07,3607		1441 1 1441
MIDAVBIT	5016	=	65
MIDAVFLG	0224	=	64 3 1321 1349
MIDDGIM	04,2000	=	28 1 493
MIDFLAG	0002	=	46 6 1320 1352
MIDFLBIT	5003	=	46
MIDGIM	04,2647		493 3 642 712
MIDGIM1	04,2667		493 1 493
MIDTOAV1	13,3553		1329 1 686
MIDTOAV2	13,3543		1329 2 691 804
MID1FBIT	5015	=	64
MID1FLAG	0223	=	64 4 1329 1331
MID2	13,3652		1331 1 1330
MID5	4363		379 1 346
MID7	4160		357 4 357 1483
MIN	0010	=	1307 4 1285 1286
MIN+	07,3347		1434 1 1433
MIN-	07,3467		1437 1 1433
MINANG	22,2366		405 1 400
MINB12	7710	=	1099 1 1097
MINB1314	05,3573		1097 1 1097
MINCHECK	12,2603		1285 1 1285
MINCOGA	12,3333		1297 1 1300
MINCON	42,3453		353 1 352
MINCON1	42,3210		339 1 341
MINCON2	42,3206		339 2 338
MINDB	24,2301		687 1 687
MINDEX	0774		75 4 199 202
MINIRECT	11,3435		1347 2 512 1327
MINLIM	16,3712		998 1 991
MINLIMAP	16,3467		992
MINPERE	23,2461		517 3 516 811
MINPERM	23,2457		517 1 519

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MINTAU	21,3316	1026	3 1025	MODDONE	12,2143	1278	3 1278	MPACSRND	00,2050	1153	1 1152
MINTIME2	05,3540	1096	1 1097	MODE	0163	72	26 297 1483	MPACTST	42,3467	353	1 352
MINTST	16,3552	994		MODECADR	1322	81	10 81 1441	MPACVBUF	7501	1148	4 1144 1369
MINUS1	7716	= 1204	2 1434 1481	MODEEXIT	07,2640	1422	8 1421 1441	MPAC2SAV	0165	= 1483	2 1467 1476
MINUS2	7715	= 1419	3 190 1414	MODEGOOD	07,3612	1441	1 1441	MPERFMSK	10,3742	1483	2 1466
MIS	E6,1720	= 114	17 114 414	MODESLP	07,3616	1441	1 1441	MPERIOD	26,2106	779	1 778
MISCJUMP	6303	1117	1 1114	MODESW	07,2000	= 28	1 1421	MPTEMP	0135	70	63 70 1191
MIXAD	41,2260	327	1 327	MOONGDEL	12,2612	1285	2 1285	MR.KLEAN	05,2501	185	2 184 1496
MIXBR	0140	= 70	12 270 351	MOOPSDEL	12,2650	1286	2 1286	MRCLEAN	17,2152	937	2 937 959
MIXCON	5033	= 270	1 270	MODREG	1011	76	20 184 1500	MRKBUF1	E7,1725	= 126	37 35 782
MIXNN1	41,2234	327	1 327	MODROUTB	04,2011	= 365	1 365	MRKBUF2	E7,1734	= 126	16 126 829
MIXNN2	41,2246	327	1 327	MONADR	40,3345	364	1 364	MRKIDBIT	5001	= 53	
MIXNOUN	41,2221	327	1 324	MONBACK	41,3350	357	1 357	MRKIDFLG	0074	= 53	
MIXTEMP	0125	= 70	3 321 327	MONBUSY	41,3351	358	1 357	MRKNVBIT	5007	= 54	
MKABORT	07,2013	223	1 222	MONDEL	41,3320	356	1 356	MRKNVFLG	0102	= 54	1 1476
MKACPT	10,2216	234	1 234	MONDO	41,3321	356	1 356	MRKREJCT	07,2310	230	1 230
MKCDUS	0360	73	2 225 229	MONITOR	41,3230	355	7 325 326	MRKRTMP	E6,1445	= 103	4 685 730
MKCDUT	0362	73	2 225 229	MONIT1	41,3232	355		MRUPTBIT	5013	= 54	
MKCDUX	0363	73	3 225 234	MONIT2	41,3245	355	2 355	MRUPTFLG	0106	= 54	
MKCDUY	0357	73	3 225 234	MONREF	41,3347	357	1 357	MSGSCAN1	32,2000	= 32	
MKCDUZ	0361	73	3 225 234	MONREQ	41,3275	356	2 356	MSIN7.5	35,3565	932	1 897
MKONCDR	17,2054	771	1 771	MONSAVE	1020	76	7 192 357	MSTORE1	01,2414	1192	2 1193 1196
MKNDX	0354	73	3 234	MONSAVE1	1021	76	12 192 383	MU(P)	0032	= 1354	
MKOVBIT	5015	= 55		MONSAVE2	1022	76	4 355 370	MUCHTIME	01,3510	1235	2 1234
MKOVFLAG	0110	= 55		MOONBIT	5004	= 46		MUEARTH	13,3734	1354	9 488 1354
MKREJECT	07,2301	230	1 226	MOONCASE	16,2365	724	1 724	MULTEXIT	5711	1494	3 1493 1494
MKRELEAS	07,2063	224	8 427 769	MOONCNTR	14,2265	749	1 749	MULTFAIL	5715	1494	1 1494
MKRLEES	07,2071	224	1 564	MOONFLAG	0003	= 46	32 458 1516	MUM	13,3732	= 1354	
MKRUPTBB	4057	132	1 131	MOONGON	23,2617	519	1 519	MUTABLE	04,3737	1305	7 494 1296
MKT2T1	0355	73	6 225 229	MOONMX	26,3421	1246	2 1243 1245	MWAITBIT	5005	= 54	
MKVACEND	07,2031	223	5 223	MOONOTH	0174	= 35	3 264 265	MWAITFLG	0100	= 53	
MKVB5X	07,2416	233	1 232	MOONPAD	23,2467	517	1 517	MXM3	22,2304	404	4 394 414
MKVB5O	07,2422	233	1 229	MOONTHIS	0173	= 34	7 264 1259	MXV	7303	1143	1 1116
MKVB5I	07,2347	232	4 223 233	MOREROLL	16,3537	993	1 993	MYSUBS	21,2000	= 30	1 999
MM	E7,1650	= 118	7 118 871	MORNUM	40,2213	318	2 317	M14RTE	35,3525	931	1 925
MMADREF	41,2033	323	1 323	MOVATHIS	13,2720	= 35	1 1327	M15RTE	35,3527	931	1 908
MMATRIX	0024	= 1251	8 1243 1341	MOVEACSM	13,2720	1315	4 35 1315	M6RTEB28	35,3537	931	
MMCHANG	41,3430	365	2 323 326	MOVEALEM	13,2773	1316	3 1259 1316	M8RTEB28	35,3545	931	1 894
MMDSPLAY	5360	1404	1 188	MOVEPCSM	13,2747	1315	3 1260 1315	M9RTEB28	35,3543	931	1 892
MMNUMBER	0775	75	9 197 201	MOVEPLEM	13,3014	1316	3 1259 1316	==========			
MMTEMP	1060	= 205	3 202	MPAC	0154	72	779 188 1515	N	E6,1656	= 106	5 106 983
MNKEYIN	0015	= 41	2 190 1449	MPAC+	00,2437	1164	2 1163	NAVKEYIN	0016	= 41	5 189 226
MODABORT	07,3622	1441	2 1441	MPAC+6	0162	= 337	7 337 380	NBDONLY	06,3542	304	1 1225
MODCHG2	12,2000	= 29	1 1516	MPAC-	00,2433	1163	2 1163	NBDX	E3,1460	84	7 84 1225
MODCHG3	13,2000	= 29	1 1516	MPACSHR	00,2033	1152	2 1160 1181	NBDY	E3,1461	84	2 299 304

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NBDZ	E3,1462	85	2 300 304	NEGVEL	21,3507	1030	3 1030	NEXTES	35,2445	472	1 471
NBD2	06,3560	304	1 306	NEG0	5020	1200	17 135 1506	NEXTIME	E6,1671	= 114	3 416 417
NBD3	06,3567	304	1 304	NEG1	7716	= 1204	5 298 1204	NEXTINCL	05,3556	1097	1 1097
NBPOSPL	33,2037	423	1 449	NEG1/2	5000	1200	9 167 1231	NEXTINSL	05,3701	1099	1 1097
NBRANCH	11,3220	1344	4 1341 1516	NEG100	5234	1220	2 620	NEXTLINE	23,2610	519	1 519
NBRCYCLP	E6,1743	= 107	4 107 700	NEG12	00,3730	1191	3 1159 1181	NEXTOPT	10,2150	168	4 168 169
NBRCYCLS	E6,1742	= 107	9 107 725	NEG180	40,2753	350	1 350	NEXTI	25,3200	866	1 866
NBSM	23,3606	1368	2 578 771	NEG2	7715	1203	7 235 1419	NEXUS	36,2462	558	2 558
NBUSMASK	10,3735	1483	1 1470	NEG3	7714	1203	6 579 1505	NICKELDP	35,3447	664	1 666
NB1NB2	23,2301	295	1 285	NEG37	31,3472	631	1 620	NINE	4334	= 1204	8 446 1045
NB2NB1	23,2257	294	4 286 287	NEG4	6061	1109	3 1049 1396	NINEB4	26,2213	788	1 787
NCDU	E6,1666	= 114	3 414 415	NEG47	14,3376	773	1 773	NINETEEN	4374	= 944	2 939 947
NDCMPTST	41,2436	332		NEG5	41,2115	325		NJET	17,3353	1054	3 1050 1053
NDRMSBIT	5006	= 60		NEG7	5731	= 205		NJETSBIT	5001	= 47	
NDXCHNGE	12,2256	1280	2 1279	NETZERO	6070	1110		NJETSFLG	0017	= 47	3 688 896
NDXCTR	E5,1421	98	6 423 426	NEWANGL	22,3031	414	1 412	NJ22	21,3567	1031	2 1031
ND1	4375	379	6 319 447	NEWANGLE	26,3546	1248	4 1246 1249	NJ23	21,3620	1032	2 1032
NEARLY1	23,2211	291	1 291	NEWAZMTH	E5,1635	= 99	3 446 454	NN	E7,1765	= 129	7 127 668
NEARONE	27,3371	1388	5 845 1385	NEWAZ1	E5,1635	= 100	2 443	NNADTAB	42,2133	271	1 270
NEAR1/4	26,3162	879	2 849	NEWDEL	12,2646	1286	2 1285 1286	NNADTEM	0146	71	8 270 348
NEEDLBIT	5007	= 46		NEWDELHI	22,3026	414	1 417	NNTYPTAB	42,2277	275	1 270
NEEDLEIN	17,2317	940	1 939	NEWDELX	12,2276	1280	3 1280	NNTYPTEM	0147	71	5 270 347
NEEDLER	21,2420	1011	10 540 1090	NEWIBIT	5003	= 61		NN1	E7,1765	= 127	2 280 558
NEEDLER1	21,2431	1011	1 1011	NEWIFLG	0172	= 61	3 1319 1324	NN1A	E7,1727	= 127	13 127 922
NEEDLER2	21,2462	1011	2 249 1011	NEWJOB	0067	68	23 191 1403	NN2	E7,1731	= 127	8 127 925
NEEDLES	21,2476	1012	1 250	NEWLIST	05,3551	1097	2 1096 1097	NO.CORES	01,2657	1211	2 1211 1216
NEEDLES3	21,2471	1012	1 1011	NEWLOC	0065	= 68	10 205 1216	NO.MMS	0041	= 208	1 208
NEEDLFUP	16,2746	946		NEWMODE	6027	1108	6 1124 1509	NO.T5VAR	21,2623	1015	1 1014
NEEDLE11	21,2443	1011	1 249	NEWMODEA	5357	1404	1 202	NO.WDS	6213	1113	5 1113 1182
NEEDLFLG	0006	= 46	3 244	NEWMODEX	5354	1404	14 422 1506	NO.05G	25,2255	850	1 850
NEG	6710	1130	4 1130	NEWOPS	6037	1108	1 1107	NO.12-10	16,3665	995	1 995
NEG.2	40,2765	350	1 350	NEWPAR	14,2461	754	1 754	NO.13-15	16,3635	995	
NEGAMA	25,2751	862	1 857	NEWPHASE	4114	221	9 437 825	NO.16-14	16,3656	995	
NEGBPW	05,3517	955	1 953	NEWPRIO	0063	= 68	13 202 1472	NO.9-11	16,3644	995	1 995
NEGCOS	13,2553	1240	1 1240	NEWRNVN	26,2243	790	1 790	NOACY	17,3122	1046	3 1045
NEGMAX	5001	= 1204	12 416 1226	NEWROLL	16,3542	993	2 993	NOADJUST	42,3737	935	2 934 935
NEGONE	7716	1203	27 160 1396	NEWSTATE	12,2665	1287	1 1289	NOATTOFF	07,3151	1428	4 143 1427
NEGOPCMD	10,2161	168	1 168	NEWTN	10,2333	672	2 672	NOAZCHGE	33,3376	446	1 445
NEGOPT	40,2540	335	1 335	NEWZCMP1	35,3635	1261	2 1260	NOBDZ	17,3040	1044	3 1043 1044
NEGOUT	13,2561	1240	1 1240	NEWZCOMP	14,3377	1260	1 1254	NOBITS	E5,1452	= 98	
NEGP	12,3431	1298	3 1297 1298	NEXBNKSS	33,3566	451		NOCHANGE	21,2724	1017	1 1017
NEGSGN	40,2275	319	1 316	NEXTBNKS	33,3550	450		NOCHG	35,2766	480	1 480
NEGTESTS	25,3203	866	1 867	NEXTCDU	07,2743	1424	4 1424 1425	NOCHORLD	33,3401	446	1 445
NEGTEF	27,3244	1385	2 1384	NEXTCOL	11,3542	1349	2 1350	NOCOARSE	05,2635	187	1 187
NEGTOVFL	12,2344	1281	1 1281	NEXTCORE	01,2717	1212	2 1211	NODAPUP	42,3631	734	1 734

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SYMBOL	DEF	H	REFERENCES
NODDOT	26,3642		1251 1 1246
NODIO	26,3650		1251 1 1246
NODISKY	25,3606		874 1 873
NODOBIT	5017	=	51 2 198 200
NODOFLAG	0054	=	51 5 210 1496
NODOP01	0022	=	48 1 536
NODSPOUT	06,2132		137 2 135
NODSPY	06,2154		137 1 137
NOEBANK	43,3364		1398 1 1399
NOFLASH	24,3363		705 1 705
NOGAMDOT	37,3705		887 1 887
NOGAMDUT	15,2651		1072 1 1071
NOGIMBUN	06,2455		148 2 147
NOGO	22,2730		411 2 400 414
NOGOMZ	22,2725		411
NOGUESS	12,3477		1299 1 1297
NOHIAUTO	21,2675		1016 1 1016
NOIBNKSW	6032		1108 1 1149
NOINT	13,2677		1314 1 1313
NOKILL	43,2775		263 1 263
NOLOCALC	25,2253		850 2 850
NOLEM	17,2624		1040 1 1040
NOLEMVAL	05,3463		955 1 953
NOMDNLST	05,2107	=	170
NOMTIG	E7,1447	=	117 3 117 724
NOMTPI	E4,1763	=	91 9 464 659
NOMXFIRE	16,3565		994 1 994
NONAVKEY	05,2773		190 5 186 189
NOPIF	35,2567		475 1 475
NOPOLY	34,2615		547 3 542
NOPOLYM	37,2233		544 1 547
NOPO1BIT	5004	=	48 3 184 442
NOQBRSM	5337		1232 1 132
NOQRSM	5335		1232 4 192 997
NORATE	21,3005		1019 1 1018
NORESET	07,3313		1432
NORFBIT	5005	=	46
NORFHOR	0004	=	46 4 621 629
NORFINAL	13,3326		1323
NORMADR	42,3314		340 1 339
NORMBNCH	10,3303		1476 1 1482
NORMEX	1340		82 20 469 662
NORMGAM	E4,1615	=	89 7 89 1261
NORMLIZE	37,3236		831 3 217 823
NORMLOP	33,2645		438 1 438
NORMRET	10,3651		1482 2 1480
NORMSW	0156	=	60 8 488 1291
NORMTEM1	1045	=	76 3 760 1473
NORMTEST	00,3511		1186
NORMT4	06,2007		133 2 133
NORMUNIT	22,3726		1514 1 1514
NORMUNX1	22,3724		1514
NORMWAKE	10,3555		1480 1 1482
NORMZI	0044	=	1261 12 1260 1261
NOROLL	16,3611		994 6 991 994
NOROLL1	16,3676		997 1 998
NOROLL1T6	16,3704		998 1 994
NOSAM	15,2353		783
NOSAVPIP	37,3016		825 1 824
NOSHIFT	22,3770		1515 6 1514
NOSWBIT	5011	=	58
NOSWITCH	0142	=	58 3 864 873
NOTADDUL	16,2525		727 1 726
NOTBIT12	40,3577		389 2 388 389
NOTIME	13,3674		1331 2 1330 1331
NOTPLAN	15,2401		783 1 783
NOTSET	35,3427		638 1 638
NOTYET	20,3633		1066 1 1066
NOUN	40,2271		319 1 316
NOUNADD	0145	=	71 29 327 378
NOUNCADR	1017		76 9 324 378
NOUNREG	1002		75 15 192 376
NOUNTEM	0122	=	69 3 327
NOUNTEST	41,2460		332 2 343 344
NOUT	1016		76 9 135 385
NOUTCON	5024	=	1204 1 192
NOUVEAU	04,2260		202 1 200
NOVAC	5134		1208 35 136 1482
NOVACADR	01,3767		1419 1 1416
NOVAC2	01,2650		1211 1 1208
NOVAC3	01,2653		1211 1 1212
NOVRWRT	35,2643		477 1 478
NOV37MM	04,2520		208 1 198
NOXLNCMD	17,2636		1040 1 1039
NO2Y	17,3401		1056 4 1056
NO2Z	17,3405		1056 3 1057
NPJETS	E6,1523	=	108 7 108 1051
NRJETS	E6,1522	=	108 13 108 1057
NRMAG	0040	=	1373 7 814 1383
NRMIDBIT	5003	=	53
NRMIDFLG	0076	=	53
NRMNVBIT	5010	=	54
NRMNVFLG	0103	=	54 1 1477
NRTERM	0020	=	1373 7 814 1382
NRUPTBIT	5014	=	55
NRUPTFLG	0107	=	55
NSEC	15,3171		1079 1 1077
NTP/2	23,3151		668 2 668
NTRYPRIO	5002	=	844
NUCHANG2	01,3032		1215 1 1220
NUDIRECT	01,3242		1220 1 1220
NUFAZ+10	4126		221
NUJET	E6,1612	=	112 7 112 1088
NUM	40,2076		316 9 315 316
NUMGRPS	5022	=	193 2 188 189
NUVCSM	E3,1600		86 1 630
NUVLEM	E3,1652		86
NVBNKTEM	1040		76 1 370
NVBUSMSK	10,3740		1483 1 1478
NVCADR	10,3731		1483 1 1479
NVCOM	40,2260		319 1 319
NVDSP	10,3312		1476 2 1477 1483
NVDSP1	10,3341		1476 1 1476
NVMONOPT	4171		370 1 1476
NVQTEM	1037		76 2 370
NVSAVE	0371		74 3 184 1482
NVSBBBNK	4215		370 2 370
NVSBCOM	4200		370 1 382
NVSBENDL	40,3346		364 2 364 366
NVSBWAIT	4461		382
NVSBWTI	4471		382 1 382
NVSUB	4170		370 3 237 1482
NVSUBB	41,2000		323 1 370
NVSUBCOM	4204		370
NVSUBEND	4216		370 4 364 372
NVSUBSY1	04,2577		382 1 382
NVSUBUSY	4456		382 2 382 1479
NVSUB1	41,3544		371 2 323 370
NVSUB2	41,3571		371 1 371
NVTEMP	0123	=	69 9 370 382
NVWORD	0367		74 5 1474 1482
NVWORD1	1145		78 20 635 1478
NV50DSP	10,3342		1476 3 1468 1478
NWAITBIT	5006	=	54
NWAITFLG	0101	=	54

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SYMBOL	DEF	H	REFERENCES	SYMBOL	DEF	H	REFERENCES	SYMBOL	DEF	H	REFERENCES
NXPOSVEL	40,3717		633 1 633	OCT14	5771		1496 4 159 1442	OCT44571	04,2403		205 1 199
NXTBNK	43,3635		1402 2 263 1403	OCT140	5040	=	1204	OCT50	5033		1201 8 249 1482
NXTFL33	06,2425		146 7 155 156	OCT1400	5051		1201 11 199 1414	OCT51	43,3100		265 2 264 265
NXTIBT	06,2413		146 3 146	OCT14000	5066	=	1411 2 1410 1411	OCT53	24,2430		690
NXTIFAIL	06,2227		140 11 149 154	OCT15	5025		1200 4 157 1178	OCT54	06,2754		159 1 143
NXTIFBIT	06,2215		140 3 140	OCT15000	5067	=	159 1 157	OCT55000	41,3726		387 1 386
NXTRST	05,2722		189 2 188 189	OCT16	4333	=	1178 2 782 1178	OCT600	04,2404		205 1 199
NXTSUPR	43,3662		1402 1 1402	OCT16000	21,3037		1019 4 1017 1028	OCT60000	4105	=	1204 16 188 1479
NXXTBNN	33,3143		443	OCT17	27,2500		587 1 586	OCT605	35,3561		932 3 894 925
NYJETS	E6,1524	=	108 6 1042 1052	OCT1720	06,2760		159 1 155	OCT612	35,3562		932 1 906
NZERO	17,2534		944 1 937	OCT176	00,2126		1155 2 1161	OCT613	16,2717		913 1 913
NZEROJP	17,2535		944 1 941	OCT177	6043	=	1419 1 1416	OCT62	5036	=	1446 1 1446
N10	E6,1723	=	106 39 107 977	OCT17770	5072		1202 2 1409 1411	OCT6200	05,2525		185 1 185
N22ORN17	0220	=	64 2 244 245	OCT20100	10,3764		1484 1 1469	OCT66	14,2711		758 1 757
N2217BIT	5012	=	64	OCT203	37,2400		564	OCT67777	10,3757		1484
N45PROC	35,3050		482 1 481	OCT217	5762		1496	OCT7	5023	=	1485 5 1409 1485
N49DISP	E7,1501	=	121 12 280 626	OCT220	07,3672		1444 1 1443	OCT740	06,2761		159 1 152
N89ERRX	30,2166		567 1 567	OCT23	4374	=	1204 1 1113	OCT74777	05,3174		193 1 190
==========				OCT24	4112		197 5 165 708	OCT75	06,2755		159 1 158
OBLATE	11,3010		1341 2 1337 1338	OCT24100	10,3476		1479 1 1467	OCT77000	06,2762		159 1 152
OBTAINLL	30,2137		567 1 568	OCT25	4376	=	1204	OCT77603	05,3173		193 1 190
OCCOS	14,2325		750 2 749 750	OCT27	11,3775		1353	OCT7777	05,2751		189
OCCULT	14,2466		754 2 753	OCT27/24	24,2427		690 1 698	OCT77770	5731		1495 4 205 1485
OCDUFTST	06,3224		165 2 160 163	OCT272	06,2756		159 1 152	OC14400	33,2441		431 1 423
OCTAL3	6214		1113 1 1204	OCT30000	4371	=	189	OC24100	43,2123		238 1 237
OCTAL30	43,2477		250 1 249	OCT30002	6440	=	1204	OC40010	06,2753		159 1 158
OCTBACK	41,3411		361 1 364	OCT31	4113		197 4 354 829	OC40200	27,2501		587
OCTHIRTY	5027	=	165 2 160	OCT34BAR	42,3513		354 2 354	OFFTUNIT	22,3766		1515 1 1515
OCT00010	5014	=	202	OCT3400	10,3734		1483 1 1473	OGA	E6,1664	=	106 6 106 991
OCT00060	21,3034		1019	OCT34300	10,3743		1483 1 1466	OGAD	E6,1450		103 2 695 946
OCT00077	31,3460		631	OCT35	24,2431		690	OGAERR	E6,1664	=	106 1 946
OCT00300	21,3035		1019	OCT37	4362	=	233 4 189 825	OGANOW	E6,1662	=	106 10 106 989
OCT01120	04,2410		205 1 200	OCT37737	06,2164		138 1 148	OGAPAST	E6,1663	=	106 3 106 989
OCT01400	21,3033		1019 1 1033	OCT37766	7676		1203 1 1003	OGARATE	E6,1533	=	107 8 989 993
OCT01760	21,3032		1019 1 1017	OCT37774	7677		1203	OGC	E5,1757	=	95 19 95 1360
OCT02200	20,2344		731 1 730	OCT37776	7700		1203 5 137 1480	OGCPL	33,2444		431 1 441
OCT02202	24,3065		699 1 699	OCT40	5012	=	165 2 162 163	OGF	E6,1702	=	114
OCT10000	5003	=	189	OCT40001	6056		1109 2 1204 1226	OHWELL1	27,3414		1501 5 1501
OCT10001	7632	=	1204	OCT40010	07,3072		1426 2 1426 1428	OHWELL2	27,3437		1501 4 1501 1502
OCT10200	10,3762		1484 1 1469	OCT40200	7704		1203 2 1492	OKMAX	35,2421		471 1 471
OCT11	4334	=	1200 1 586	OCT40201	01,3402		1229 1 1226	OKPHI	22,2723		410 1 410
OCT1103	5756		1496 1 1496	OCT404	14,2203		746 1 746	OKTHETA	22,2703		410 1 410
OCT12	4377	=	689	OCT40400	7765		1495 2 1469 1494	OKTOCOPY	10,2760		1470 2 1470 1475
OCT120	5037	=	1204 2 201 998	OCT40420	10,3760		1484	OKTOENT	10,3533		1479 1 1482
OCT13	5024	=	165 2 161 741	OCT41	4270	=	802 1 792	OKTOGRAB	13,3516		1325 1 1325

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SYMBOL	DEF	H	REFERENCES
DKTDPLAY	10,3021		1471 3 1470
DKU12	22,2250		402 1 402
DKU21	22,2224		402 1 402
DKU31	22,2274		403 1 403
DK2DELAY	00,3746		1488 1 1488
DLDAZMTH	E5,1637	=	99 3 443 446
DLDAZ1	E5,1637	=	100
DLDBODY1	E6,1503	=	115
DLDBODY2	E6,1504	=	115
DLDBODY3	E6,1505	=	115
DLDBT1	1074	=	77 1 829
DLDELP	E6,1706	=	111 3 111 1071
DLDELQ	E6,1707	=	111 3 111 1070
DLDELR	E6,1710	=	111 3 111 1071
DLDPRIO	5440		1410 1 1413
DLDUYA	E7,1533	=	118 3 118 883
DMEG/MS	33,2447		431 2 430 431
DMEGA	E7,1457	=	121 9 121 1256
DMEGAB	E6,1533	=	104 4 104 107
DMEGAC	E6,1525	=	104 7 104 722
DMEGACLC	16,2277		721
DMEGAES	E4,1546	=	89 1 787
DMEGAM1	E5,1642	=	97 3 97 1257
DMEGAM2	E5,1650	=	97 3 97 1257
DMEGAM3	E5,1656	=	97 3 97 1258
DMEGAXB	E6,1533	=	104
DMEGAXC	E6,1525	=	104
DMEGAYB	E6,1535	=	104 3 964
DMEGAYC	E6,1527	=	104 2 937 963
DMEGAZB	E6,1537	=	104 3 967
DMEGAZC	E6,1531	=	104 1 967
DMEGMOON	13,3062		1317 1 1317
DNCEMORE	33,3037		441
DNE	5017	=	1204 186 135 1514
DNE/C	31,3436		630 2 625
DNEBIT	04,3631		1288 1 1299
DNEB4	26,2215		788 1 788
DNEDPP	33,3115		442 2 428 446
DNEORTWO	5426		1410 1 1411
DNESEK	21,2157		1003
DNETHOU	17,2545		944 1 938
DNETHTH	35,3453		664 1 666
DNMNITOR	37,3064		827 1 827
DNROLL	16,3430		992 1 991
DP/INERT	43,2136		239 2 239 240
DPDEGIN2	40,3011		350
DPDEGOUT	40,2524		335 1 334
DPFAILOF	06,3252		165 1 165
DPFAILON	06,3235		165
DPIMDIFF	43,2147		239 1 239
DPJUMP	6046		1108 1 1108
DPJUMP2	6216		1114 1 1108
DPJUMP3	6232		1115 1 1114
DPONLY	06,2342		143 1 142
DPTCADR	1323	=	81 3 192 747
DPTCOARK	43,2175		242 1 240
DPTCOARV	43,2174	=	242 1 242
DPTC1	43,2217		242 3 242
DPTDATA	33,3445		449 1 449
DPTDEGIN	40,3004		350 1 349
DPTDRIVE	10,2000		166 1 137
DPTDRV	10,2000	=	28 1 166
DPTIND	1303		80 25 160 744
DPTINITE	05,3202		193 1 184
DPTINITR	05,3203		193 1 187
DPTIONVN	23,2406		516 1 515
DPTIONX	1051	=	76 6 271 516
DPTIONY	E4,1742	=	90 3 502 503
DPTION1	1131		78 7 271 1473
DPTION2	1132		78 12 281 896
DPTION36	20,2200		502 1 502
DPTMODES	1331		81 38 144 1492
DPTMON	06,2765		160 2 137
DPTNREG	E5,1473	=	98
DPTNSW	0046	=	51 3 527 528
DPTN1	04,3013		527 1 527
DPTN2	04,3071		528 1 528
DPTSTALL	07,3573	=	1441 2 453 772
DPTTEST	06,2130		137 2 137
DPTVARK	20,3232		973 1 972
DPTX	0036	=	39
DPTXCMD	0054	=	40
DPTY	0035	=	39 2 81
DPTYCMD	0053	=	40
DPTZERO	06,3151		163 1 162
DPT2	10,2044		167 1 167
DRBITAL	11,2000	=	28 1 1334
DRBITAL1	11,2000	=	28 1 1353
DRBITAL2	13,2000	=	29 1 1353
DRBWFBIT	5012	=	52
DRBWFLAG	0066	=	52 14 210 1350
DRDERBIT	5012	=	62
DRDERSW	0201	=	62 3 1285 1286
DRIGCHNG	11,3361		1346 2 1320 1345
DRIGEX	E4,1670	=	89 7 89 1346
DTHERV	04,3257		532 1 531
DTHINT	31,2236		509 1 510
DTHPREC	13,3105	=	34 4 503 516
DTHSHIP	23,2423		516
DUT	13,2211		513 1 513
DUTHERE	0161	=	1483 3 1479 1481
DUTPUT	20,2315		731 3 730
DUTTAG	E6,1611	=	112 4 112 1089
DUTO	0010	=	41 5 134 138
DVERADAY	23,2245		294 1 294
DVERFFIX	33,2276		428 2 426 430
DVERFLOW	6766		1133 3 1132 1156
DVERFLWY	6763		1133 4 1131 1156
DVERFLWZ	6760		1133 4 1131 1156
DVERNOUT	25,3577		873
DVF+	00,2414		1162 2 1162
DVFIND	0121		69 13 891 1214
DVFLCLR	12,3222		1295 1 1295
DVRLINE	15,3431		1085 1 1085
DVRLINE1	15,3437		1085 2 1083 1085
DVRLINE2	15,3441		1085 1 1085
DZONE	10,2016		166 2 166
==========			
P	E5,1741	=	96 15 96 1303
P(T1)	E7,1755	=	127 3 127 905
P/RJCODE	15,3205		1080 4 1074 1088
P/RPRE	0032	=	128 2 908 909
PAC	E5,1775	=	95 11 95 782
PACLIM	20,2635		964
PACTIVE	05,2730		189 1 189
PACTOFF	E6,1423		102 19 171 960
PACTTMP	E6,1672	=	106 4 106 949
PADLONG	1263	=	80 2 80 537
PARAM	04,3637		1289 4 908 1303
PARAM30	35,3404		637 3 636 638
PASSIVE	22,3247		498 4 472 658
PASTEOPT	4146		357 1 357
PASTEVB	4140		357 3 357 364
PAXERR	E6,1476	=	113 1 1090
PAXERR1	E6,1713	=	111 8 111 1090

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SYMBOL	DEF	H	REFERENCES	SYMBOL	DEF	H	REFERENCES	SYMBOL	DEF	H	REFERENCES
PBIAS	24,3757		717 1 715	PHASE2	0755		75	PIC4	14,2405		753 1 753
PBIASX	E3,1452		84 1 84	PHASE3	0757		75	PIINVERS	35,3133		551 1 553
PBIASY	E3,1454		84	PHASE4	0761		75	PIKUP20	37,2345		563 1 212
PBIASZ	E3,1456		84	PHASE5	0763		75 3 539 833	PINACT	05,2735		189 1 189
PBLASTOK	17,3222		1051 1 1050	PHASE6	0765		75	PINBALL1	40,2000	=	34 1 315
PBODY	E4,1550		89 18 89 1352	PHEXIT	13,3224		1321 1 1320	PINBALL2	41,2000	=	34 1 323
PBYPASS	17,3372		1055 1 1050	PHICALC	32,2156		645 1 645	PINBALL3	42,2000	=	34 2 270 338
PCDUDOTS	20,2543		963	PHIDOT	E6,1705	=	111 7 111 1090	PINBALL4	04,2000	=	27 1 375
PCDUYPST	E6,1645	=	105 4 105 971	PHIV	E4,1565	=	89 6 89 1348	PINBRBIT	5012	=	54
PCDUZPST	E6,1646	=	105 4 105 971	PHI2	E7,1760	=	127 6 127 920	PINBRFLG	0105	=	54 1 1476
PCLOOP	05,2670		188 1 188	PHI333	E6,1506	=	104 11 104 954	PINBRNCH	10,3272		1475 8 198 1483
PCMD	E6,1623	=	105 8 105 966	PHSBB1	E3,1437		84	PINDEX	E6,1520	=	108 3 108 1041
PCON	E7,1717	=	127 3 127 928	PHSBB2	E3,1441		84	PINIDMSK	10,3571		1480 1 1480
PCOPY	20,2674		966 2 960 965	PHSBB3	E3,1443		84	PINMASK	7707	=	1483 1 1475
PCOPYCYC	20,2672		965	PHSBB4	E3,1445		84	PINSUPBT	4215	=	370 5 244 374
PDA	0026	=	73 2 287	PHSBB5	E3,1447		84	PINSUPER	40,2000	=	33 1 244
PDAPEND	20,2673		965	PHSBB6	E3,1451		84	PINTEGRL	20,2571		963 1 963
PDDL	6472		1125 1 1116	PHSCHK2	16,3221		959	PINTEST	43,2002	=	384
PDELOFF	E6,1605	=	105 7 105 964	PHSCHNG2	10,2451		1411 1 1410	PIPABIAS	E3,1452	=	84 1 297
PDSPFBIT	5004	=	53 1 588	PHSNAME1	E3,1436		84 7 204 1416	PIPACHK	33,2131		425 1 424
PDSPFLAG	0077	=	53 3 391 575	PHSNAME2	E3,1440		84	PIPAGE	1230	=	79 5 79 833
PDVL	6526		1126 1 1116	PHSNAME3	E3,1442		84	PIPASC	33,3704		453 1 439
PDXCHNGE	12,2312		1280 2 1280	PHSNAME4	E3,1444		84	PIPASCF	E3,1453	=	84 1 297
PEGGY	05,3435		954 2 954	PHSNAME5	E3,1446		84 2 888	PIPASCFX	E3,1453		84 1 84
PERFCHEK	10,3357		1477	PHSNAME6	E3,1450		84	PIPASCFY	E3,1455		84
PERFDLAY	E5,1656	=	100 3 424 443	PHSPART2	01,3755		1419 1 1419	PIPASCFZ	E3,1457		84
PERFERAS	33,3033		441	PHSPRDT1	1054		76 5 1410 1418	PIPASR	37,3254		832 2 823 824
PERFMASK	10,3717		1482 2 1471 1473	PHSPRDT2	1056		76 3 200 619	PIPATASK	33,2153		425 2 425
PERF2MSK	10,3723		1483 2 1471 1473	PHSPRDT3	1060		76 1 205	PIPAX	0037	=	39 13 271 1508
PERF4MSK	10,3725		1483 1 1473	PHSPRDT4	1062		76 1 202	PIPAY	0040	=	39 4 434 1508
PERIAPO	22,3163		496 2 556 666	PHSPRDT5	1064		76 1 861	PIPAZ	0041	=	39 7 434 1508
PERIAPO1	22,3153		496 5 465 669	PHSPRDT6	1066		76 2 635	PIPCHECK	37,3106		828 1 828
PERIODCH	12,2131		1278 1 1278	PHS2CADR	01,3762		1419 1 1414	PIPCTR	1227	=	79 4 79 827
PERORLIM	20,2617		964	PI/16	27,3355		1388 2 1384 1386	PIPFAIL	06,2632		155 1 159
PERRB	E6,1575	=	105 4 105 966	PI/4.0	23,3102		577 2 576 626	PIPFREE	07,3173		1429 1 829
PFAILOK	07,3137		1428 1 143	PICAPAR	14,2333		752 1 740	PIPFREE2	07,3170		1429 1 1429
PFAILOK2	07,3132		1428 1 1428	PICBXT	14,2530		755 1 755	PIPINDEX	E5,1422		98 4 425 428
PFORWARD	20,2620		964	PICEND	14,2522		755 1 753	PIPJOBB	33,2170		425 1 425
PFRATBIT	5014	=	51	PICGXT	14,2526		755 1 755	PIPLOOP	37,3122		828 2 828
PFRATFLG	0051	=	51 3 684 757	PICKANG1	27,2235		395 1 395	PIPSDONE	37,2745		824 1 834
PGNCSALT	1272	=	80 1 537	PICKAXIS	27,2256		396 2 394	PIPTIME	1204		79 18 79 1328
PHASCHNG	5412		1409 110 194 1507	PICKX	27,2310		396 2 396	PIPTIME1	1245	=	79 8 79 1330
PHASETAB	10,2000	=	28 2 1404 1411	PIC1	14,2370		753 3 753 754	PIPUSE	07,3156		1429 2 306 435
PHASETMP	E6,1611	=	107 2 941 942	PIC2	14,2373		753 1 753	PIPUSE1	07,3162		1429
PHASE1	0753		75 4 189 1413	PIC3	14,2402		753 6 753 754	PITCHANG	0026	=	935

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PITCHDAP	20,2530	963	1 978	POSDEL	12,2632	1286	1 1285	PREC132	32,2604	909	1 911
PITCHTIM	17,3164	1050	3 1056 1057	POSDELX	12,2264	1280	1 1279	PREC140	32,2607	909	1 909
PITCHT5	20,3473	978	2 967 971	POSEC	42,3327	340	2 340	PREC150	32,2612	909	
PJETS	17,2733	1042	3 1041 1062	POSECADR	26,2431	796	1 792	PREC155	32,2625	909	
PLANET	15,2340	782	4 756 769	POSEXIT	E6,1724	= 112	5 112 888	PREC160	32,2637	909	1 909
PLANTIN	26,2000	= 31	1 1243	POSGN	40,2310	319	1 316	PREC162	32,2647	909	1 909
PLANVEC	E5,1600	= 93	5 93 769	POSITON	E5,1423	98	5 423 431	PREC165	32,2655	909	2 909
PLAYJUM1	10,3037	1471	3 1476 1483	POSMAX	4777	1200	37 149 1494	PREC167	32,2672	910	1 910
PLAYTEM1	0155	= 1484	27 1466 1474	POSNV	E5,1530	= 99	2 440	PREC168	32,2674	910	1 910
PLAYTEM3	0157	= 1484	3 1473 1481	POSN17C	33,3170	443	2 443 446	PREC170	32,2703	910	
PLAYTEM4	0160	= 1484	11 1465 1481	POSOPCMD	10,2144	168	1 168	PREC172	32,2750	911	1 911
PMANNDX	E6,1657	= 110	5 110 1025	POSTAND	26,3737	1447	2 1446 1447	PREC173	32,2752	911	1 911
PMINF	35,3445	663	2 673	POSTBURN	24,2246	686	3 215 698	PREC174	32,2762	911	1 911
PMINM	35,3455	664		POSTCDH	E7,1471	= 129	4 129 673	PREC175	32,2770	911	2 908 910
PMISC	20,2717	966		POSTCOM	26,3766	1448	2 1448	PREC205	32,3005	911	
PMMASK	10,3736	1483	1 1471	POSTCSI	E7,1457	= 129	3 129 673	PREC205M	32,3024	912	1 911
POFFSET	20,2632	964		POSTJUMP	4701	1103	64 143 1515	PREC206	32,3027	912	1 912
POINTAXS	31,2705	623	2 622 623	POSTTPI	E5,1640	= 93	4 280 558	PREC207	32,3037	912	1 911
POINTER	0156	= 1419	7 1417 1419	POST41	24,2275	687	5 685 706	PREC210	32,3056	912	1 912
POINTEX	1150	= 79	6 79 624	POSVEL	21,3477	1030	3 1030	PREC220	16,2703	912	1 911
POINTVSM	E6,1756	= 114	5 114 714	POS1/2	5002	= 1204	9 1068 1226	PREC225	32,3071	913	1 913
POINT1	26,3152	879	1 866	POS1/4	11,3755	= 1353		PREDANG	E7,1770	= 119	2 119 871
POINT2	26,3154	879		POUT	20,2636	964		PREDICT3	25,3343	870	1 870
POINT8	26,3270	881	1 595	POWDNCOD	6214	= 540	1 536	PREDOT	7123	1138	2 1143 1146
POLISH	0117	69	38 69 1199	POWERED	0003	= 209	4 209	PREDSPAL	40,3323	364	1 334
POLLEY	5113	1207	2 1207	POWFLITE	23,2000	= 31	1 1365	PREFINAL	25,3333	870	4 856 870
POLY	7171	1139	10 291 1387	POWFLIT1	23,2000	= 31	1 1372	PREL	E6,1701	= 111	8 111 1091
POLYCNT	0140	= 70	4 1139 1140	POWFLIT2	23,2000	= 31	1 291	PRELTERM	33,3427	447	2 446 447
POLYCOEF	12,3043	1292	1 1294	POWRSERS	7164	1139	1 542	PREMM1	04,2457	= 207	3 198 208
POLYCOM	7201	1139	1 1139	PPRECOMP	20,2644	964		PREMTRXC	E5,1632	= 99	5 445 454
POLYLOC	E6,1673	= 114	1 547	PRAXIS	E7,1722	= 126	5 126 597	PREMTRX1	E5,1632	= 100	1 443
POLYLOOP	7211	1140	1 1140	PRDTTAB	01,2000	= 212	3 1417 1419	PRENVBSY	4453	382	1 382
POLYNUM	E6,1661	= 114	3 114 542	PRE-HUNT	25,3014	863	1 216	PREPTVC	24,2647	695	1 697
POLYRET	0141	= 70	3 1139 1140	PREBJUMP	5361	1404		PREREAD	37,2701	822	3 218 804
POLYSTOP	E6,1703	= 115	2 115 542	PREC/TT	04,3216	531	2 527	PREREAD1	37,2722	823	2 536 823
POLY2	7214	1140	1 1140	PRECHECK	24,2570	693	3 214	PRERRORS	43,3250	1396	3 1397
PONG	33,2250	426	1 426	PRECIBIT	5010	= 52		PRESINE	00,3525	1187	2 1187
PON2	33,2244	426	1 426	PRECIFLG	0064	= 52	6 210 1324	PRESTAND	26,3662	1446	1 1446
PON4	33,2237	426		PRECOMP	20,3247	973	2 965 968	PRESTORE	6370	1121	1 1121
POODAPAD	04,2405	205		PRECSET	22,3215	498	5 464 675	PRESWTCH	17,2351	941	1 251
POOOOO	5721	1495	12 247 1470	PRECX	32,3073	913	3 909 913	PREVGAM	26,3046	814	2 809 810
POOFIZZ	04,2234	201	1 201	PREC100	32,2541	908	1 895	PRE40.6	20,2241	729	2 218 708
POOH	04,2161	200		PREC120	32,2547	908	1 912	PRFMSTAQ	5025	= 769	1 767
POOKLEAN	05,2505	185	1 201	PREC125	32,2555	908	1 911	PRFTRBIT	5006	= 56	
POS-2.5	24,3761	735		PREC130	32,2601	909	1 908	PRFTRKAT	0120	= 56	4 263 597

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PREUNIT	34,3652		597 1 596	PRIO7	5063		1202 8 255 568	PUTDECSF	41,3174		348 2 347 348
PRIOBORT	10,3017		1470 2 1469 1478	PROCEED	10,3633		1481 1 1479	PUTDPCOM	41,3130		347 1 348
PRIOCHNG	5210		1210 12 253 1480	PROCEEDE	06,2075		136	PUTNORM	41,3137		347 1 347
PRIOCH2	01,3113		1217 1 1210	PROCESSW	06,3023		160	PUTSFNOR	41,3206		348 1 348
PRIODBIT	5002	=	53	PROCKEY	40,3357		367 1 136	PUTXY	41,2714		344
PRIODFLG	0075	=	53	PROCTNON	06,2244		142 1 142	PUTXYZ	41,2632		343
PRIODSP	10,2731		1469 1 585	PROGLARM	5706		1494 1 1493	PWORD	17,2642		1040 2 1040
PRIODSPR	10,2726		1469 1 1494	PROG20	37,2261		562 1 206	PWORD1	E6,1453	=	103 4 103 1061
PRIOENT	5656		1493 2 1494 1496	PROG21	37,2001		457 1 206	PWORD2	E6,1454	=	103 4 103 1062
PRIOLARM	10,3766		1494 1 746	PROG22	30,2000		565 1 206	PYJETS	0005	=	41 2 1065 1075
PRIOOCT	10,3753		1483 2 1467 1474	PROG22A	30,2034		565 2 565 566	PYTABLE	17,2714		1042 4 1041 1058
PRIOPLAY	10,3040		1471 2 1467 1470	PROG22B	30,2055		566 1 565	POOHCHK	13,3377		1324 2 1323 1324
PRIORITY	0167		72 30 191 1472	PROG22C	30,2103		566	P05P06	26,2000	=	31 1 1446
PRIOTIME	1147		78 2 1470 1480	PROG52	15,2000		738 3 206 738	P06	26,3660		1446 1 206
PRIO1	5006	=	1204 1 540	PRONVBIT	5011	=	54	P11	34,2002		535 1 447
PRIO10	5003	=	1204 6 252 700	PRONVFLG	0104	=	54 1 1477	P11+7	34,2013		535 1 539
PRIO11	5064		1202	PROUT	33,2424		430 1 537	P11FOUR	23,2000	=	31 1 549
PRIO12	4710		1103 2 183 698	PRSHRTMP	4431		380 4 336 338	P11ONE	34,2000	=	33 2 535 544
PRIO13	5065		1202 4 619 804	PRT2CADR	01,3763		1419 1 1416	P11OUT	33,2451		431 1 540
PRIO14	5066		1202 7 392 1414	PSIV	E4,1573	=	89 3 89 1348	P11SCADR	34,2305		540 1 538
PRIO15	5067		1202 4 159 1482	PSI333	E6,1507	=	104 6 104 954	P11TWO	37,2000	=	33 1 543
PRIO16	5070		1202 12 159 875	PSTROKER	20,2537		963	P11XIT	34,2302		540 1 537
PRIO17	5071		1202	PTAUNEG	17,3172		1050 1 1050	P17	35,3151		559 1 206
PRIO2	5005	=	1204	PTAUPOS	17,3174		1050 1 1050	P17.1	35,3154		559 3 559 561
PRIO20	5002	=	1204 7 247 844	PTBAD	05,2746		189 3 188	P17.2	35,3220		560 1 560
PRIO21	5073		1202 2 301 822	PTIGINC	E4,1423		88 2 468 530	P17.3	35,3224		560
PRIO22	7657		1202 2 437 447	PTMP1	E6,1541	=	104 4 104 966	P17S	36,2000	=	33 1 552
PRIO23	7660		1202	PTMP2	E6,1543	=	104 3 104 966	P17S1	35,2000	=	33 2 551 559
PRIO24	7661		1202 1 746	PTMP3	E6,1545	=	104 3 104 966	P20.1	37,2315		563 1 563
PRIO25	7662		1202 2 190 518	PTMP4	E6,1547	=	104 3 104 966	P20.2	37,2321		563 1 563
PRIO26	7663		1202 4 417 586	PTMP5	E6,1551	=	104 3 105 966	P20.3	37,2333		563 1 563
PRIO27	7664		1202 4 585 707	PTMP6	E6,1553	=	105 3 105 966	P20FLGDN	4647		648 7 463 658
PRIO3	5057		1202 2 505 1204	PTOACSM	13,2731		1315 2 264 1320	P20R52JB	37,2367		564
PRIO30	4371	=	1204 15 194 1481	PTOALEM	13,3004		1316 1 1320	P20S	37,2000	=	33 4 457 570
PRIO31	7665		1202 4 306 998	PT1/16	26,3274		881 2 866	P20S1	30,2000	=	32 2 565 566
PRIO32	7667		1202 5 223 1478	PULSEIMU	22,3653		1512 1 430	P20S2	23,2000	=	31 2 575 614
PRIO33	7670		1202 1 1470	PULSEM	15,2275		759	P20S3	34,2000	=	33 1 579
PRIO34	7671		1202 8 229 1204	PURRS4	10,3137		1473 2 1471 1473	P20S4	34,2000	=	33 2 592 617
PRIO34A	7671	=	1003	PUSH	00,3247		1182 1 1118	P20S6	30,2000	=	32 2 598 610
PRIO35	7672		1202 1 1225	PUSHLOC	0166		72 28 1113 1214	P21	E6,1666	=	114
PRIO36	7673		1202	PUSHUP	6164		1113 1 1109	P21ALT	E7,1620	=	129 3 129 458
PRIO37	7674		1203 6 202 1480	PUTADD	41,2332		328 3 328	P21BASER	E7,1604	=	129 3 129 458
PRIO4	5004	=	1204 1 250	PUTCOM	41,3075		347 8 343 345	P21BASEV	E7,1612	=	129 3 129 458
PRIO5	5061		1202 7 200 1313	PUTCOM2	41,3155		348 4 347 350	P21BIT	5004	=	50
PRIO6	5062		1202 4 169 1396	PUTDCSF2	41,3207		348 1 348	P21CONT	37,2044		457 1 457

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P21DSP	37,2110		458	P30S	35,2000	=	33	P38	04,2742		526 1 206
P21FLAG	0041	=	50 2 457 458	P30SUBS	4000	=	27 2 484 648	P39	04,3166		530 1 206
P21GAM	E7,1624	=	129 2 281 458	P30S1	35,2000	=	33 1 635	P39/P79A	04,3175		530 1 530
P21GNENN	37,2147		459 2 558 560	P30S1A	31,2000	=	32 1 639	P39/P79B	04,3203		530 1 529
P21GRIG	E7,1603	=	129 3 129 458	P31	35,3337		637 1 206	P39/79SW	0176	=	62 4 527 530
P21PROG1	37,2011		457 1 459	P32	04,3303		652 1 206	P39P79	04,3123		529 1 529
P21TIME	E4,1715	=	90 13 90 617	P32/P72A	04,3331		652 1 652	P39SWBIT	5007	=	62
P21VEL	E7,1622	=	129 4 129 458	P32/P72B	04,3356		653 1 654	P40BLNKR	24,2234		686 1 690
P21VSAVE	37,2065		458 1 457	P32/P72C	04,3400		653 1 673	P40CKLS2	24,2420		689 1 685
P22DNLST	0004	=	209 1 209	P32/P72D	04,3404		653 1 653	P40CLK	24,2340		688
P22MKBIT	5005	=	52	P32/P72E	14,2002		653 2 653	P40CNV85	24,2370		689 3 689 704
P22MKFLG	0061	=	52 2 565 599	P32/P72F	04,3407		653 2 653 654	P40CSM	24,2073		684 1 206
P22OVER	30,2110		566	P32STRT	04,3306		652 1 652	P40GMB	24,2151		685
P22S	31,2000	=	32 1 609	P33	04,3437		658 1 206	P40MINDB	24,2262		687
P22SUBRB	30,2143		567 4 566 621	P33/P73A	04,3442		658 2 658 659	P40PVA	24,2114		684
P23	31,2403		619 1 206	P33/P73B	04,3454		658 1 660	P40RCS	24,2254		686 2 686 706
P23.00	31,2431		619	P33/P73C	12,2000		659 2 658 659	P40S	24,2000	=	31 4 684 735
P23.05	31,2442		620 1 620	P33/P73D	12,2004		659 1 659	P40S/C	24,2104		684 1 684
P23.06	31,2444		620 1 627	P33/P73E	04,3524		659 2 659	P40S/F	24,2106		684 2 688
P23.15	31,2452		620 2 620 623	P33/P73F	04,3535		659 1 659	P40S/RS	24,2177		685 1 689
P23.151	31,2463		620 1 620	P34	35,2000		463 1 206	P40S/SV	24,2204		685 1 215
P23.152	31,2466		620 1 620	P34/P74A	35,2003		463 2 463 464	P40SET	24,2216		686 1 686
P23.16	31,2501		620 1 620	P34/P74B	35,2024		463 1 463	P40SNEWM	24,2237		686 1 686
P23.17	31,2515		621	P34/P74C	35,2026		463 1 465	P40SXTY	24,2123		684
P23.175	31,2531		621 1 621	P34/P74D	35,2067		464 1 464	P40S1	16,2000	=	29 3 710 723
P23.176	31,2532		621 1 620	P34/P74E	35,2072		464 1 464	P40S2	27,2000	=	32 1 688
P23.18	31,2550		621 1 621	P35	35,2157		468 1 206	P40S3	30,2000	=	32 1 712
P23.20	31,2553		621 1 621	P35/P75A	35,2166		468 1 468	P40S5	22,2000	=	30 1 717
P23.30	31,2557		621 2 621	P35/P75B	35,2173		468 1 468	P40TMP	E7,1672	=	124 13 35 691
P23.31	31,2563		621 1 631	P37	36,2466		891 6 206 896	P40TSK	24,2452		690
P23.55	31,2573		621	P37E	36,2753		895 1 894	P40TTOG	24,2135		684
P23.56	31,2627		622 1 621	P37G	36,3030		896 1 895	P41/DSP	24,2343		688 1 684
P23.57	31,2631		622 1 622	P37GFRB1	36,3211		898 2 891 895	P41/P40	24,2326		688 2 684 693
P23.60	31,2641		622 1 620	P37N	36,3033		896	P41CSM	27,2614		688 1 206
P23.65	31,2674		623 1 623	P37PROC	36,3244		899 1 898	P41REDSP	24,2360		689 1 693
P23.85	31,2700		623 1 621	P37Q	36,3057		896 1 896	P47/DSP	24,2547		692
P23ABRT	37,2460		571 1 570	P37R	36,3064		896 1 896	P47BOD	24,2542		692
P23S	4000	=	27	P37RANGE	E6,1776	=	116 2 116 903	P47BODY	24,2534		692 3 214 692
P23S1	16,2000	=	30 1 631	P37T	36,3070		896 1 896	P47CSM	24,2463		691 1 206
P3XORP7X	35,3100		484 1 481	P37U	36,3153		897 1 897	P50S	15,2000	=	29 5 738 782
P30	35,3323		636 1 206	P37V	36,3155		897 1 897	P50S1	14,2000	=	29 5 743 766
P30/P31	35,3355		637 3 636 637	P37W	36,3167		898 2 897 898	P50S2	16,2000	=	30 3 742 780
P30/RET	1127	=	78 2 637	P37OALRM	32,2262		900 1 895	P50S3	17,2000	=	30 2 771 781
P30/31RT	E7,1664	=	125 4 637 638	P37OGOF	36,3235		899 5 891 897	P51	14,3067		766 2 206 766
P30PHSI	35,3275		635	P37OGOFR	36,3221		898 2 895 898	P51A	14,3076		767 1 767

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SYMBOL	DEF	H	REFERENCES	SYMBOL	DEF	H	REFERENCES	SYMBOL	DEF	H	REFERENCES
P51AA	14,3100		767 2 767 769	P66END	26,2503		800 1 799	QUIKREAD	37,3067		827 2 824 827
P51B	14,3140		768 1 767	P67	26,2500		800 1 870	QUIKRUPT	06,2146		137 1 138
P51C	14,3161		768 1 769	P67.1	26,2512		800 3 215 875	QUITBIT	5013	=	64
P51C.1	14,3174		768 1 768	P67.2	26,2531		802 1 875	QUITFLAG	0221	=	64 4 266 1323
P51C.2	14,3177		768 1 768	P67.2CAD	25,3631		875 1 875	Q19	26,3332	=	880 1 858
P51D	14,3211		768 1 768	P67.3	26,2541		802	Q2	E7,1711	=	119 3 119 859
P51F	14,3217		769 1 768	P72	04,3305		652 1 206	Q21	26,3200		880 1 845
P51F	14,3235		769 1 769	P73	04,3441		658 1 206	Q22	26,3202		880 1 845
P51FIVE	5022	=	769	P74	35,2002		463 1 206	Q3	26,3170		879 1 859
P51G	14,3260		769 1 769	P75	35,2163		468 1 206	Q5	26,3172		880 1 860
P51ZERO	5021	=	769 1 767	P76	13,2071		511 1 206	Q6	26,3174		880 1 860
P52A	15,2016		739 2 739	P76LOC	13,2000	=	29 1 511	Q611	E7,1704	=	125 4 125 596
P52B	15,2020		739 1 739	P76SUB1	13,2222		513 2 512	Q6111	E7,1705	=	125 6 125 597
P52C	15,2120		740 3 739 757	P77	35,3153		559 1 206	Q7	E6,1574	=	116 11 281 867
P52D	15,2100		740 2 740	P78	04,2744		526 1 206	Q7F	26,3176		880 3 845 867
P52E	15,2137		740	P79	04,3172		530 1 206	Q7FKDMIN	26,3166		879 1 869
P52F	15,2142		740 2 740 741	==========	==========		==========	Q7MIN	26,3312	=	881 1 865
P52I	15,2147		741 1 740	Q	0002	=	39 369 41 1511	==========	==========		==========
P52J	15,2110		740 2 739 741	Q+1	6706		1130 4 135 1481	R	0002	=	935 3 934
P52LS	16,2531		742 1 740	Q+10000	4707		1103 1 1105	R(T1)	E7,1645	=	127 9 127 930
P52T	15,2041		739 2 739	Q+2	6710	=	1130 4 1210 1490	R(T1)/	E7,1637	=	127 7 127 915
P53	14,3067	=	766 1 206	QAXERR	E6,1572	=	113 3 113 1078	R(T2)/	E7,1655	=	127 12 127 916
P54	15,2000	=	738 1 206	QCHAN	0002	=	41 2 1198	R*TL**P	23,3653		1369 2 1371
P60S	26,2000	=	31 1 789	QMAJ	0300	=	72 11 72 780	R-OTHER	E3,1721		86 4 172 290
P60S1	26,2000	=	31 1 797	QMIN	E5,1777	=	95 16 101 784	R-TO-RP	26,3371		1245 4 604 1341
P60S2	26,2000	=	31 2 800 808	QPLAC	E5,1424		98 4 452 454	R/APRE	0034	=	128 3 908 909
P60S3	26,2000	=	31 1 803	QPLACE	E5,1425		98 14 208 443	RACFAIL	E6,1626	=	109 10 109 1056
P60S4	10,2000	=	28 1 817	QPLACES	E5,1426		98 6 35 537	RACTCADR	05,2752		189 1 189
P60S5	27,2000	=	32 1 815	QPRET	0052	=	40 26 223 1349	RACT1	E5,1540	=	101 11 101 679
P61	26,2217		789 1 206	QREL	E6,1702	=	111 6 111 1078	RACT2	E5,1452	=	101 8 654 681
P61.1	26,2267		790 1 810	QRUPT	0012	=	39 21 133 1450	RACT3	E7,1537	=	122 31 122 675
P61.2	26,2276		790 2 790 791	QSAVED	E4,1766	=	91 5 91 560	RAD	E6,1766	=	114 1 115
P61.3	26,2232		790 2 793 798	QTEMP	E7,1657	=	123 22 123 722	RADCADR	1324	=	81 1 192
P61.4	26,2235		790 1 790	QTEMP1	E7,1730	=	124 7 124 713	RADMOON	31,3442		630 1 630
P62	26,2320		792 1 206	QTSN45	23,3473		1363 1 1357	RADSTALL	07,3575		1440 1 587
P62.1	26,2342		793 1 1067	QUADANGL	22,3507		1038 2 1037	RAFAIL	17,2765		1043 1 1043
P62.2	26,2326		792 1 1069	QUADROT	22,3002		412 3 412 718	RAKE	04,2347		203 2 203
P62.3	26,2401		794 2 792 869	QUALITY1	13,3770		1516 1 1342	RANGE	E4,1720	=	90 10 90 634
P63	26,2405		795 2 794	QUALITY2	12,3754		1516 1 1516	RANGE814	27,2476		587 1 587
P63.1	26,2421		795 2 794 798	QUALITY3	11,3146		1342	RANGER	25,2571		859
P63FLAG	E6,1727	=	112 7 793 1078	QUARTER	5003	=	1204 9 285 1191	RANGERD	27,2415		586 1 580
P64	26,2433		797 1 853	QUICKIGN	24,3554		708	RANGERD1	27,2437		587
P65	26,2441		798 1 864	QUICTRIG	23,3555		1367 2 705 1367	RANGERD2	27,2450		587 1 587
P65.1	26,2457		798 2 216 798	QUIKDSP	06,2136		137 1 133	RANGERD3	27,2453		587 2 587
P66	26,2474		799 1 869	QUIKOFF	06,2167		138 1 137	RANGERD4	27,2444		587 1 587

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SYMBOL	DEF	H	REFERENCES	SYMBOL	DEF	H	REFERENCES	SYMBOL	DEF	H	REFERENCES
RAPO	0020	= 1379	1 1379	RDFAIL	17,3055	1045	1 1045	REENTRY1	26,2000	= 31	2 851 879
RAPREC	E7,1575	= 123	2 469 472	RDLONOR	40,2675	338	1 337	REFAZE10	25,2120	847	1 798
RASFLAG	0106	= 65	10 187 1325	RDM	13,3764	1354		REFLASH	10,2704	1468	2 686 687
RATEAVG	15,2530	1065	3 1070 1071	RDOT	E7,1677	= 119	17 119 872	REFLECT	15,3355	1083	1 1083
RATEDEN	16,3444	992		RDOTREF	1155	= 79	5 79 866	REFSMBIT	5003	= 52	
RATEFILT	21,2210	1004	1 1004	RDOTV	E7,1501	= 129	4 129 667	REFSMFLG	0057	= 52	9 481 769
RATEINDX	1130	78	6 184 1018	RDRPTBB	4061	132	1 132	REFSMMAT	E3,1735	86	39 171 934
RATELIM	16,3500	992	1 990	RDSP	E5,1444	= 99		REFTEST	35,3414	638	1 637
RATENUM	16,3460	992		READACCS	37,2744	824	4 539 833	REGION6	16,3414	991	
RATEZRO	20,2204	721		READCDUK	22,2376	405	2 394 399	REGODSP	10,2707	1468	2 540 705
RATT	0000	= 1354	37 458 1330	READGYMB	15,2434	1063	3 219 1068	REGODSPR	10,2712	1469	1 874
RATT1	0016	= 1354	6 458 607	READGYM1	15,2447	1063	1 1063	REGR21	43,2636	257	1 257
RAXERR	E6,1573	= 113	6 1074 1079	READLO	40,2655	337	5 337 339	REGSLEEP	07,3255	1431	1 1431
RBDFAIL	E6,1627	= 109	10 109 1058	READLO1	40,2666	337	1 338	REGUP	6202	1113	3 1113
RBFAIL	17,3053	1045	1 1045	READPIPS	22,3527	1508		REG1TST	16,3350	990	
RBLAST	17,3314	1053	2 1053	RECALTST	40,3454	376	2 345 366	REG2TST	16,3400	991	
RBLASTOK	17,3342	1053	1 1053	RECAL1	40,3457	376	1 376	REG3TST	16,3356	990	
RBYPASS	17,3516	1057	1 1053	RECAL2	40,3470	376	2 377	REG4TST	16,3404	991	
RCFAIL	17,2767	1043	1 1043	RECAL3	40,3502	377		REG5TST	16,3413	991	
RCL	1222	= 80	1 80	RECRATIO	13,3760	1354	1 1344	REINIT	21,2534	1012	3 1004 1025
RCLP	E7,1530	= 121	9 121 606	RECT.1	31,3376	630	1 623	REINTBIT	5011	= 66	2 1325
RCM	0002	= 935	4 934 935	RECT.2	31,3405	630	1 630	REINTFLG	0236	= 66	6 513 1503
RCNORM	E5,1654	= 96	4 96 1282	RECT.3	31,3410	630	1 630	REJECT2	07,2315	230	1 230
RCON	E7,1635	= 127	13 127 930	RECT.4	31,3414	630	1 630	REJECT3	07,2326	231	1 231
RCSADDR	21,2021	736	1 736	RECT.5	31,3416	630	1 630	RELDELV	E5,1636	= 94	6 94 558
RCSADDR4	04,2413	205		RECTEST	11,3246	1344	1 1344	RELDSP	4473	382	9 198 377
RCSATT	21,2122	1002	5 205 1059	RECTIFY	11,3421	1347	8 1259 1346	RELDSPON	4410	379	3 315 382
RCSCADR	24,3762	735		RECTOUT	13,3226	1321	2 1320 1322	RELDSP1	4516	383	2 356 368
RCSDAPON	21,2024	736	6 198 736	RECYCLE	04,3045	527	1 529	RELDSP2	4507	383	2 383
RCSDAPUP	42,3624	734	2 734	REDAP	21,2546	1014	1 1003	RELINTO	10,3453	1478	2 1474 1478
RCSFLAGS	E6,1501	103	53 416 1066	REDO	33,2002	422	1 247	RELINUS	27,2074	391	1 212
RCSINIT	21,2625	1015	1 1015	REDOCTR	1154	78	4 172 186	RELOADSV	11,3622	1350	1 1349
RCSINITB	21,2626	1015	1 1015	REDOMANC	27,2023	390	1 390	RELRET	0144	= 70	4 383
RCSLOC	21,2120	1002	1 1002	REDOMANN	27,2002	390		RELTAB	4072	133	4 135 361
RCSSWIT	21,2617	1015	1 1015	REDOMASK	10,3726	1483	1 1468	RELTAB11	4105	133	3 134 1204
RCSUP	21,2014	736	1 735	REDOPOSE	37,3744	888	1 889	RELVBIT	5007	= 58	
RCS2CADR	17,3575	1059	1 1059	REDOPRIO	10,2764	1470	1 1483	RELVELSW	0140	= 58	3 848 851
RCV	E3,1534	= 85	27 85 1347	REDORCS	21,2105	1002	1 192	REM	26,2162	787	1 786
RCVCSM	E3,1606	86	3 584 630	REDOR22	27,2377	586	1 213	REMA	26,2165	787	1 787
RCVLEM	E3,1660	86	1 584	REDOSAT	23,2765	549	2 192 549	RENDEZ	37,2000	= 33	1 572
RD	E7,1663	= 127	6 127 912	REDOTVC	16,3140	958	1 192	RENDEZVU	0002	= 209	21 208 209
RDAPEND	16,3675	996		REDO40.9	16,2405	725	1 212	RENDGUID	23,2000	= 31	
RDCDUS	15,2324	762	1 761	REDO5.31	37,2705	823		RENDISP	34,3257	584	2 582 583
RDE	13,3766	1354	1 1341	REDO5.5	37,2751	824	1 217	RENDISP2	34,3310	585	1 585
RDESIRED	E5,1757	= 96	5 96 1301	REENTRY	25,2000	= 31	2 844 853	RENDISP3	34,3317	585	2 585

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SYMBOL	DEF	H	REFERENCES	SYMBOL	DEF	H	REFERENCES	SYMBOL	DEF	H	REFERENCES
RENDISP4	34,3332		585	REP11S	34,2276		540 1 535	REVERS	35,2460		472 1 472
RENDISP7	34,3300		585 1 585	REP11SA	34,2300		540 2 535 539	REVS	E6,1660	=	106 6 106 983
RENDNOD	04,2224		201 1 201	REQ	5641		1492 1 1492	REVUP	20,3577		983 2 983
RENDVOD	04,2217		201 1 200	REQADD	41,2064		324 1 324	REV37	04,2246		201 1 201
RENDWBIT	5017	=	57	REQCOM	41,2310		328 2 328	RGEXIT	E4,1770	=	91 3 92 635
RENDWFLG	0131	=	57 13 210 1350	REQDATX	41,2303		328 3 343 344	RHO	E6,1635	=	109 4 109 1015
REND1	34,2641		579 3 584 587	REQDATY	41,2305		328 3 343 345	RHOSB	E4,1720	=	90 4 90 935
REND1A	34,2645		579 2 580	REQDATZ	41,2307		328 3 324 345	RHO1	E6,1636	=	109 4 109 1015
REND10	34,3027		581 2 584	REQEXLOC	41,2207		326	RHO2	E6,1637	=	109 4 109 1015
REND10A	34,3067		582 2 582	REQEX1	41,3473		366 1 366	RIGHT	00,2236		1159 1 1161
REND12	34,3124		583 2 582 585	REQMM	41,3452		365 1 365	RIGHT-	00,2332		1161 1 1158
REND13	34,3141		583 1 584	REQRET	1013		76 17 192 374	RIGHTGTS	33,2550		436 1 436
REND14	34,3163		583 1 581	REQUESTC	41,3477		366 1 366	RIGHTR	00,2031		1152 1 1160
REND14A	34,3207		584 1 583	REREADAC	37,3305		833 3 217	RIGHT5	4336		378 2 346 347
REND15	34,3214		584 1 581	RES	26,2143		787 2 786 787	RINDEX	E6,1517	=	108 4 108 1045
REND16	34,3221		584 1 583	RESA	26,2161		787 1 786	RINIT	E7,1567	=	122 13 122 712
REND17	34,3227		584 1 583	RESCALES	34,2623		547 3 545	RLIMTEST	20,2560		963 2 963
REND18	34,3235		584 1 583	RESCHNG	33,3360		446 1 218	RLS	E4,1425		88 10 179 1316
REND2	34,2653		579 1 579	RESETPRF	43,3020		263 1 237	RLTST	34,2604		547 1 543
REND3	34,2673		579 3 581 585	RESETVHF	43,3027		264 1 237	RM	E7,1703	=	125 5 125 588
REND3A	34,2672		579 1 579	RESETX2	12,3132		1294 1 1292	RMAG	E3,1765		87
REND4	34,2715		580 1 579	RESIGN	35,2455		472 1 472	RMAG1	0014	=	1373 4 1376 1385
REND5	34,2731		580 1 583	RESO	E4,1532	=	88 3 89 787	RMANNDX	E6,1656	=	110 6 110 1025
REND5A	34,2735		580 1 580	RESQ	37,3462		836 1 835	RMAX	E4,1402		88 1 582
REND6	34,2761		581 1 580	REST	10,3467		1478 1 1476	RME	04,2564		209 1 1323
REND7	34,2767		581 1 583	RESTAIER	33,3303		445 1 218	RMM	04,2562		209
REND8	34,3004		581 1 581	RESTARPT	E5,1577	=	99 2 436	RN	1170		79 17 171 1327
REND9	34,3007		581 1 581	RESTART	01,2000	=	27 4 212 1418	RND/TST	42,3456		353 3 352 353
REND9A	34,3017		581 1 581	RESTARTS	01,3520		1414 1 189	RNDCON	42,3215		339 2 340
REPCHEK	16,3022		947 1 947	RESTEST1	33,3324		445 1 217	RNDREFDR	07,3060		1426 3 152 1446
REPETE	35,2431		471 1 471	RESTEST3	33,3335		445 1 218	RNDVZBIT	5011	=	47 5 201 259
REPFRAC	E6,1642	=	105 6 105 947	RESTREG	0366		74 4 184 1475	RNDVZFLG	0010	=	47 5 259 1446
REPIP1	37,3272		833 1 834	RESTSLEP	10,3473		1479 1 1479	RNGETEST	36,2416		557 1 554
REPIP3	37,3300		833 1 834	RESTSRF	43,3212		267 1 236	RNGSCFLG	0120	=	56 3 56 618
REPLACE	17,3661		1061 2 1061	RESULTCT	E5,1547	=	99 5 425 429	RNRAD	0046	=	39 1 588
REPLACEP	17,3704		1062	RESUME	5333		1232 50 132 1450	RN1	1231	=	79 9 35 1330
REPLACER	17,3700		1062 3 1061 1062	RETARG	33,3655		453 1 453	ROLL/PIP	E6,1672	=	111 3 111 887
REPLACEY	17,3713		1062	RETARG1	33,3676		453 1 453	ROLL/180	E6,1664	=	111 11 111 1081
REPLACE1	17,3666		1061 2 1061	RETNON	06,2266		142 1 143	ROLLC	E6,1715	=	111 15 112 1082
REPLACE2	17,3673		1062 2 1061	RETRN1	26,2641		805 1 804	ROLLDAP	16,3272		989 1 946
REPOSADR	37,3771		889 1 888	RETRN2	26,2631		805 2 805	ROLLDUMP	15,3647		1089 1 1089
REP11	34,2253		539 1 213	RETRN3	26,2626		805 1 804	ROLLFIRE	E6,1571	=	105 7 105 997
REP11A	34,2026		535 2 213 539	RETROBIT	5002	=	55	ROLLHOLD	E6,1717	=	112 4 112 1089
REP11A-1	34,2025		535 1 539	RETROFLG	0114	=	55 3 903 906	ROLLJETS	0006	=	41 5 1065 1089
REP11A-2	34,2024		535 1 539	REVCNT	6211		1113 3 546 1204	ROLLOGIC	16,3313		989 2 989

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SYMBOL	DEF	H	REFERENCES
ROLLON	16,3421		991 1 990
ROLLPREP	16,2730		946
ROLLSET	16,3503		993 3 992
ROLLTIME	17,3274		1053 4 1044 1046
ROLLTM	E6,1714	=	111 4 111 1089
ROLLWORD	E6,1572	=	105 9 105 996
RONE	E4,1726	=	90 17 90 1382
ROO	04,2130		199
ROOAD	04,2412		205 1 199
ROOTMU	0020	=	1305 3 1281 1300
ROOTOPOO	04,2031		197 1 197
ROOTRET	1076		77 1 77
ROPECHK	43,3522		1400 1 1397
ROTA	26,2057		779 2 778
ROTATE	05,3220		676 2 675
ROTI80	27,2266		396 1 396
ROUND	00,2116		1154 1 1118
ROUNDSUB	7105		1137 4 1149 1160
ROWDOT	30,3574		613 3 611 612
ROWDOT1	30,3605		614 1 614
ROWDOT2	30,3624		614 2 614
ROWDOT3	30,3626		614 1 614
RP-TO-R	26,3344		1243 8 567 1343
RPAD	22,3151		496 5 497 1388
RPADTEM	E4,1722	=	90 6 90 523
RPAD1	22,3151	=	1388
RPASS1	E7,1755	=	129 4 129 675
RPASS2	E5,1624	=	101 7 101 680
RPASS3	E7,1553	=	122 15 122 675
RPASS36	E4,1726	=	90 5 90 503
RPASS4	E7,1631	=	123 4 123 558
RPER	0016	=	1379 3 522 1379
RPPREC	E7,1617	=	123 2 469 472
RPQFLAG	0170	=	61 5 1319 1345
RPQFLBIT	5001	=	61
RPQOK	11,3333		1345 1 1345
RPQV	E4,1662	=	89 7 89 1346
RPRE	0030	=	128 7 908 912
RPRE,	E7,1667	=	127 5 127 912
RPREXIT	0050	=	1251 3 1243 1245
RPRPXXXX	26,3407		1245 1 1243
RPSTART	E6,1702	=	115 2 115 542
RPSV	E4,1677	=	89 5 89 1338
RPTORA	26,3361		1243 1 1243
RPTORB	26,3353		1243 1 1244
RPVAR	E4,1407		88 1 602
RQVV	E4,1671	=	89 1 89
RRATE	E4,1722	=	90 7 90 634
RRECT	E3,1502	=	85 14 85 1347
RRECTCSM	E3,1554		86 9 86 1317
RRECTHIS	E3,1554	=	86 6 264 1314
RRECTLEM	E3,1626		86 3 86 1316
RRECTOTH	E3,1626	=	86 2 264 265
RRECT1	0022	=	85
RREI	E6,1703	=	111 8 111 1091
RSBBQ	E3,1432		84 3 172 186
RSP-RREC	E4,1755	=	91 2 280 644
RSPHERE	13,3762		1354 2 1345
RSTGTS1	33,2456		434 1 217
RSTPAF	34,3732		617
RSTRTST	20,2271		730
RSURF	15,2247		750 1 749
RSUBM	15,2245		750 1 750
RT	E7,1473	=	118 6 118 849
RTABLE	17,3130		1047 4 1043 1057
RTARG	E7,1414	=	117 10 117 898
RTARG1	E7,1603	=	122 12 122 491
RTB	01,2475		1195 1 1195
RTB/BHIZ	01,2474		1195 1 1117
RTBCODES	22,2000	=	30 1 1508
RTBCODE1	22,2000	=	30
RTD18	32,2357		903 1 903
RTD22	32,2414		903 1 903
RTE	32,2000	=	32 3 899 916
RTEALRM	36,2776		895 3 893 906
RTEAST	E7,1457	=	118 3 118 294
RTECON	34,2000	=	33
RTECON1	35,2000	=	33 2 931 932
RTEDISP	32,2316		902 1 895
RTEDVD	E7,1631	=	127 10 127 926
RTED1	1351		83 1 893
RTEGAM2D	E7,1633	=	127 5 127 893
RTENCKEX	E7,1733	=	127 11 127 916
RTENCK1	31,3700		915 1 897
RTENCK2	31,3710		915 1 911
RTENCK3	31,3726		915 1 908
RTENCK3A	31,3731		915
RTENCK3B	31,3734		915 1 915
RTENCK3D	31,3742		916 1 915
RTERM	0022	=	1373 5 809 1384
RTEVN	36,3002		895 2 895 896
RTE1	36,2000	=	33 1 890
RTE2	16,2000	=	30 1 912
RTE299	36,2507		891
RTE3	31,2000	=	32 1 915
RTE317	36,2540		892 2 892
RTE320	36,2562		892
RTE340	36,2574		892 1 892
RTE350	36,2604		893 1 893
RTE360	36,2607		893 4 892 895
RTE367	36,2614		893 1 893
RTE369	36,2633		893 1 893
RTE372	36,2655		893 1 893
RTE373	36,2657		893 1 893
RTE374	36,2676		894 1 894
RTE375	36,2703		894 1 894
RTE380	36,2713		894 1 894
RTE385	36,2734		894 1 894
RTE390	36,2736		894 1 894
RTE505	36,2755		895
RTE510	36,2770		895 2 895
RTE515	36,2772		895 1 895
RTE625	36,2774		895
RTGO	E7,1713	=	119 6 119 810
RTGON64	E7,1713	=	119 1 281
RTGON67	E7,1713	=	120 2 281 849
RTHETA	E4,1724	=	90 12 90 634
RTIG	E7,1631	=	123 13 123 716
RTINIT	E7,1451	=	118 10 118 883
RTMU	E7,1747	=	126 5 126 681
RTMURTE	35,3631		932 1 919
RTNAPSE	E5,1712	=	96 3 1303
RTNLAMB	E5,1712	=	96 9 96 1300
RTNORM	E7,1465	=	118 3 118 294
RTNPRM	E5,1755	=	96 3 96 1290
RTNSAVER	0145	=	71 3 1369 1371
RTNTR	E5,1712	=	96 1 1301
RTNTT	E5,1712	=	96 3 1289
RTORPA	26,3413		1245 1 1245
RTORPB	26,3402		1245 1 1245
RTRIAL	26,3020		811 1 808
RTRN	E4,1767	=	91 14 91 683
RTRNCADR	01,3557		1415 5 1414 1419
RTRNLOC	E6,1613	=	107 2 941 942
RTRNMU	04,2734		494 1 494

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SYMBOL	DEF	H	REFERENCES	SYMBOL	DEF	H	REFERENCES	SYMBOL	DEF	H	REFERENCES
RTSR1/MU	E7,1751	=	126 3 126 667	R21MARK	0037	=	50 3 200 573	R36PROG2	42,3531		503 1 502
RTX1	E7,1745	=	126 13 126 1330	R22	34,2630		579 2 213 563	R36PROG3	42,3533		503 1 503
RTX2	E7,1746	=	126 17 126 1330	R22ALARM	43,2643		257 2 257	R36PROG4	42,3554		503 1 503
RT23	31,2000	=	32 1 619	R22CABIT	5011	=	64	R36PROG5	42,3556		503 1 503
RT53	14,2000	=	29 2 631 772	R22CAFLG	0217	=	64	R36P3	41,3733		502 1 504
RUN	E5,1427		98 4 449	R22S1	27,2000	=	32 1 585	R36TAG2	41,3751		504 2 504
RUPTAGN	0734		74 5 74 1232	R23.END	31,3133		626	R40ENABL	24,3507		707 1 214
RUPTREG1	0070		68 40 133 1488	R23.05	31,2707		623	R51	14,2532		756 2 215 740
RUPTREG2	0071		68 19 140 1441	R23.1	31,2715		623 1 623	R51.2	14,2536		756
RUPTREG3	0072		68 10 422 1473	R23.10	31,3134		627 6 620 621	R51.3	14,2537		756 1 758
RUPTREG4	0073		68 7 68 1449	R23.2	31,2723		623 1 623	R51.4	14,2671		758 1 757
RUPTSTOR	0063	=	68	R23.3	31,2750		624 1 623	R51A	14,2614		757 1 758
RUTMXTAB	42,3047		283 1 270	R23.4	31,2762		624 1 624	R51B	14,2704		758 1 757
RUTMXTEM	0153		71 2 270 346	R23.5	31,2764		624 1 624	R51DSP	14,2553		756 1 756
RVAR	E6,1402		102 1 584	R23.51	31,3061		626 1 626	R51K	14,2655		757 2 742 757
RVARMIN	E6,1404		102 2 582	R23.52	31,3103		626 1 626	R51ST	14,2603		756 2 756
RVCON	13,3271		1321 1 1320	R23.53	31,3111		626 1 626	R52	14,2011		744 4 564 757
RVCS/RDS	34,3661		597 1 594	R23.55	31,2771		625 1 623	R52A	14,2026		744
RVEC	E5,1656	=	96 15 464 1303	R23.6	31,3113		626	R52C	14,2035		744 1 745
RVQ	00,3274		1182 1 1118	R23.7	31,3126		626 1 626	R52D	14,2040		744 1 745
RVSW	0157	=	60 10 464 1289	R23.8	31,3127		626	R52E	14,2061		745 2 744
RVSWBIT	5007	=	60	R23BIT	5007	=	48 2 257 572	R52F	14,2074		745 6 745 746
RWORD	17,2747		1043	R23CSM	37,2470		572 1 257	R52H	14,2112		745 1 744
RWORD1	E6,1451		103 12 103 1061	R23CSM1	37,2505		573 1 573	R52HA	14,2113		745 1 745
RWORD2	E6,1452	=	103 7 103 1062	R23FLG	0025	=	48 3 257 581	R52I	14,2125		745
RXLNS	17,2775		1043 2 1043	R3D1	4335		378 5 320 375	R52J	14,2133		745 2 744 746
RZC	E7,1626	=	121 7 121 630	R30LOC	23,2000	=	31 1 515	R52JA	14,2046		744 1 746
RZXLNS	17,3057		1045 2 1045	R30OK	27,3367		1388	R52L	14,2170		746 1 744
R02	07,2000	=	28 1 1443	R31	31,2000	=	32 1 505	R52M	14,2140		746 1 744
R02BOTH	07,3653		1443 8 562 934	R31CALL	31,2000		505 1 255	R52Q	14,2107		745 1 745
R02ZERO	07,3667		1444 2 767 1443	R31FLAG	0222	=	64 1 506	R52SYNC	14,2131		745 1 745
R1	0040	=	1306 19 666 1303	R31FLBIT	5014	=	64 2 255 256	R52VRB	14,2014		744 1 747
R1A	E5,1743	=	96 15 96 1303	R34	31,2000	=	32 1 510	R53	14,3300		772 3 620 768
R1D1	4333		378 14 233 1178	R34ANG	31,2060		506 1 510	R53A	14,3304		772 1 773
R1SAVE	1073		77 4 192 1480	R34LOS	31,2311		510 1 506	R53B	14,3326		773 1 772
R1VEC	E5,1656	=	96 6 96 1296	R35	31,2000	=	32	R53C	14,3341		773 2 773
R2	E5,1721	=	96 3 1287	R35A	30,2000	=	32	R53C1	14,3336		773 2 773 782
R2D1	4334		378 7 320 1204	R36	20,2164		502 1 266	R53D	14,3361		773 2 773
R2VEC	E5,1664	=	96 10 96 1296	R36A	41,3727		502 2 502	R53EXIT	E7,1501	=	117 4 117 781
R21BIT	5002	=	50	R36B	40,3600		504 1 503	R53FLAG	0011	=	47 2 744 772
R21CSM	37,2466		572 1 257	R36CM	20,2000	=	30 1 501	R53FLBIT	5012	=	47
R21CSMA	37,2537		573 2 573	R36CM1	40,2000	=	34 1 503	R53JOB	14,2153		746 1 746
R21CSM1	37,2544		573	R36INT	42,3521		502 2 502 504	R53OUT	14,3362		773
R21C1	37,2531		573 2 572 573	R36LM	41,2000	=	34 2 502 504	R53Z	14,3347		773 1 773
R21END	37,2550		573 4 572 573	R36LM1	42,2000	=	34 2 266 502	R54	14,2714	=	759 1 757

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R55	15,2271		759 1 757	SAMEJETS	16,3623		995	SCHZEROS	33,3110		442 5 430 445
R55.1	15,2276		759	SAMPTIME	0013	=	39 5 225 380	SCNDSOL	31,3642		673 7 665 673
R55.2	15,2304		759 1 759	SATOUT	34,2471		545 3 545 546	SCOUNT	1366	=	82 4 82 1400
R55CDR	15,2323		759 2 741 759	SATRATE	E6,1721	=	115 4 115 550	SCOUTEND	40,2606		336 5 336 337
R55RET	15,2317		759 1 759	SATRLRT	E6,1700	=	114 5 115 547	SCTVAR	30,3635		614 2 602 605
R56	17,2056		781 2 758 768	SATSCALE	E6,1731	=	115 1 547	SD	22,2370		405
R56A	17,2066		781 2 781 782	SATSTICK	23,3006		550 1 550	SDISPLAY	43,2773		263 1 1403
R56A1	17,2073		781 1 782	SATSTKON	43,3215		549 1 734	SECAD	22,2016		399
R56B	17,2143		782 1 782	SATSW	E6,1725	=	115 9 115 546	SECMAX	E7,1453	=	122 6 122 471
R57	37,2401		570 2 620 622	SAVBNK	E6,1771	=	115 3 115 575	SECON1	42,3202		338 1 340
R57A	37,2413		570 1 571	SAVE	E5,1474	=	98	SECON2	42,3204		339 1 338
R57B	37,2437		571 1 571	SAVECBIT	5006	=	64	SEC1THET	35,3135		551 1 554
R57BIT	5010	=	58	SAVECFLG	0214	=	63 3 620 623	SEC2THET	35,3137		552 1 554
R57FLAG	0141	=	58 4 619 622	SAVEDCDU	E6,1772	=	115 6 116 596	SEC24.96	24,2414		689 1 693
R60ADRS	31,3471		631 1 622	SAVEDEN	27,3134		1383 1 1383	SEC29.96	24,2415		689 3 686 689
R60CALL	31,2617		622 1 631	SAVEFLAG	1071	=	1483	SELECTMU	04,2712		494 6 463 658
R60CSM	27,2000		390 5 398 684	SAVELOCR	10,3151		1473 1 1472	SELFADRS	43,3247		1396 2 263
R60FLAG	0126	=	56	SAVELOCS	10,3144		1473 2 1469 1472	SELFBANK	01,3241		1220 1 1220
R60FLBIT	5014	=	56	SAVENDX	15,3726		1091 1 1090	SELFCHEC	43,2000	=	34 1 1395
R61CNTR	E6,1775	=	116 6 116 586	SAVEPOS	E7,1706	=	125 5 126 596	SELFCHK	43,3340		1397 5 193 1397
R61CSM	37,2557		574 2 564 745	SAVEVEL	E7,1714	=	126 3 126 596	SELFERAS	1357		82 2 82 83
R61C1	37,2577		574	SAVOR52	E5,1576	=	93 4 93 747	SELFRET	1361	=	82 7 82 1397
R61END	37,2615		575 1 574	SAX	E5,1757	=	95 3 753 754	SELFSUPR	40,2000	=	34
R61TEST	27,2114		392 1 390	SBAND	42,2000	=	34 1 934	SENDID	05,3766		1101 2 1097 1101
R62DISP	27,2330		398 2 252 398	SBANDANT	42,3652		934 2 250 935	SENDOCMD	10,2171		169 1 168
R63	34,3572		596 2 593 618	SBIT1	5017	=	1395	SENDPULS	07,3016		1425 1 1424
R63COMP	34,3572	=	618 1 617	SBIT10	5006	=	1395	SEPMIN	42,3350		341 2 338 340
==========				SBIT11	5005	=	1395 2 1401 1402	SEPMNRET	0144	=	70 2 341
S(X1)	0032	=	1306 6 1281 1287	SBIT12	5004	=	1395 1 1401	SEPSCRET	0144	=	70 2 340 341
S+ZERO	5021	=	1395 9 263 1401	SBIT13	5003	=	1395	SEPSEC	42,3317		340 1 339
S+1	5017	=	1395 9 263 1403	SBIT14	5002	=	1395	SEPSECNR	42,3332		340 3 338 340
S+2	5016	=	1395	SBIT15	5001	=	1395 1 1402	SEPSEC1	42,3325		340 1 340
S+3	6214	=	1395	SBIT2	5016	=	1395	SERVCADR	24,2457		690 1 687
S+4	5015	=	1395	SBIT3	5015	=	1395	SERVCAD1	26,2642		805 2 802 804
S+5	5022	=	1395	SBIT4	5014	=	1395 1 1399	SERVCAD2	26,2642	=	802 1 800
S+6	6211	=	1396	SBIT5	5013	=	1395	SERVEXIT	37,3227		830 4 690 874
S+7	5023	=	1396 1 1397	SBIT6	5012	=	1395	SERVICER	37,3104		828 2 217 825
S-ZERO	5020	=	1396 1 1400	SBIT7	5011	=	1395 1 1402	SERVICES	37,2000	=	33 1 822
S-1	7716	=	1396 2 1402 1403	SBIT8	5010	=	1395	SERVNOUT	25,3611		874 2 802 845
S-2	7715	=	1396	SBIT9	5007	=	1395 1 1399	SERVXT	24,3215		701 4 689 702
S-3	7714	=	1396	SBNK03	5062	=	1396 1 1401	SETAUG	40,2550		335 1 335
S-4	6061	=	1396	SCALEPOP	25,2115		847 1 845	SETBANK	13,3064		1317 4 1315 1316
S-7	5731	=	1396 1 1397	SCALPREP	26,3717		1447 2 1446 1447	SETBIT	10,2175		169 1 166
SAC	E5,1773	=	95 11 95 782	SCALSAVE	1152		78 3 1446 1447	SETCLOCK	24,3275		703
SALFA	E6,1507	=	112 6 112 1079	SCAXIS	E6,1750	=	114 16 114 716	SETCNT	06,3153		163 1 161

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SYMBOL	DEF	H	REFERENCES	SYMBOL	DEF	H	REFERENCES	SYMBOL	DEF	H	REFERENCES
SETCOARS	07,3027	1426	3 147 1423	SETUPDSP	10,2440	1404	1 1404	SHIFTR1	22,3263	500	11 465 681
SETCOAST	35,3704	1327	1 1328	SETUPDYN	24,3320	703	1 703	SHOLTS	41,3661	386	1 385
SETDESMD	06,3154	163	11 161 163	SETUPER1	33,3046	441	1 441	SHORTMP	7256	1141	9 285 1448
SETEBANK	4327	378	2 327 337	SETUPGC	33,3162	443		SHORTMP2	7262	1141	
SETGAMMA	13,2571	1241	2 1236 1238	SETVAC	41,3510	366	1 366	SHORTT	00,2017	1152	2 1115
SETGLOCK	06,2460	148	4 147 148	SETVANDI	30,2414	600	1 599	SHORTV	00,2121	1155	1 1115
SETGMEX	13,2577	1241	1 1241	SETVHELG	43,3023	264	1 237	SHOW	33,2427	431	3 425 427
SETGWLST	33,2532	436	1 436	SETWBODY	21,2755	1018	1 1019	SHOWSUM	43,2762	263	1 263
SETIFLGS	13,2670	1314	3 210 1328	SETWIN=0	30,3531	613	1 613	SHOWI	33,2431	431	1 431
SETINTG	27,2343	586	6 563 623	SETWD	05,3575	1097	3 1097 1099	SIDETRAK	25,2716	861	
SETISSW	06,2665	157	7 143 1429	SETWW5D	30,2367	599	1 599	SIDLOOP	43,3271	1396	1 1397
SETJ=2A	30,3554	613	1 613	SETXTACT	43,2105	237	1 238	SIGHTSIX	6211	= 773	2 773 783
SETJTAG	15,3207	1081	2 212 825	SETZOFND	06,3157	163	1 161	SIGN	7624	1151	1 1116
SETLOC	01,2704	1212	3 1212 1216	SET1/PDT	14,3275	769	3 742 768	SIGNCK1	21,3472	1030	1 1030
SETMARK	10,2750	1469		SEUDOPOO	04,2200	200	1 202	SIGNCK2	21,3563	1031	1 1031
SETMAXDB	24,2320	687	2 203 698	SEVEN	5023	1200	24 133 1485	SIGNCK3	21,3614	1032	1 1032
SETMAXER	04,2345	203	1 203	SFAIL	1357	= 82	4 82 1397	SIGNCK4	21,3651	1032	1 1032
SETMGA	04,2664	493	1 493	SFCOM	42,2124	271	1 271	SIGNCK5	21,3677	1033	1 1033
SETMIND	26,3133	851	1 848	SFCONSTI	E5,1477	= 98		SIGNFIX	40,2737	349	2 349
SETMINDB	24,2304	687	3 203 687	SFCONUM	41,3047	346	2 333 348	SIGNMPAC	22,3712	1514	16 401 1385
SETMOON	13,2742	1315	3 1315 1346	SFINTAB	42,2443	277	1 271	SIGNRET	0125	= 70	
SETMUER	04,2723	494	1 494	SFINTABR	41,3212	349	1 349	SIGNTEST	40,2347	320	2 319
SETNADD	4325	378	2 324 347	SFOUTAB	42,2513	278	1 271	SIM2CADR	05,2347	183	
SETNBPOS	33,3442	449	1 424	SFOUTABR	41,2600	334	1 334	SINB	E5,1675	= 95	
SETNCADR	4317	378	7 324 378	SFRET	41,3064	346		SINBLANK	40,2473	322	1 322
SETNORM	10,2756	1470	1 1468	SFRET1	41,3046	346		SINCDU	0736	= 74	6 74 1371
SETOFF	06,3240	165	1 165	SFRUTMIX	41,3034	346	4 327 348	SINCDUX	0742	= 74	6 545 967
SETOVF	6752	1132	1 1135	SFRUTNOR	41,3026	346	4 333 348	SINCDUY	0736	= 74	5 763 1372
SETOVF2	7121	1137	1 1133	SFTEMP1	0123	= 69	20 271 351	SINCDUZ	0740	= 74	4 544 1372
SETPAF	34,3756	618	1 617	SFTEMP2	0124	= 69	2 351 352	SINE	00,3527	1187	2 1118 1366
SETPD	7562	1149	1 1116	SGNAGREE	22,3544	1508	4 426 1323	SINESLOC	23,3735	1371	1 1370
SETPRFLG	43,3015	263	1 237	SGNCHECK	12,2574	1285	2 1285 1286	SINGIMLC	27,2313	396	1 394
SETPRIO	10,2732	1469		SGNCOM	40,2323	319	1 320	SINI	26,3640	1251	2 1247
SETRAD	22,3201	497	1 496	SGNOVOVF	00,2402	1162	1 1162	SINM	E6,1510	= 112	2 112 1071
SETRADX	22,3214	497	1 497	SGNOFF	0123	= 69	3 319 320	SINNODI	0010	= 1251	1 1247
SETRE	13,2601	1242	3 601 1238	SGNON	0122	= 69	3 319 320	SINO	E6,1512	= 112	3 112 1070
SETREX	0051	= 1242	2 1242	SGNRDOT	E5,1756	= 96	4 96 1301	SINOCOSM	E6,1514	= 112	3 112 1071
SETROUND	00,2272	1159	3 1159	SGNRT	E6,1666	= 106	3 106 990	SINTH	0022	= 73	19 287 1360
SETRXX	13,2614	1242	3 1242	SGNTAB	40,2344	320	2 319 320	SINTRIM	15,3177	1079	2 1071 1074
SETSAMP	06,3022	160	1 160	SGNTO1	40,2755	350	1 349	SINVEC1	27,2315	396	1 394
SETSURF	43,3207	267	1 236	SGNTST1	40,2363	320	3 320	SINVEC2	27,2317	396	1 395
SETT86	24,3315	703	2 703	SHAFTA	1161	= 98		SIN33	14,2510	755	1 753
SETTIME4	06,2074	135	1 137	SHAXIS	14,2162	746		SIX	6211	= 1204	41 147 1481
SETT5	21,2160	1003	2 1002 1003	SHIFTA	27,2560	588	1 588	SIXTY	43,3240	1396	1 1402
SETUP.9	24,3137	700	1 699	SHIFTNDX	27,2547	588	4 580 583	SIZETAB	01,2000	212	2 1417 1419

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SYMBOL	DEF	H	REFERENCES	SYMBOL	DEF	H	REFERENCES	SYMBOL	DEF	H	REFERENCES
SIZETST	42,3474	354	2 352 353	SOMEERRR	33,3077	442		SQRARG	1077	77	
SKEEP1	1371	= 82	20 82 1403	SOMERR2	33,3102	442	2 428 446	SQRT	00,3207	1181	1 1118
SKEEP2	1372	= 82	10 82 1401	SOPT	43,3707	1403	1 1403	SQRTABRT	00,3402	1184	2 1184
SKEEP3	1373	= 82	14 82 1402	SOPTION	43,3672	1402	2 1401	SQRTNEG	00,3373	1184	1 1184
SKEEP4	1374	= 82	14 82 1403	SOPTIONS	43,3314	1397	2 1397	SQRTNM2	00,3474	1186	1 1186
SKEEP5	1375	= 82	10 82 1402	SOPTION1	43,3324	1397	1 1397	SQRTNORM	00,3501	1186	1 1186
SKEEP6	1376	= 82	6 82 1403	SOPTION2	43,3325	1397		SQRTSHFT	00,3221	1181	1 1181
SKEEP7	1377	= 82	22 186 1402	SOPTION3	43,3326	1397		SQRTSUB	00,3343	1184	3 1175 1189
SKIPADD	10,3172	1474	1 1474	SOPTION4	43,3327	1397		SR	0021	= 39	35 267 1417
SKIPSIM	05,2351	183	1 183	SOPTION5	43,3330	1397		SRDDV	00,2024	1152	1 1175
SKIPTPER	23,2744	523	1 523	SOPTION6	43,3331	1397		SRRETURN	E7,1656	= 121	2 627 629
SKIPVBIT	5006	= 50	2 190 588	SOPTION7	43,3332	1397		SRTEST	00,3455	1186	1 1185
SKIPVHF	0043	= 50	1 587	SOPTON10	43,3333	1397		SR30.1	23,2667	522	2 517 519
SLAP1	05,2342	183	1 326	SOUPLY	33,3123	442		SR52.1	13,2244	776	1 744
SLEEPIE	33,2522	436	5 434 446	SOURCBIT	5010	= 64	1 584	SR52/1	13,2000	= 29	1 776
SLEFT5	4354	379	1 362	SOURCFLG	0216	= 64	6 579 587	SR52E1	13,2360	777	1 777
SLOAD	6450	1124	1 1116	SOUTHDR	E5,1431	98	3 98 426	SR52E2	13,2357	777	1 777
SLOAD2	6024	1107	5 1124 1514	SPARE	0007	= 170	14 179	SR52E22	13,2353	777	1 777
SLOPE	E6,1654	= 110	4 110 1031	SPBIT1	16,2154	719		SR52E3	13,2355	777	1 777
SLOPEBIT	5015	= 49		SPCOS	5074	1207	7 999 1367	SSP	6567	1126	1 1116
SLOPEHI	00,2314	1160	1 1185	SPCOS1	5074	= 999	1 1037	STABLISH	43,2524	251	1 236
SLOPELO	00,3007	1174	1 1186	SPCOS2	5074	= 999	1 1037	STADR	6323	1119	1 1118
SLOPESW	0033	= 49	2 1285 1296	SPECSTS	33,2625	437	1 218	STALL	07,3600	1441	2 1440
SLOPEVAL	05,3505	955	1 953	SPECTEST	01,2674	1212	1 1216	STALTEM	0154	= 1326	3 1325
SLOPE2	21,3440	1030	2 1032 1033	SPITGYRO	33,3367	446		STAR	E5,1765	= 95	16 95 779
SLOWBIT	5003	= 55		SPLRET	23,2653	520	1 644	STARAD	E5,1735	= 95	24 95 1362
SLOWFLG	0115	= 55	3 892 922	SPLRET1	23,2501	517	1 520	STARALGN	0736	74	2 74
SMALL	00,3133	1178	1 1175	SPNDX	E6,1506	= 108	34 108 1035	STARCODE	0735	74	11 281 783
SMALLMP	21,2042	999	3 1005 1035	SPNDXCHK	21,3023	1019	2 1019	STARIND	0304	= 72	18 208 783
SMALL2	00,3062	1175	1 1178	SPOLYARG	E6,1707	= 115	3 115 543	STARM	0040	= 73	4 285
SMCDURES	23,3742	1372	1 594	SPRTETIG	E7,1412	= 128	2 902 905	STARSAV1	E5,1610	= 94	7 94 777
SMODE	1362	= 82	7 82 1397	SPRTEX	E7,1762	= 127	14 127 913	STARSAV2	E5,1616	= 94	10 94 776
SMODECHK	43,3303	1397	3 1397 1400	SPSCODE	5007	= 1420		STARSAV3	E7,1704	= 125	5 282 783
SMPAC+	00,3404	1185	3 1184	SPSIN	5075	1207	8 999 1367	STARTAB	14,2000	= 29	1 1389
SNAPAGN	05,3646	1098		SPSIN1	5075	= 999	1 1037	STARTEB	05,3175	193	1 190
SNAPEND	05,3665	1099		SPSIN2	5075	= 999	1 1037	STARTENT	25,2000	844	1 796
SNAPLOOP	05,3635	1098	1 1098	SPSIX	31,3462	631	1 621	STARTEN1	25,2063	845	2 790 845
SNGLCD	22,2374	405		SPSOFF	24,3017	698	4 198 708	STARTMNV	27,2047	391	
SNTH	E5,1731	= 96	18 96 1302	SPSOFF97	24,3535	708	1 216	STARTPIP	33,2163	425	1 425
SN1	00,3552	1188	1 1187	SPSON	24,2635	695		STARTSB2	05,3006	190	1 188
SN359+	22,3425	667	1 666	SPT	5100	1207	1 1207	STARTSIM	05,2345	183	
SOB	0042	= 1251	4 1246 1247	SPVAC	5160	1208	3 202 1472	STARTSTO	6403	1122	
SOLNSBIT	5015	= 57		SPVACIN	5154	1208	1 1208	STARTSUB	05,2776	190	3 183 190
SOLNSW	0127	= 56	5 1299 1302	SPVQUIT	37,3513	883		STARTSW	05,2344	183	
SOLPOS	26,2123	787		SQ	1076	= 77	2 1207	STAR52	13,2313	776	1 776

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SYMBOL	DEF	H	REFERENCES	SYMBOL	DEF	H	REFERENCES	SYMBOL	DEF	H	REFERENCES
STATE	0074	68	53 46 1443	STORJUMP	6341	1120	1 1119	SW/NDX	0305	= 72	7 1068 1091
STATEBIT	5013	= 52		STORLP71	27,3641	1505	2 1505	SWBIT	0131	= 70	5 1197 1199
STATEFLG	0067	= 52	8 586 1495	STORT	34,3350	593		SWBRANCH	6664	1129	1 1199
STATEINT	13,2627	1313	3 213 1314	STRAT	14,2450	754	1 754	SWCALL	4666	1103	5 189 1195
STATEND	13,2031	210	1 210	STRATGY	14,2442	754	1 754	SWCHCLR	35,2057	464	1 464
STATEST	31,2032	= 35		STRKCHK	20,3502	981		SWCHSET	35,2035	464	1 464
STATEUP	13,2000	209	1 1314	STRKTIME	E6,1654	= 106	2 106 939	SWICHOVR	17,2354	941	3 941 959
STATEXIT	0111	69		STRKTSTI	20,3501	981	1 251	SWINIT	05,3204	193	9 184 185
STATEXTP	31,2140	508	1 505	STRKTTMP	E6,1677	= 106	1 106	SWITCHES	01,2543	1197	1 1199
STATINT1	13,2636	1313	2 213 1313	STROKER	E6,1574	= 105	11 105 983	SWRETURN	4675	1103	10 205 1444
STATQUD	04,2251	201	1 201	STROKILL	20,3575	983	1 983	SWSAMPLE	1314	81	9 160 745
STBLEORB	04,2000	= 28	1 526	STROKON	43,2513	251	1 236	SWSKIP	01,2624	1199	2 1199
STBYDUMP	15,2654	1072		STRSAT	34,2510	546	1 542	SWSTORE	01,2600	1198	2 1198
STEERADS	24,3060	699	1 685	STRTGYRO	07,3270	1432	2 1430 1435	SWTOVBIT	5001	= 63	
STEERBIT	5005	= 50		STRTGYR2	07,3274	1432	4 1433 1437	SWTOVER	0207	= 63	
STEERING	24,3205	701	1 699	STRULBIT	5003	= 57		SWWORD	0130	= 70	2 1197 1198
STEEROFF	25,3613	875	1 870	STRULLSW	0134	= 57	1 57	SXA	01,2411	1192	1 1117
STEERSAT	34,2452	545	1 546	STSHOSUM	43,3524	1400	2 263	SXTALARM	23,2142	288	2 288
STEERSW	0042	= 50	4 707 722	ST52ST	13,2324	777	1 776	SXTANG	23,2053	287	1 452
STEERULL	24,2724	696	1 696	SUBETA	26,3117	851	1 851	SXTANG1	23,2076	287	1 286
STEP2CK	34,3377	593	1 593	SUBETA2	26,3125	851	1 851	SXTLOGIC	23,2027	285	1 285
STEP3CK	34,3432	594	1 593	SUBEXIT	E4,1770	= 91	36 91 682	SXTMARK	07,2002	222	3 453 781
STICKCHK	21,3130	1021	3 550 1025	SUBLIST	0337	= 1099	12 1096 1099	SXTMARKE	07,2000	= 28	1 222
STIKBIT	5002	= 48	2 593	SUBTR	00,3701	1190	1 1191	SXTMARK1	10,2000	= 28	1 234
STIKBITS	23,3037	550	2 550	SUFFCHEK	12,3460	1299	3 1298 1299	SXTNB	23,2000	285	4 454 771
STIKFLAG	0020	= 48	2 199 250	SUHALFA	22,2700	410	1 410	SXTOPTN	E5,1413	= 98	
STKTEST	34,3421	593	1 593	SUHALFAP	22,2720	410	1 410	SXTSM	17,2022	771	2 757 768
STOINST	05,3407	953	1 953	SUPDACAL	4715	1104	2 358 1401	SXTVAR	34,3335	585	1 581
STOPRAT	4000	= 27	1 418	SUPDXCHZ	5227	1220	5 370 1220	SYNCT4	06,2156	137	1 138
STOPRATE	4526	418	5 188 418	SUPERBNK	0007	= 41	26 186 1493	SYSTEST	43,2360	247	1 237
STOPYZ	4537	418	1 418	SUPERSW	4773	1106	2 1475 1480	S1	0050	= 40	55 405 1368
STORBNDS	12,2157	1278	1 1280	SUPER011	5035	1201	3 535 1422	S10BITS	5054	= 1396	2 1398
STORCMD	10,2063	167	1 168	SUPER100	5011	= 1201		S11.1	34,2542	546	2 540 691
STORDELT	35,2467	472	2 471 472	SUPER101	5037	1201	1 1204	S13BITS	43,3242	1396	1 1402
STORE	6371	1121	6 1120	SUPER110	5040	1201	1 1204	S17.1	36,2012	552	1 559
STORE,1	6363	1121	1 1120	SUPRCON	43,3241	1396	1 1402	S17.2	36,2070	553	1 560
STORE,2	6366	1121	1 1120	SURELY.9	24,3154	700	1 700	S2	0051	= 40	46 430 1361
STOREDTA	33,2552	436	2 436 438	SURFFBIT	5010	= 62		S2BVTRS	30,3042	605	
STOREL/D	25,3525	872	1 864	SURFFLAG	0177	= 62	8 210 1328	S2GETUM	30,2430	600	
STOREMAX	12,2116	1278	3 1277 1278	SVCT3	5306	1225	2 1225	S2INCP1	30,3046	605	
STOREMIN	12,2170	1278	1 1278	SVCT3X	7717	1225	3 1225	S2INTS1	30,2737	604	
STOREPL	E5,1430	98		SVDWN1	10,2237	289	3 265 1315	S2RPTR	30,3000	605	
STORE1	6572	1126	1 1157	SVDWN2	10,2263	289	3 265 1316	S2RTRP	30,2772	604	
STORHAPO	23,2716	522		SVMRKDAT	E7,1537	= 121	6 121 599	S22.1	30,2312	598	1 566
STORHPER	23,2730	523		SW/	01,2543	= 1199	1 1117	S22.111	30,2326	599	1 599

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SYMBOL	DEF	H	REFERENCES			SYMBOL	DEF	H	REFERENCES			SYMBOL	DEF	H	REFERENCES		
S22.981X	30,3263		608	1	608	S22WSUBL	E4,1406		88	1	606	S40.81	20,2201		721	1	721
S22A8DF	30,2263		568	2	568	S22WUNL	E7,1666	=	125	2	125 129	S40.9	16,2302		723	1	700
S22B0X12	30,3015		605	1	606	S22W72X	30,2636		603	1	603	S41.1	22,3431		717	2	689 691
S22B0X22	30,3123		606	1	600	S22W76X	30,2644		603	3	602 603	S41.2	20,2347		731	2	253 1014
S22B0X32	30,3001		605	1	607	S22W78X	30,2664		603	3	603	S50	14,2225		749	1	749
S22B0X42	30,3104		606	1	605	S221X3	0030	=	614	2	609	S52.2	11,2331		774	2	740 761
S22B0X44	30,3220		607	2	607	S223X1	0022	=	614	3	601 609	S52.2.1	11,2352		774		
S22BX22A	30,3146		607	1	607	S2231NXT	31,2341		609	1	609	S52.2A	11,2343		774	1	774
S22BX22B	30,3157		607	1	607	S2231X13	31,2332		609	2	601 602	S52.3	16,2661		780	1	740
S22BX44A	30,3223		608	1	607	S30.1	31,3475		639	1	636	S52/2	11,2000	=	29	1	774
S22BX44B	30,3233		608	1	608	S31.1	31,3547		641	1	637	S52/3	15,2000	=	29		
S22C=I	30,2470		601	1	601	S32.1F1	0245	=	66	4	664 673	S61.1	26,2544		803	2	789 792
S22CALRC	30,3332		609	2	600 606	S32.1F2	0246	=	66	4	664 674	S61.1A	26,2604		804	3	216 804
S22D	0036	=	614	3	601 602	S32.1F3A	0247	=	66	8	664 674	S61.1B	26,2622		805	1	804
S22D=9	30,2763		604	1	600	S32.1F3B	0250	=	66	8	664 674	S61.1C	26,2565		804	2	215 804
S22DSPP	30,2233		568	4	568	S32/33.X	13,2231		679	2	662 678	S61.2	26,2651		808	1	790
S22DSPPA	30,2200		567	1	568	S32/33.1	35,3457		678	2	654 659	S61DT	E6,1774	=	116	3	215 804
S22EDRM	E7,1673	=	125	8	125 609	S32BIT1	5001	=	66			S62.3	10,2376		818	1	794
S22EXEX	30,3267		608	1	606	S32BIT2	5002	=	66			S8BITS	4373	=	1396	1	1403
S22FLGS	31,2355		610	2	599 604	S32BIT3A	5003	=	66			==========					
S22F2410	30,3277		608	2	601 607	S3229T3B	5004	=	67			T	0036	=	1306	17	465 1299
S22F244	30,3162		607			S33/34.1	35,2216		469	2	464 658	T(X)	27,3334		1387	2	1384 1385
S22F244X	30,3161		607	1	604	S34/35.1	36,2000		474	4	468 531	T-OTHER	E3,1642	=	86	1	172
S22GTP	30,3272		608	1	608	S34/35.2	35,2526		475	2	465 468	T-TO-ADD	E7,1731	=	124	6	1329 1331
S22I=N	30,2712		604	1	604	S34/35.3	35,2616		477	1	480	TABLNTH	06,2037		135	1	135
S22LOC	E5,1750	=	97	6	97 610	S34/35.4	35,2661		478	1	480	TABPCOM	17,2664		1041	4	1040
S22LSITE	30,2117		566	1	569	S34/35.5	35,2741		480	2	465 468	TABRCOM	17,2777		1043	2	1043
S22NXTIN	30,2416		600	3	604	S3435.23	35,2544		475	1	475	TABRZCMD	17,3061		1045	2	1045
S22NXTU	30,2525		601	1	601	S3435.25	35,2546		475	1	528	TABYCOM	17,2735		1042	4	1041
S22NXTWI	30,2536		601	1	601	S3435LOC	36,2000	=	33	1	474	TACHEXIT	43,3057		264	1	265
S22NXXA	30,2562		602	1	602	S40.1	16,2020		710	1	684	TAD	7040		1135	1	1116
S22NXXB	30,2607		602	1	602	S40.18	16,2116		711	1	710	TAGSUB	01,2466		1194	4	1192 1193
S22N7071	30,2175		567	2	566	S40.13	16,2427		726	3	213 709	TAKEON	34,2534		546	1	546
S22OFF=I	30,2755		604	1	600	S40.130	16,2453		726	2	726 727	TAR/EREF	33,3502		449	2	450 452
S22RHO	0040	=	614	6	602 609	S40.131	16,2504		727	1	726	TARGDRVE	33,3635		452	2	450 451
S22RL	E5,1634	=	614	2	601	S40.132	16,2511		727	1	727	TARGETNG	25,2125		848	1	847
S22RTNEX	E7,1703	=	125	4	125 608	S40.133	16,2520		727	1	727	TARGETV	12,3551		1300	1	1300
S22SAVET	30,2707		603	2	605 606	S40.134	16,2522		727	1	727	TARGTIME	E5,1614	=	93	2	528 531
S22SCLW	30,2676		603	1	603	S40.135	17,2020		728	1	726	TARG1/2	E5,1431	=	98	2	452
S22SHIFT	30,2353		599	1	599	S40.14	20,2500		735	2	254 1014	TARG1BIT	5006	=	48		
S22TOFF	E7,1667	=	125	12	125 608	S40.15	17,2462		943	3	938 947	TARG1FLG	0024	=	48	8	391 776
S22TPRIM	E7,1671	=	125	3	125 604	S40.2,3	24,3574		714	1	684	TARG2BIT	5007	=	48		
S22UMRL	E7,1501	=	614	7	601 609	S40.2.3B	24,3715		716	1	715	TARG2FLG	0025	=	48	6	566 776
S22UOFF	1214	=	614	3	604 614	S40.6	20,2252		730	1	685	TAR1	33,3511		450	1	450
S22UUT	1256	=	614	9	602 603	S40.8	16,2153		719	1	700	TASKOVER	5324		1232	71	143 1489

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TAT	0014	= 1354	11 458 1330	TEMK	1075	= 77	10 1207	TEPHEM	E3,1706	86	19 87 1507
TAU	E6,1561	= 109	12 109 1053	TEMP	E5,1451	= 98		TEPHEM1	1267	= 80	7 80 536
TAU.	E4,1711	= 89	13 89 1340	TEMPADD	E5,1450	= 98		TERMATE	10,3614	1481	1 1479
TAUCHCK	17,3115	1045	1 1045	TEMPALFA	E6,1771	= 116	2 116 888	TERMEXTV	5534	= 238	3 240 243
TAUCHECK	17,3033	1044	1 1044	TEMPBB	0064	= 1411	1 1410	TERMIBIT	5001	= 59	
TAUNORM	21,3745	1035	2 1035	TEMPBBCN	0073	= 1411	6 1410 1412	TERMIFLG	0151	= 59	2 744 773
TAU1	E6,1562	= 109	9 109 1051	TEMPBETA	E6,1772	= 116	3 116 888	TERMNVEC	12,3637	1302	1 1302
TAU2	E6,1563	= 109	9 109 1052	TEMPDAP	E6,1445	103	8 103 949	TERMP03	07,2366	232	1 232
TAZEL1	E5,1432	98	4 449 450	TEMPFLSH	0374	74	4 199 1475	TERMSXT	07,2357	232	1 232
TBASE1	1053	76	6 221 1415	TEMPG	0061	= 1411	11 221 1413	TERMITMP	0133	= 71	3 1370
TBASE2	1055	76	2 1325	TEMPG2	0071	= 1411	3 1409 1412	TERM52	14,2205	746	2 232 746
TBASE3	1057	76		TEMPNM	0063	= 1411	3 1410 1413	TERRLAMB	E5,1761	= 96	2 1298 1299
TBASE4	1061	76	1 205	TEMPOK	06,2520	149	2 149	TEST	01,2612	1199	1 1199
TBASE5	1063	76	3 484 539	TEMPOR1	1300	80	9 576 604	TESTBIT	40,3434	375	3 375
TBASE6	1065	76	2 703 824	TEMPOR2	0160	= 1483	10 1467 1477	TESTLEAD	33,2000	= 32	1 422
TBITS	E6,1606	= 112	2 112 1088	TEMPP	0062	= 1411	6 1410 1413	TESTLOOP	13,3305	1323	6 1320 1351
TBUILDFX	5031	1201		TEMPPHS	0154	= 1419	9 1414 1419	TESTNN	41,2046	324	1 357
TC	E3,1550	= 85	10 85 1347	TEMPPR	0070	= 1411	2 1410 1413	TESTOFUF	40,3101	352	4 349 359
TCALARM2	43,3266	1396		TEMPP2	0072	= 1411	5 1409 1412	TESTTIME	33,2443	431	1 423
TCCSM	E3,1622	86		TEMPROLL	E6,1770	= 116	3 116 888	TESTVB	41,2041	324	
TCDANZIG	27,3352	= 1387	12 294 1382	TEMPR60	1146	78	5 390 731	TESTXACT	43,2076	237	17 240 1499
TCDH	E5,1634	= 101	11 101 677	TEMPSET	15,3040	948	1 960	TESTY	35,2264	469	1 469
TCDU	37,3770	889	1 887	TEMPSW	0065	= 1411	7 1409 1412	TEST3979	04,3114	528	1 528
TCFINDVC	4370	379	1 366	TEMPSWCH	0157	= 1419	3 1414 1419	TET	E3,1516	= 85	32 85 1346
TCGETCAD	00,3755	1488	1 1489	TEMPSW2	0066	= 1411	4 1409 1412	TETCSM	E3,1570	86	3 86 1506
TCLEM	E3,1674	86		TEMPTIME	E5,1440	98	2 430	TETLEM	E3,1642	86	3 86 1507
TCNOVAC	4365	379	1 366	TEMPVAR	1261	= 80	3 1253 1254	TETOTHER	E3,1642	= 86	
TCORR	17,2540	944	1 939	TEMP2G	0155	= 1419	9 1414 1419	TETTHIS	E3,1570	= 86	1 512
TCPIN	43,3076	265	1 265	TEMP333	E6,1510	= 104	3 104 954	TET1	0036	= 85	
TCPINAD	43,3101	265	1 265	TEMREG	E6,1573	= 105	25 105 995	TEVENT	1336	81	5 81 698
TCQ	6711	= 1404	3 165 261	TEMX	1224	= 79	5 79 834	TF	E7,1751	= 126	10 126 559
TCQBNK00	00,3454	1185	1 1185	TEMY	1225	= 79	3 79 834	TFF	E4,1743	= 90	13 90 523
TCSI	E5,1636	= 101	7 101 677	TEMZ	1226	= 79	5 79 834	TFF/RTMU	0036	= 1373	7 516 1384
TCSLEEP	00,3766	1489	1 1488	TEM1	0141	70	6 70 1476	TFF/TRIG	27,2631	815	4 643 810
TCSUBTR	00,3731	1191	1 1189	TEM1B	E7,1646	= 118	8 118 870	TFFALFA	0032	= 1373	6 1377 1384
TCTSKOVR	4367	379	1 982	TEM2	0142	70	9 70 1511	TFFBANK	23,2410	516	1 515
TCWAIT	4366	379	1 366	TEM3	0143	70	9 70 1366	TFFCALLS	23,2703	522	1 522
TDEC	1100	78	9 78 1350	TEM4	0144	70	9 70 338	TFFCONIC	27,2757	1376	1 808
TDECAYFX	5032	1201		TEM5	0145	70	2 71	TFFCONMU	27,2760	1376	1 522
TDEC1	0040	= 1354	55 210 1350	TEN	4377	= 1204	9 191 1143	TFFDELQ	0012	= 1373	2 1385 1386
TDEC2	E5,1634	= 93	2 498	TENBNK14	22,3445	718	1 718	TFFELL	27,3252	1385	1 1383
TDELTAV	E3,1520	= 85	14 85 1349	TENMOOT	E6,1637	= 105	3 105 947	TFFEL1	27,3254	1385	1 1383
TDESIRED	E5,1672	= 96	5 96 1299	TENT	32,2166	645	1 645	TFFNP	0034	= 1373	7 814 1385
TDPOS	E5,1706	= 97	1 97	TENTH	34,3663	597	1 594	TFFQ1	0016	= 1373	5 1382 1385
TDVEL	E5,1714	= 97	1 97	TENTHSEK	21,2361	1006	1 1006	TFFRP/RA	27,3026	1379	1 522

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SYMBOL	DEF	H	REFERENCES	SYMBOL	DEF	H	REFERENCES	SYMBOL	DEF	H	REFERENCES
TFFRTALF	0030	= 1373	3 1377 1384	TICKTFF	23,2521	518	1 517	TITER	E7,1664	= 125	7 125 471
TFFSW	0167	= 61	3 1382	TICKTPER	23,2511	517		TIX	01,2442	1193	1 1117
TFFSWBIT	5017	= 61		TIG	E7,1412	= 117	68 117 897	TLESS26	32,2251	646	1 645
TFFTEM	0044	= 1373	15 815 1386	TIG-0	24,2612	695	3 214 694	TLIFTOFF	1336	= 81	5 535 539
TFFTICK	23,2554	518		TIG-5	24,2574	694	3 214 693	TLIM	06,2507	149	1 140
TFFVSQ	0024	= 1373	2 814 1376	TIGAVEG	24,2555	693	2 215 690	TLOAD	6437	1124	3 405 1204
TFFX	0042	= 1373	8 815 1385	TIGBLNK	24,2437	690	3 215 686	TM	E6,1716	= 114	4 412 416
TFFXTEST	27,3160	1383	1 1383	TIGNOW	24,2264	687	2 687 688	TMANUCHK	22,3104	415	
TFFZEROS	26,3334	= 1388	2 1382 1383	TIGON	24,2500	691	2 216 691	TMARK	E5,1442	98	5 430 445
TFF1/ALF	0026	= 1373	7 1377 1386	TIME/RIO	E7,1523	= 118	3 118 849	TMAXFIRE	16,3716	998	2 994
TFF1/4	26,3324	= 1388	4 1376 1382	TIMECHEK	10,3543	1480	1 1480	TMEXITL	05,3717	1099	
TF1	E5,1620	= 94	3 94 554	TIMECHK	22,3115	415	1 415	TMFAIL2	07,3764	1450	2 1451
TF0	E5,1626	= 94	2 94 554	TIMEDELT	13,3710	1331	5 1329 1331	TMFI	E6,1666	= 114	9 399 401
TGO	E7,1427	= 117	19 117 727	TIMEDIDL	27,3561	1504	2 1503 1506	TMINDEX	0336	73	6 73 1099
TGOCALC	16,2220	720		TIMEDIDR	27,3573	1504	1 219	TMINFIRE	16,3715	998	1 993
TGR26	32,2170	645	1 645	TIMEINC	13,3645	1331	2 1331	TMIS	E6,1666	= 114	15 114 399
TGR26CON	32,2253	646	1 645	TIMEMO	E4,1433	88	2 88 787	TMODE	6446	1124	
THETA	0024	= 73	11 760 1357	TIMEOVFL	12,2326	1281	1 1279	TMODULO	1345	82	
THETA(1)	E4,1747	= 90	3 91 644	TIMER	E5,1500	= 99		TMP1	E6,1706	= 106	7 106 974
THETACON	16,2151	712	1 710	TIMERAD	12,3556	1301	2 901 910	TMP2	E6,1710	= 106	11 106 974
THETAD	1155	78	23 78 1511	TIMESTEP	11,3240	1344	4 1324	TMP3	E6,1712	= 106	7 106 975
THETADX	E6,1572	= 109	7 109 1028	TIMETEST	01,3566	1415	1 1419	TMP4	E6,1714	= 106	11 106 975
THETADY	E6,1573	= 109	3 109 1027	TIMETHET	12,2744	1289	8 465 898	TMP5	E6,1716	= 106	7 106 976
THETADZ	E6,1574	= 109	4 109 1028	TIMETST	15,3525	1087		TMP6	E6,1720	= 106	11 106 977
THETAH	E7,1701	= 119	7 119 871	TIMETST1	15,3550	1087	1 1087	TMRAD100	32,2277	901	2 893 903
THETAN	E5,1466	= 99	2 99 537	TIMETST2	15,3564	1087	1 1087	TMRESUME	05,3721	1099	
THETAN1	E5,1466	= 100	13 100 445	TIMETST3	15,3603	1088	1 1087	TNIT	E7,1473	= 122	4 122 724
THETAX	E5,1460	= 99	1 99	TIMETST4	15,3605	1088	1 1087	TNITPREV	E7,1475	= 122	3 122 724
THETAX1	E5,1460	= 100	5 100 445	TIMETST5	15,3606	1088	2 1087 1088	TNONTEST	06,2231	141	1 139
THETA165	35,3571	932	1 897	TIMEX	35,2523	472	2 470 472	TNUV	E3,1526	= 85	12 85 1349
THETA210	35,3573	932	1 897	TIME1	0025	= 39	23 132 1480	TOBALL	27,2013	390	3 390 391
THETDONE	25,2226	849	1 852	TIME2	0024	= 39	37 171 1508	TOBALLC	27,2034	390	1 390
THETL	E7,1747	= 126	3 126 554	TIME2SAV	1150	78	5 79 1448	TOCON2	5455	1410	1 1411
THETZERO	E5,1616	= 94	4 94 553	TIME3	0026	= 39	4 190 1231	TOF-FF	27,2000	= 31	1 1376
THIRD	35,3112	485	1 471	TIME4	0027	= 39	4 135 190	TOF-FF1	27,2000	= 31	1 1388
THIRTEEN	5025	= 1178	5 831 1515	TIME5	0030	= 39	25 131 1072	TOFF	E6,1605	= 112	7 112 1088
THISAXIS	26,3332	= 35	1 506	TIME6	0031	= 39	6 994 1062	TOFFOVFL	15,3501	1085	1 1085
THISPREC	13,3071	= 35	5 503 712	TIMRBIT	5005	= 60		TOFFTEST	15,3552	1087	1 1087
THISSHIP	23,2446	517	1 516	TIMRFLAG	0155	= 60	4 635 688	TOGETHER	20,2365	732	1 732
THISVINT	13,2034	210	1 1330	TIMSCAL	15,3510	1086	1 1085	TOLDAZMT	E5,1641	= 100	
THRDCHK	10,2307	672	2 671	TIMSUBM	0016	= 1251	3 1248	TOLDAZ1	E5,1641	= 100	
THREE	6214	= 1204	55 35 1500	TIMSUBO	E3,1706	= 87	1 1248	TON1	E6,1621	= 113	12 113 1088
THREE/8	11,3747	1353	1 1339	TINT	E7,1655	= 123	5 527 528	TON2	E6,1607	= 112	10 112 1088
THRUST	0055	= 40		TINTSOI	E5,1610	= 93	2 527 528	TON2TEST	15,3566	1087	1 1087
TICKTEST	23,2531	518	2 515 518	TINYTHET	26,3136	852	1 849	TORQINCH	33,3062	441	

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SYMBOL	DEF	H	REFERENCES
TORQNDX	E5,1450	= 99	7 423 441
TORQUE	33,2122	425	1 442
TPAGREE	7226	1141	15 246 1508
TPASS4	E7,1655	= 123	13 123 898
TPDVL	6557	1126	1 1126
TPERTICK	23,2561	518	1 518
TPLEFTN	40,3060	351	3 336 351
TPMODE	22,3565	1509	12 582 1294
TPREV	E5,1763	= 96	2 1298 1299
TPSL1	4420	380	6 341 351
TPUSH	00,3272	1182	1 1182
TR*GL**P	23,3520	1366	1 1366
TRACE1	40,3143	359	
TRACE1S	40,3154	359	
TRACKBIT	5013	= 49	2 257 259
TRACKFLG	0031	= 49	7 259 739
TRACKTRM	43,2653	259	2 236 632
TRANSANG	07,2441	558	1 557
TRANSM1	E4,1400	= 92	2 92 440
TRANSPOS	22,2334	404	1 399
TRANSP1	22,3662	1513	2 287
TRANSP2	22,3676	1513	1 287
TREAILOF	5631	1492	2 264 587
TREAILON	5643	1492	1 587
TRG*NBSM	23,3637	1369	2 454 1368
TRG*SMNB	23,3624	1368	
TRIG1	23,3271	1357	1 1357
TRIG2	23,3302	1357	1 1357
TRIM/CMD	16,3244	959	1 958
TRIMONLY	24,2156	685	1 690
TRIMSCAL	24,3753	717	2 715
TRIPA	1256	= 80	4 1253 1254
TRKMKCNT	1126	78	8 78 1327
TRMATTCK	43,2452	249	1 249
TRMO3BIT	5014	= 49	1 453
TRMO3FLG	0032	= 49	2 232 451
TRNSPSPD	22,2343	404	2 399 404
TRTAGXPI	15,3274	1082	
TRUE360X	12,3204	1295	1 1293
TRUNA	1160	= 98	
TRUNBIAS	1342	82	2 571 625
TRUNBIT	5014	= 47	
TRUNCMD	10,2132	168	1 167
TRUNFLAG	0013	= 47	3 744 745
TRUNION	E5,1754	= 97	2 622 625
TRUNVAR	31,3453	631	1 626
TRUNX	E7,1603	= 121	3 121 129
TRUN19	31,3444	631	1 626
TRUN19A	31,3445	631	
TRUN38	13,2342	777	1 777
TSIGHT	E5,1606	= 93	13 93 782
TSIGHT1	15,2263	750	1 740
TSK	21,2072	999	4 999 1000
TSKOVCDR	01,3517	1235	1 1234
TSLC	7565	1149	1 1116
TSLCLOOP	00,2201	1157	1 1157
TSLCTEST	00,2207	1157	1 1157
TSLC2	00,2172	1157	1 1149
TSSL	00,2101	1154	3 1152 1161
TSSR	00,2025	1152	
TST,TRIM	24,2435	690	1 685
TSTAB	40,3543	388	1 389
TSTART82	E4,1724	= 90	6 516 644
TSTCON1	41,3656	385	1 385
TSTCON2	41,3657	386	1 385
TSTCON3	41,3660	386	1 386
TSTFORDP	41,2466	332	1 331
TSTINIT	20,3512	981	1 981
TSTINITJ	16,3250	960	2 959
TSTLTS1	41,3633	385	1 385
TSTLTS2	41,3662	386	1 385
TSTLTS3	41,3667	386	1 386
TSTLTS4	40,3376	368	1 386
TSTORE	6423	1122	1 1122
TSTPOINT	23,3730	1371	
TSTRLSRM	13,2616	1242	1 1242
TSTRT	E7,1664	= 125	3 125 468
TSTRXUT	24,3734	716	2 716
TST2I=0	30,3473	612	1 613
TTE	E7,1726	= 119	6 119 808
TTEMP	E6,1672	= 114	4 415
TTE1	E7,1732	= 119	4 120 816
TTG/O	24,2334	688	2 214 689
TTGPHS	24,2566	693	2 689 691
TTMP1	E6,1611	= 105	42 105 977
TTMP2	E6,1613	= 105	14 105 976
TTOGO	E7,1660	= 123	8 123 703
TTPI	E7,1662	= 123	23 124 677
TTPIO	E5,1640	= 101	3 654 659
TUSED	E6,1712	= 111	7 111 1088
TVCADDR	16,3257	= 960	3 958 959
TVCCADR	16,3257	960	2 959 960
TVCDAPHS	16,3152	958	1 958
TVCDAPON	17,2147	937	1 699
TVCEXADR	16,3263	960	1 960
TVCEXEC	16,2720	946	3 188 946
TVCEXFIN	16,3134	949	3 946 948
TVCEXPHS	E6,1651	= 106	15 106 960
TVCINIT1	17,2171	938	1 944
TVCINIT2	17,2222	938	
TVCINIT3	17,2256	939	
TVCINIT4	17,2324	940	1 959
TVCON2C	24,3066	699	1 696
TVCPHASE	E6,1644	= 105	16 105 970
TVCPITCH	0054	= 40	5 731 982
TVCRCS	E6,1525	104	3 104 108
TVCTMP1	E6,1523	= 104	
TVCYAW	0053	= 40	3 731 968
TVCZAP	24,3071	699	4 198 706
TVEC	0032	= 1354	4 1342
TWEEKIT	0050	= 1307	4 1285 1299
TWELVE	5771	= 1040	6 204 1045
TWIDDLE	5235	1223	5 425 707
TWO	5016	= 1204	84 205 1503
TWODT	17,2000	721	1 711
TWOPI	35,3106	485	3 471 677
TX789	E7,1447	= 121	3 121 1260
T1	E7,1715	= 127	6 127 915
T1BITS	E6,1622	= 113	2 113 1087
T1TOT2	E5,1546	= 101	5 281 673
T12	E7,1723	= 127	4 127 903
T2	E7,1735	= 127	7 127 916
T2BITS	E6,1610	= 112	2 112 1088
T2TOT3	E7,1655	= 129	5 281 673
T3RPTBB	4055	132	1 131
T3RUPT	01,3416	1231	2 131 132
T3RUPT2	01,3423	1231	1 1232
T3TOT4	E5,1640	= 94	2 272 902
T4JUMP	06,2116	137	2 136
T4RPTBB	4063	132	1 131
T4RUP	06,2000	= 28	2 133 134
T4RUPT	06,2000	133	2 131 132
T5IDLDAP	42,3650	734	1 734
T5IDLER	05,3155	192	2 184 187
T5IDLER1	20,3736	1069	2 1066

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T5IDLER2	15,3744		1091 1 1091	UNITNORM	04,3726		1291 1 1291	UPLIM	12,3312		1297 1 1297
T5IDLOC	05,3153		192 7 192 1091	UNITR	E3,1757		87 12 835 885	UPLOADNV	27,3510		1502 2 1501
T5IDL24	24,2432		690 1 695	UNITV	E7,1507	=	118 2 118 848	UPLOCBIT	5014	=	61
T5LOC	1312		81 26 132 1091	UNITW	E3,1713		86 10 86 883	UPLOCKFL	0164	=	61
T5PHASE	E6,1465	=	103 10 736 1059	UNITX	26,3332		1205 7 34 1205	UPMNSVCD	27,2746		1333 1 1332
T5PHASE2	21,2661		1016 1 1003	UNITY	26,3330		1205 1 34	UPNEG	7530		1148 1 1148
T5RPTBB	4064		132	UNITZ	26,3326		1205 2 34 778	UPOK	07,3747		1450
T5RUPT	4065		132 2 131 132	UNP36	E4,1734	=	90 4 90 503	UPOLDMOD	0301	=	72 3 72 1506
T5TEMP	E6,1502		103 34 1005 1045	UNRM	E5,1616	=	93 9 93 640	UPOUT	27,3703	=	1506 7 1500 1507
T5TIME	E6,1634	=	109 6 109 1039	UNSETR1	10,3602		1480 1 1479	UPOUT4	27,3704	=	1502 3 1501 1502
T5TVCDT	E6,1625	=	105 8 105 971	UNSUSPEN	40,3404		368 1 368	UPPART2	27,3373	=	1500 1 1500
T5WAIT60	21,2627		1015 1 1015	UNVEC	E7,1545	=	129 5 680 681	UPPART3	27,3554	=	1503
T6ADDR	21,2630		1015 1 1016	UNZZ	06,2315		143 1 144	UPPOS	7520		1148 1 1148
T6ADR	1311		81	UPACTOFF	27,3757		1507 4 200 1507	UPRPTBB	4056	=	132 1 131
T6ENABL	16,3672		996 5 995	UPBUFF	0304	=	72 32 72 1507	UPRPT1	07,3730		1450
T6LOC	1310		81 4 131 1066	UPCNTRL3	25,3152		866 1 865	UPRUPT	07,3716		1450 1 131
T6L1	17,3647		1061 1 1061	UPCONTRL	25,3035		864 1 798	UPSTORE	27,3512	=	1502 1 1502
T6L2	17,3654		1061 1 1062	UPCOUNT	0303	=	72 5 72 1501	UPSVFLAG	E3,1501	=	85 6 85 1333
T6PROG	21,3757		1036 2 1020 1035	UPDATBIT	5011	=	49 1 588	UPTEMP	0330		72 10 72 1505
T6PROGM	21,3067		1020 2 1020 1026	UPDATERT	25,2173		849 2 851	UPTEST	07,3770		1450 2 1450
T6RUPTOR	17,3642		1061 1 1061	UPDATEVG	24,3104		699 2 689 701	UPTMFAST	06,2660		156 1 159
T6SCALE	7665	=	998 1 993	UPDATE1	27,2000	=	32	UPVERB	0302	=	72 5 72 1503
T6SETUP	17,3542		1059 1 1058	UPDATE2	27,2000	=	32 2 1331 1500	UPVERBSV	0331		72 2 1499 1500
T6START	17,3617		1061 1 1015	UPDATFLG	0027	=	48 21 259 738	UPVERIFY	27,3455		1502 3 1501 1502
==========	==========		==========	UPDATIME	43,2341		246 1 246	UPVRFYNV	27,3511		1502 1 1502
U=SCAXIS	27,2222		395 1 395	UPDATNN	41,2320		328 3 357 372	UPWAKE	27,3546		1503
UBAR0	E7,1604	=	121 6 121 629	UPDATRET	0117	=	69 3 328 329	UP1	E5,1610	=	101 11 101 681
UBAR1	E7,1612	=	121 2 121 627	UPDATVB	41,2340		328 10 321 372	UP21	4376	=	1502 1 1501
UBAR2	E7,1620	=	121 4 121 627	UPDAT1	41,2345		329 2 328 361	UP70	5021	=	1500 1 1499
UBX/2	E7,1563	=	118 12 118 885	UPDNLIST	05,2207	=	170	UP71	5017	=	1500 1 1499
UBY/2	E7,1571	=	118 14 118 885	UPDTCALL	20,2150		417 1 416	UP72	5016	=	1500 1 1499
UBZ/2	E7,1577	=	118 3 118 885	UPDTMEND	43,2355		246	UP73	6214	=	1500 1 1499
UCL	1272	=	80 2 581	UPDTPHAS	5022	=	1502 1 1504	UR	0010	=	935 1 935
UCLSTAR	E7,1642	=	121 4 121 625	UPEND70	27,3715		1506 1 1503	URH	E7,1541	=	118 2 812 816
UH/	E7,1745	=	128 5 897 929	UPEND71	27,3624		1504 1 1503	URONE	E4,1742	=	91 4 790 812
ULAGEOFF	24,2727		697 1 696	UPEND72	27,3656		1505 1 1503	URP	0016	=	935 1 935
ULOS	E5,1624	=	93 7 93 477	UPEND73	27,3530		1503	URPV	0016	=	1354 11 1341 1516
UM	1234	=	80 13 80 609	UPENT2	7722		1485 4 1474 1479	URRECT	E5,1646	=	96 4 96 1282
UMPAC+	00,3170		1179 2 1179	UPERCMC	43,3762		1500	UR1	E5,1723	=	96 11 96 1302
UMPAC-	00,3162		1179 2 1179	UPERLEM	43,3756		1500	UR1/	E7,1737	=	127 8 127 929
UN	E5,1675	=	96 7 96 1302	UPERROR	43,3764		1500 2 1500	US	E5,1616	=	94 3 625 627
UNAJUMP	00,2000		1118 1 1115	UPERROUT	27,3752		1507 4 1500 1506	USEADD	41,2105		324 1 324
UNI	E7,1501	=	118 6 118 849	UPFLAG	5546		1486 58 203 1503	USEKAY	36,2454		558 2 558
UNIT	00,3023		1175 2 1118 1515	UPFNDVAC	27,3536		1503 1 1503	USEMAXDT	13,3362		1323 1 1324
UNITDV	00,3151		1179 3 1177	UPJOB	27,3543		1503 1 1503	USEPIOS	13,3025		1316 1 1316

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SYMBOL	DEF	H	REFERENCES	SYMBOL	DEF	H	REFERENCES	SYMBOL	DEF	H	REFERENCES
USERPRIO	0163	= 1483	3 1470 1480	VAC2USE	0454	74	3 191 1211	VB6N5	14,2767	761	1 760
USPRCADR	4757	1105	3 1366	VAC3	0531	74		VB64	43,2500	250	1 236
USSTAR	E7,1650	= 121	3 121 625	VAC3USE	0530	74	3 191 1211	VCNTR	E6,1643	= 105	6 105 947
USTAR	1244	= 80	5 80 605	VAC4	0605	74		VCNTRTMP	E6,1653	= 106	5 106 947
UT	E7,1712	= 124	13 124 717	VAC4USE	0604	74	3 191 1211	VCRCS	35,3553	932	1 896
UV1/	E7,1745	= 127	4 127 906	VAC5	0661	74	9 204 1419	VCSPS	35,3551	931	1 896
UXA/2	E7,1541	= 118	9 118 885	VAC5LOC	20,2000	= 30	1 204	VCV	E3,1542	= 85	21 85 1347
UYA/2	E7,1547	= 118	4 118 885	VAC5STOR	20,2000	204	4 186 1496	VCVCSM	E3,1614	86	1 630
UZ	0024	= 1354	2 1341 1342	VAC5USE	0660	74	3 191 1211	VCVLEM	E3,1666	86	
UZA/2	E7,1555	= 118	5 118 886	VAD	6720	1131	1 1116	VDEF	00,3232	1182	1 1118
U1POS	22,2242	402	1 402	VALMIS	33,2262	427	1 441	VDISP	E6,1710	= 115	1 115
U2	E5,1713	= 96	5 96 1301	VAPREC	E7,1567	= 123	2 469 472	VDT/180	E6,1567	= 113	8 1084 1089
U2POS	22,2216	402	1 402	VARALARM	5764	1496	4 158 1443	VD1	4374	379	18 192 1204
U3POS	22,2266	403	1 403	VARDELAY	5272	1223	5 142 1423	VEARTH	E5,1735	= 95	6 95 783
==========				VARGAINS	16,2750	946	1 947	VECAGREE	00,3010	1174	4 1171 1515
V	E7,1673	= 119	18 119 870	VARIANCE	E7,1525	= 121	13 121 1253	VECANG1	27,2321	396	1 395
V(T1)/	E7,1671	= 127	6 127 929	VARK	E6,1641	= 105	4 105 973	VECANG2	27,2323	396	1 395
V(T2)/	E7,1707	= 127	10 127 916	VARSTO	E6,1511	= 104	7 104 954	VECLEAR	27,2131	394	1 394
V(21K)	32,2247	646	1 644	VARST5	E6,1516	= 104	1 954	VECMODE	22,3543	1508	1 1511
V(24K)	32,2237	646		VARSUBL	31,3450	631	2 625 626	VECOEM	E4,1436	= 88	5 88 788
V(26K)	32,2255	646	1 645	VARSUBL3	31,3451	631		VECOFANG	22,2724	410	2 410
V(28K)	32,2233	646		VATT	0006	= 1354	27 458 1330	VECPOINT	27,2126	394	4 390 597
V(3K)	32,2235	646	1 644	VATTI	0024	= 1354	5 458 512	VECPT	27,2000	= 32	1 393
V(32K)	32,2243	646	1 645	VBARS	E7,1665	= 119	8 119 862	VECQTEMP	E6,1710	= 113	3 394 396
V(4K)	32,2245	646	1 644	VBCOARK	43,2150	240	1 236	VECSGNAG	22,3772	1515	
V(400)	32,2231	646	1 645	VBFANDIR	41,2146	325	1 325	VECSHIFT	22,3253	499	3 666 680
V-OTHER	E3,1727	86	4 172 290	VBPROC	40,3347	366	5 326 374	VECTAB	E4,1616	= 89	9 89 1352
V/SC	7573	1150	1 1116	VBRELDSP	40,3366	368	1 315	VEHUPBIT	5010	= 48	
V/SCDV	00,2750	1173	3 1172	VBRESEQ	40,3364	367	1 326	VEHUPFLG	0026	= 48	14 260 1259
V/SC1	7601	1150	1 1150	VBRQEXEC	41,3466	366	1 326	VEL	E7,1515	= 118	4 118 848
V/SC2	00,2654	1171	1 1150	VBRQWAIT	41,3512	366	1 326	VEL/C	E7,1473	= 117	5 117 783
VACDSP	10,3101	1472	1 1472	VBSP1LD	41,3006	345	2 343 344	VELSC	33,3706	453	1 439
VACFOUND	01,2643	1211	5 1211	VBSP2LD	41,3007	345	2 343 344	VEM	26,2173	787	1 787
VACSTOR	07,2244	229		VBSP3LD	41,3010	345	1 343	VEMA	26,2200	787	1 788
VACT1	E7,1503	= 129	4 129 675	VBTERM	40,3355	367	2 326 373	VEMSCON	26,3026	811	1 809
VACT2	E5,1532	= 101	4 101 682	VBTSTLTS	41,3613	385	1 326	VERB	40,2255	319	1 315
VACT3	E7,1545	= 122	14 122 682	VBUF	0122	69	58 69 1370	VERBFAN	41,2133	325	7 324 327
VACT4	E7,1473	= 129	6 129 668	VBZERO	43,2124	239	1 236	VERBMASK	4160	= 1483	1 1468
VACX	E4,1624	= 89	1 89	VB04N06	34,3761	618	1 617	VERBNOUN	E4,1765	= 91	9 91 662
VACY	E4,1626	= 89	1 89	VB06N18	34,3762	618	1 617	VERBREG	1001	75	20 192 376
VACZ	E4,1630	= 89		VB06N22	15,2160	741	1 740	VERBSAVE	1041	76	3 324 364
VAC1	0401	74		VB06N98	33,2442	431	1 431	VERBTAB	41,2151	325	1 325
VAC1ADRC	05,3170	193	1 191	VB51	07,2427	233	1 232	VERB37	04,2000	= 27	4 194 208
VAC1USE	0400	74	4 191 1211	VB53	17,2145	782	1 781	VERB69	43,2037	236	1 236
VAC2	0455	74		VB56CADR	4625	632	1 632	VERB94	43,3126	265	1 237

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SYMBOL	DEF	H	REFERENCES	SYMBOL	DEF	H	REFERENCES	SYMBOL	DEF	H	REFERENCES
VERB96	43,3150	266	1 237	VNCON	43,3010	263	1 263	VSQUARE	E7,1621	= 118	6 118 873
VERIFBIT	5015	= 61		VNDSPCON	40,3223	361	1 361	VSSL	00,2145	1156	3 1155 1161
VERIFLAG	0165	= 61		VNDSPLY	04,3263	532	4 526 529	VSSR	00,2127	1155	1 1159
VERTORFT	33,2227	426		VNG0641	04,2644	452	1 452	VSTORE	6412	1122	
VESO	E4,1540	= 89	3 89 787	VNLDOCDU	43,2237	242	1 242	VSU	6716	1131	1 1116
VFINAL	26,3300	881	1 854	VNLODCDU	43,2173	241	2 240 249	VSUN	E5,1743	= 95	9 95 783
VFINAL1	26,3302	881	1 853	VNLODDT	43,2357	246	1 246	VS1	E7,1671	= 119	5 119 865
VFLAG	0062	= 52	4 753 755	VNLODGYR	43,2267	243	1 243	VTARGET	E5,1704	= 96	4 96 1300
VFLAGBIT	5006	= 52		VNPLANV	15,2431	784	1 783	VTARGTAG	E5,1703	= 96	5 96 1300
VG	E7,1457	= 122	7 122 721	VNPLAN23	16,2017	631	1 631	VTEMP	1226	= 80	2 80 579
VGAMCALC	26,3051	814	2 643 809	VNPOOH	4575	484	12 463 662	VTIG	E7,1637	= 123	8 123 717
VGBODY	E7,1664	= 124	6 124 689	VNSTORE	E7,1763	= 127	3 127 896	VTPRIME	E7,1617	= 122	9 122 557
VGDISP	E7,1772	= 120	8 279 903	VN0629	33,3775	454	1 454	VV/SC	7576	1150	
VGPREV	E7,1720	= 124	5 689 725	VN0641	33,3466	449	1 449	VVEC	E5,1745	= 96	22 96 1303
VGTEMP	E7,1645	= 123	4 700 725	VN1	1237	= 79	4 79 1330	VVXSC	7353	1145	
VGTIG	E7,1720	= 124	12 124 726	VN1645	35,3002	481	7 465 898	VXM	7306	1143	1 1116
VHFCNT	1125	78	10 175 897	VONE	E4,1734	= 90	12 90 1376	VXM/MXV	7311	1144	1 1143
VHFGOOD	27,2544	588	1 588	VONE'	E4,1771	= 92	4 92 1382	VXSC	7350	1145	1 1116
VHFRANGE	1256	= 80	4 583 588	VPASS1	E7,1511	= 129	4 653 675	VXV	7427	1147	1 1116
VHFRBIT	5007	= 64		VPASS2	E5,1616	= 101	5 101 680	VZC	E7,1634	= 121	4 121 630
VHFREAD	27,2504	587	2 132	VPASS3	E7,1561	= 122	12 122 675	V01N25	10,3720	1483	2 1471 1473
VHFRFLAG	0215	= 64	4 200 580	VPASS4	E7,1637	= 123	7 123 558	V01N70	14,2712	758	1 756
VHFTIME	1151	= 79	5 175 587	VPDVL	6542	1126		V01N71	14,3365	773	1 773
VHHDOT	34,2307	540	1 540	VPPREC	E7,1611	= 123	2 469 472	V04N06	10,3724	1483	1 1473
VINIT	E7,1575	= 122	12 122 712	VPRED	E7,1766	= 120	9 119 902	V04N06SR	04,3276	532	1 527
VINTFBIT	5015	= 53		VPROJ	7374	1146	1 1116	V04N46	42,2061	254	1 253
VINTFLAG	0071	= 53	20 209 1349	VQUIT	26,3214	880	2 856 870	V05N00M1	10,3737	1483	1 1476
VIO	E7,1724	= 119	5 118 809	VRCALC	27,2664	816	2 808 816	V05N09	5050	1201	7 464 1494
VIPRIME	E7,1611	= 122	16 122 724	VRCONT	26,3260	881	1 854	V05N30E	33,3500	449	1 449
VL	E7,1766	= 119	13 281 864	VRECT	E3,1510	= 85	10 85 1347	V05N70	31,3456	631	1 620
VLAUN	E5,1520	= 99	5 439 440	VRECTCSM	E3,1562	86		V05N7022	30,2115	566	1 565
VLAUNS	E5,1472	= 99		VRECTLEM	E3,1634	86		V05N71	31,3457	631	1 623
VLMIN	26,3204	880	1 856	VRECT1	0030	= 85		V05N7122	30,2116	566	1 566
VLOAD	6454	1124	1 1116	VREF	1157	= 79	4 865 866	V06N07	10,3721	1483	
VLOAD*	6056	= 1204	1 1123	VREFER	25,3637	876	6 870 871	V06N11	4656	662	1 652
VLOADCOD	5001	= 1204	1 1123	VRIGHT2	00,2242	1159	1 1159	V06N13	4657	662	1 658
VLTEST	25,3057	864		VROTATEX	7367	1145	3 1155 1177	V06N16N	41,3775	504	1 502
VMAGI	E7,1722	= 119	7 119 888	VROUND	7107	1137	6 1145 1146	V06N18	27,2125	392	2 390 391
VMAX	E4,1403	88	1 582	VRPREV	E7,1465	= 122	3 122 724	V06N22	5052	1201	3 398 799
VMIN	26,3324	= 880	1 851	VSHRRND	00,2073	1153	4 1155 1191	V06N30S	06,3540	303	
VMODE	6470	1124	3 1146 1508	VSHR2	00,2060	1153	1 1153	V06N33	35,3441	638	1 637
VMOON	E5,1751	= 95	7 95 750	VSQ	00,3245	1182	1 1118	V06N33SR	04,3274	532	1 526
VN	1176	79	18 171 1327	VSQ/4API	E6,1616	= 112	5 112 1084	V06N34	15,2157	741	1 739
VNBANK	4610	484	1 484	VSQMIN	15,3747	1092	2 1083 1084	V06N34SR	04,3300	532	1 527
VNCOMP17	35,3237	560	4 560 561	VSQSUB	00,3317	1183	3 1175 1182	V06N37	4614	485	4 463 653

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SYMBOL	DEF	H	REFERENCES			SYMBOL	DEF	H	REFERENCES			SYMBOL	DEF	H	REFERENCES		
V06N40	24,2425		690	8	684 708	V15T02S	22,3552		1509	5	395 1360	V37N99	04,2010		195	1	194
V06N42	35,3442		638	1	637	V16N20	15,2244		742	1	741	V37QCAD	04,2411		205	1	201
V06N43	37,2151		459	1	459	V16N35	35,3443		638			V37XEQ	04,2274		202	1	205
V06N45	35,3444		638			V16N40	24,2426		690	1	686	V37XEQC	04,2323		202		
V06N45B	30,2114		566	1	565	V16N44	23,2407		516	2	516 519	V4N06RTE	36,3247		899	1	896
V06N47	42,2060		254	1	253	V16N45	4621		485	2	481 635	V41K	14,3274		769	1	767
V06N49	34,3341		585	1	585	V16N53	31,2137		507	1	505	V5LOOP1	20,2003		204	1	204
V06N49EE	30,3643		614	1	606	V16N54	31,2136		507	1	505	V5LOOP2	20,2036		204	1	205
V06N50	4661		662			V16N67	26,2543		802	1	800	V5N09RTE	32,2276		900	1	900
V06N51	42,3771		935	1	935	V16N69	26,2473		798	1	798	V5OUT1	20,2025		204	1	204
V06N55	4615		485	3	483 652	V16N85B	24,2424		690	2	687 689	V5OUT2	20,2052		205	1	205
V06N55SR	04,3275		532	1	526	V1683	24,2422		690	1	692	V5ON00	10,3722		1483	1	1478
V06N57SR	04,3277		532	1	527	V2(T1)/	E7,1677	=	127	7	127 929	V5ON25	07,2426		233	1	233
V06N58	4616		485	2	465 560	V2TERROR	32,3105		918	1	918	V5ON25P	31,3461		631	1	621
V06N58SR	04,3301		532	1	529	V2T1X	32,3455		923	2	921 925	V5OPASTE	10,3425		1478	1	1478
V06N59	4617		485	1	480	V2T100	32,3075		918	2	893 912	V51NB	37,2464		571	1	573
V06N60	26,2424		795	1	790	V2T101	32,3110		918	1	918	V52	43,3157		266	1	236
V06N61	26,2425		795	2	789 793	V2T102	32,3206		919	1	919	V53	37,2555		573	1	573
V06N62	34,2622		547	1	540	V2T105	32,3213		919	1	919	V59FLAG	0116	=	55	2	570 571
V06N63	26,2426		795	1	791	V2T110	32,3220		920	1	919	V59FLBIT	5004	=	55		
V06N64	26,2427		796	1	795	V2T115	32,3250		920	2	920	V59NB	37,2463		571	1	570
V06N66	26,2511		800	1	800	V2T120	32,3261		920	1	920	V6N22	14,3273		769	1	767
V06N72	35,3263		561	1	560	V2T125	32,3272		920	2	920	V6N33RTE	36,3246		899	2	891 897
V06N74	26,2440		797	1	797	V2T130	32,3300		921	1	920	V6N34	37,2152		459	1	457
V06N75	4660		662	2	654 659	V2T135	32,3311		921	2	921	V6N39RTE	36,3251		899	1	895
V06N81	4620		485	2	480 637	V2T140	32,3314		921	4	919 921	V6N49	31,3455		631	1	626
V06N81SR	04,3302		532	1	529	V2T145	32,3322		921	3	919 921	V6N60RTE	36,3252		899	2	891 895
V06N84	13,2220		513	2	511	V2T150	32,3327		921	1	921	V6N61RTE	36,3250		899	1	895
V06N85B	24,2423		690	2	688 703	V2T155	32,3341		921	1	921	V6N81RTE	36,3253		899	1	896
V06N87NB	37,2462		571	1	571	V2T160	32,3346		921	1	921	V6N99INP	40,3646		632	1	632
V06N89*	16,2530		742	1	743	V2T165	32,3354		922	2	921 922	V60	43,2303		244	1	236
V06N89A	14,2161		746			V2T175	32,3374		922	1	921	V61	43,2311		244	1	236
V06N89B	30,3644		614	2	567 608	V2T177	32,3406		922	1	922	V62	43,2314		244	1	236
V06N90N	41,3776		504	1	504	V2T179	32,3411		922	1	922	V63	43,2321		244	1	236
V06N92	14,2160		746	1	745	V2T185	32,3416		922	1	921	V67	43,3201		267	1	236
V06N93	15,2322		759	1	759	V2T195	32,3440		923	1	923	V67CALL	40,3624		632	1	267
V06N93S	33,3631		451	1	451	V2T200	32,3446		923	1	923	V67DEC2	40,3766		634	1	632
V06N94B	17,2146		782	1	781	V2T205	32,3451		923	2	923	V67EXITX	40,3674		633	2	632
V06N99A	40,3763		634	1	632	V2T300	32,3453		923	6	922	V67FLBIT	5002	=	63		
V06N99DS	40,3630		632	1	632	V37	04,2011		197	2	266 365	V67WMID	40,3671		632	1	632
V06N9933	40,3636		632	1	632	V37BAD	04,2073		198	1	202	V67WORB	40,3664		632	1	632
V0648	42,2057		254	1	254	V37FLAG	0162	=	60	5	508 829	V67WW	40,3701		633	1	632
V0694	37,2556		573	1	572	V37FLBIT	5012	=	60	2	199 1495	V67XXX	40,3746		633	1	633
V1	0325	=	72	18	72 868	V37KLEAN	05,2513		185	1	200	V70UPDAT	43,3726		1499	1	236
V1LEAD	25,2433		855	1	855	V37NONO	04,2272		202	1	199	V71UPDAT	43,3730		1499	1	236

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SYMBOL	DEF	H	REFERENCES
V72UPDAT	43,3732	1499	1 236
V73UPDAT	43,3734	1499	4 236 1499
V74	43,2721	= 260	
V82CALL	23,2332	515	1 255
V82EMBIT	5003	= 63	
V82EMFLG	0211	= 63	7 517 522
V82FLAGS	E4,1742	= 90	7 90 518
V82GOFF	23,2337	515	1 515
V82GOFF1	23,2411	516	1 516
V82GOFLP	23,2357	515	1 516
V82GON	23,2566	519	1 515
V82GON1	23,2604	519	2 519 520
V82GON2	23,2637	519	1 519
V82GON3	23,2657	520	1 520
V82PERF	43,2562	255	1 237
V82REDSP	23,2576	519	1 519
V82STALL	23,2370	516	1 516
V83	31,2027	505	1 507
V83CALL	31,2032	505	2 35 505
V83PERF	43,2567	255	2 237 256
V85PERF	43,2601	256	1 237
V86PERF	43,2646	258	1 237
V89CALL	34,3712	617	1 262
V89PERF	43,2745	262	1 237
V89RECL	34,3734	617	2 617 618
V90PERF	43,3142	266	1 237
V92CONT	43,2367	247	1 247
V94ENTER	31,2576	622	2 213 621
V94FLAG	0213	= 63	4 266 622
V94FLBIT	5005	= 63	1 265
V96ONBIT	5015	= 63	
V96ONFLG	0204	= 63	2 266 1314
V97E	24,3514	708	1 705
V97ETASK	24,3523	708	2 216 708
V97E40.6	24,3542	708	1 214
V97NOO	10,3763	1484	1 1478
V97P	24,3465	707	1 705
V97PTASK	24,3473	707	2 216 707
V97T	24,3432	706	1 705
V97TRCS	24,3456	707	1 216
V97TTASK	24,3441	706	2 216 706
V97VCNTR	E6,1444	103	8 216 947
V99E	24,3374	705	1 705
V99EJOB	24,3400	706	
V99FLASH	24,3562	709	
V99P	24,3410	706	1 705
V99P/TIG	24,3427	706	2 706
V99T	24,3402	706	2 705 707
V99TJOB	24,3406	706	
W	E5,1400	= 93	73 93 1349
WAITADR	0063	= 68	3 1223 1227
WAITBANK	0062	= 68	1 1226
WAITBB	5266	1223	2 1223 1232
WAITEXIT	0061	= 68	5 1223 1488
WAITLIST	5245	1223	59 142 1435
WAITMASK	10,3202	1474	1 1474
WAITONE	27,2404	586	3 579 586
WAITONE1	27,2406	586	1 586
WAITTEMP	0064	= 68	3 1230
WAIT1/2	16,3312	989	
WAIT2	01,3246	1226	2 1223
WAKE	13,3500	1325	2 1326
WAKECAD	00,3767	1489	1 1488
WAKECADR	10,3732	1483	3 1474 1475
WAKEPLAY	10,3246	1475	1 1480
WAKEP62	26,2374	794	2 215 1077
WAKER	00,3761	1488	1 1489
WAKESTAL	13,3535	1326	2 1325
WAKETEST	01,3065	1216	1 1216
WAKE1	13,3501	1325	1 1325
WANGI	E5,1446	= 99	1 423
WANGO	E5,1444	= 99	1 423
WANGT	E5,1450	= 99	1 99
WATLSTO-	5261	1223	1 1223
WBODY	E6,1525	= 108	15 108 1030
WBODY1	E6,1527	= 108	6 416 1028
WBODY2	E6,1531	= 108	7 108 1028
WCALC	22,2737	412	1 412
WDAGAIN	41,3371	361	2 361 362
WDCNT	0137	= 70	5 359 362
WDRET	0115	= 69	9 359 362
WEARTH	26,3656	1251	1 1249
WEIGHT/G	E6,1475	103	9 103 954
WHICHALF	15,3325	1083	
WHIMPER	7767	1495	2 1495 1496
WHOCARES	E7,1777	= 129	7 129 1472
WHOLECON	42,3447	353	3 352 353
WITCHONE	10,3427	1478	3 1470 1474
WIXA	1252	= 80	6 80 1258
WIXB	1253	= 80	4 80 1258
WL	21,3436	1029	2 1033
WL-H/SLP	21,3431	1029	2 1031 1032
WLH	21,3432	1029	1 1031
WLH/SLOP	21,3430	1029	1 1031
WLMH	21,3434	1029	1 1032
WLOOP	12,3025	1292	1 1292
WMATEND	11,3651	1350	1 1348
WMATRXNG	43,2755	262	1 237
WMIDPOS	E6,1400	102	2 623 633
WMIDVEL	E6,1401	102	1 633
WORBPOS	E4,1404	88	2 600 632
WORBVEL	E4,1405	88	2 600 632
WORKW	0000	= 614	2 612
WOZERO	05,3620	1097	2 1097 1102
WPLATI	E5,1570	= 99	
WPLATO	E5,1474	= 99	
WRDRET	0115	= 69	
WRENDPOS	E4,1400	88	2 580 632
WRENDVEL	E4,1401	88	1 632
WRTN17	21,3243	1023	1 1022
WRTN22	21,3201	1022	
WTABORT	01,3375	1229	1 1227
WTEMP	E6,1513	= 108	13 108 1032
WTGTSMPL	33,2545	436	1 436
WTLISTNT	33,2527	436	1 217
WTLST2	01,3403	1230	8 1228 1229
WTLST4	01,3272	1227	1 1230
WTLST5	01,3322	1228	1 1226
WTLTCADR	01,3766	1419	3 1415 1418
WTOPTION	1316	81	7 161 183
WWOPT	E4,1724	= 634	4 283 633
WWPOS	E4,1720	= 634	10 283 634
WWVEL	E4,1722	= 634	7 283 633
X	0024	= 1306	22 1278 1293
X(T1)	E7,1721	= 127	23 127 929
X(T2)	E7,1725	= 128	12 892 918
X(T2)PRE	E7,1723	= 128	3 908 912
XACTALM	43,2114	237	
XACTO	43,2116	238	
XACTOQ	43,2476	250	2 239
XAD	01,2425	1193	1 1117
XAD2	01,2430	1193	2 1193
XANG	07,2000	= 28	1 558

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SYMBOL TABLE LISTING, INCLUDING DEFINITION, HEALTH, PAGE OF DEF, # OF REFS, PAGE OF FIRST REF, PAGE OF LAST REF.

SYMBOL	DEF	H	REFERENCES
XCHNYLOC	10,3445		1478 1 1474
XCHQADD	10,3237		1475 1 1474
XCHSLEEP	10,3206		1474 1 1475
XCHTOEND	10,3444		1478 3 1470 1474
XCHX	01,2417		1193 1 1117
XCOMMON	12,3100		1293 1 1295
XD/360	E6,1615	=	112 5 112 1085
XDC	E5,1713	=	95 12 95 1362
XDELVBIT	5011	=	50
XDELVFLG	0045	=	50 9 480 898
XDIFF	12,2201		1279
XDSPBIT	5017	=	55
XDSPFLAG	0112	=	55
XI	0030	=	1306 7 1279 1298
XKEP	E3,1552	=	85 3 96 1347
XKEPCSM	E3,1624		86
XKEPLEM	E3,1676		86
XKEPNEW	E4,1705	=	89 3 89 1335
XLNMASK	17,2633		1040 2 1039
XLNNDX	17,2660		1040 8 1041 1058
XLN1NDX	17,2771		1043 4 1044 1057
XMAX	0012	=	1305 9 1278 1281
XMIN	0014	=	1306 6 1278 1281
XMIN/360	15,3752		1092 1 1084
XMODULO	1343		82
XNB	E5,1713	=	95 24 287 1513
XNBADR	33,2445		431 1 423
XNBEB	22,3660		1513 1 1513
XNB1	E5,1554	=	93 15 93 1513
XNB1EB	22,3661		1513 1 1513
XNDX1	E6,1513	=	108 7 108 1055
XNDX2	E6,1514	=	108 6 108 1058
XOLDBUF	E6,1536	=	116 3 116 827
XPIPBUF	E6,1533	=	116 4 116 827
XPREV	E3,1552	=	96 2 1279 1282
XPRODUCT	16,2262		721
XREG	1003		75 5 271 347
XREGLP	1006		75 3 318 347
XRNGERR	E7,1675	=	119 1 281
XROT	27,2304		396 1 396
XRS	E7,1745	=	126 10 126 560
XS/360	15,3754		1092 2 1084 1092
XSCD	E7,1451	=	117 1 117
XSCREF	0306	=	73 6 715 716
XSM	E5,1671	=	95 35 95 1359
XSMADR	33,2446		431 1 443
XSMD	0306	=	73 9 73 780
XSQC(XI)	0034	=	1306 5 1281 1287
XSTORE	01,2373		1192 3 1192
XSU	01,2436		1193 1 1117
XTMP1	0006	=	614 3 613 614
XTRANS	E6,1631	=	109 4 109 1040
XT1LIM	32,3734		930 2 919
XT1LIMX	32,3766		930 1 930
XT1LIM2	32,3760		930 1 930
XT1LIM3	32,3762		930 1 930
XT1LIM5	32,3764		930 1 930
XUNIT	04,3563		1206 4 34 1239
XXXALT	E7,1455	=	122 4 122 496
X1	0046	=	40 98 441 1512
X1CON	32,2257		647 1 644
X2	0047	=	40 45 458 1377
X789	E3,1700		86 9 604 1260
==========			
YACLIM	20,3011		968
YACTOFF	E6,1424		102 6 280 949
YACTTMP	E6,1674	=	106 4 106 949
YAWANG	0024	=	935 2 934 935
YAWDAP	20,2732		967 1 978
YAWLIM	15,3175		1079 2 1076
YAWTIME	17,3230		1052 2 1055
YAWT5	20,3475		978 1 963
YBIAS	24,3755		717 1 715
YBLASTOK	17,3266		1052 1 1052
YBYPASS	17,3536		1058 1 1052
YCMD	E6,1624	=	105 5 105 970
YCOPY	20,3050		970 2 960 969
YCOPYCYC	20,3046		969
YDAPEND	20,3047		969
YDC	E5,1721	=	95 6 95 1362
YDELOFF	E6,1607	=	105 7 105 968
YDOTLIM	15,3173		1079 2 1076
YERORLIM	20,2773		967
YERRB	E6,1577	=	105 4 105 970
YFORWARD	20,2774		967
YINDEX	E6,1521	=	108 3 108 1042
YINTEGRL	20,2745		967
YJETCODE	15,3202		1080 2 1074 1078
YJETS	17,2734		1042 3 1042 1062
YK1K2	32,2227		646 1 645
YMANNDX	E6,1660	=	110 5 114 1025
YMISC	20,3073		970
YNB	E5,1721	=	95 7 287 1359
YNB1	E5,1562	=	93 4 93 287
YNDX	E6,1515	=	108 10 108 1056
YOFFSET	20,3006		968
YOLDBUF	E6,1537	=	116 2 116 824
YOUT	20,3012		968
YPIPBUF	E6,1534	=	116 2 116 824
YPRECOMP	20,3020		968
YREG	1004		75 3 344 352
YREGLP	1007		75 2 75 352
YSCD	E7,1457	=	117 1 117
YSCREF	0314	=	73 5 715 716
YSM	E5,1677	=	95 7 95 1359
YSMD	0314	=	73 5 73 780
YSTROKER	20,2741		967
YTAUNEG	17,3236		1052 1 1052
YTAUPOS	17,3240		1052 1 1052
YTMP1	E6,1555	=	105 3 105 970
YTMP2	E6,1557	=	105 3 105 970
YTMP3	E6,1561	=	105 3 105 970
YTMP4	E6,1563	=	105 3 105 970
YTMP5	E6,1565	=	105 3 105 970
YTMP6	E6,1567	=	105 3 105 970
YUNIT	04,3561		1206 1 34
YV	1111	=	78 11 78 1350
YWORD	17,2676		1041
YWORD1	E6,1455	=	103 4 103 1061
YWORD2	E6,1456	=	103 4 103 1062
YZERO	E6,1704	=	107
YZTABLE	17,3151		1049 4 1044 1057
==========			
Z	0005	=	39 17 270 1495
ZBLAST	17,3722		1062 1 1061
ZBLAST1	17,3725		1062 1 1061
ZBLAST2	17,3730		1062 1 1061
ZDC	E5,1727	=	95 6 95 1362
ZERINFLT	23,2265		295
ZERO	5021		1200 308 135 1515
ZEROANS	00,3376		1184 2 1184
ZEROCMDS	21,3753		1036
ZERODP	04,3565	=	1206
ZEROER	21,3000		1019 1 1019
ZEROEROR	20,2155		419 1 411

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SYMBOL	DEF	H	REFERENCES	SYMBOL	DEF	H	REFERENCES	SYMBOL	DEF	H	REFERENCES
ZEROICDU	5521	1420	4 143 1422	0.6SECT5	21,2023	736	1 736	1/6TH	14,2713	758	1 756
ZERDING	33,2356	429	3 424 443	OEBANK	43,3343	1398		1BITDP	27,2325	396	3 643 852
ZERDING1	33,2360	429	1 429	==========				1B1	04,3563	= 1251	1 1241
ZEROJET	21,2632	1015	5 549 1016	1.0B18	31,3446	631	1 628	1DAPCAS	20,3164	972	
ZERONDX	E5,1655	= 100	3 100 428	1.1RTEB1	35,3535	931	1 927	1DPB2	06,3672	663	1 664
ZERONDX1	E5,1655	= 100	5 423 443	1.11SPOT	01,2025	212		1DPB28	06,3674	663	2 665 670
ZEROO	26,3334	= 1260		1.2SPOT	01,2071	= 212	2 212	1REV	12,2112	1278	1 1277
ZEROPCDU	06,3210	164	1 163	1.3SECDP	13,2364	777	1 776	1RTEB1	35,3477	931	7 909 919
ZERORTE	35,3523	931	5 903 930	1.3SPOT	01,2014	212	1 212	1RTEB10	35,3507	931	
ZEROT5	21,2553	1014	1 1014	1.5SPOT	01,2017	212		1RTEB12	35,3511	931	
ZEROVEC	04,3565	1206	19 34 1353	1.7SPOT	01,2022	212		1RTEB13	35,3513	931	2 892 896
ZEROVECS	26,3334	1205	27 34 1260	1.8SEC	14,2204	746	1 745	1RTEB17	35,3515	931	2 919 920
ZI	E5,1722	= 97	25 97 1261	1-CSTH	E5,1735	= 96	4 96 1297	1RTEB2	35,3501	931	6 666 906
ZIXA	1254	= 80	5 80 1258	1-E(-AT)	20,3477	978	2 965 968	1RTEB25	35,3517	931	1 930
ZIXB	1255	= 80	5 80 1258	1/ACTSAT	20,3472	978	1 971	1RTEB28	35,3521	931	4 894 925
ZMFASBIT	5006	= 46		1/ATTLIM	17,2537	944	1 939	1RTEB3	35,3503	931	2 909 911
ZMFASURE	0005	= 46	3 623 630	1/C	15,2253	750	1 750	1RTEB4	35,3505	931	1 909
ZNB	E5,1727	= 95	7 287 1359	1/CONACC	E6,1640	= 105	5 105 993	1SEC	5041	1201	14 415 703
ZNB=S1	23,2145	288	1 287	1/ERRLIM	5015	= 978	1 971	1SECX	5041	= 431	1 423
ZNB1	E5,1570	= 93	5 93 288	1/GMAX	26,3332	= 881	1 872	1SECXT	E5,1644	= 100	
ZNDX	E6,1516	= 108	9 108 1057	1/GYRO	06,3474	303	3 301 305	1SECXT1	E5,1644	= 100	3 423 443
ZOLDBUF	E6,1540	= 116	1 825	1/KA1	26,3304	881	1 853	1SEC2D	17,2012	727	1 727
ZONE	1307	81	4 164 167	1/KB1	26,3210	880	1 866	1SHOTCHK	16,3011	947	2 946 960
ZOPALARM	06,3041	161		1/K44	26,3276	881	1 854	1SHOTOK	16,3031	948	2 947
ZOPFINI	06,3057	161	3 161	1/MINLIM	16,3713	998		1STOR2ND	10,3405	1477	1 1477
ZOPFIN2	06,3064	161	1 161	1/MU	0016	= 1305	4 1277 1296	1STO2S	22,3546	1509	4 288 454
ZOPFIN3	06,3065	161	1 159	1/PIPA	06,3262	297	2 438 828	1TO2SUB	22,3576	1509	6 1509
ZOPTCNT	1317	81	4 161 163	1/PIPADT	1074	77	11 77 833	1ODEGS-	23,2323	296	1 285
ZOPTDES	06,3027	161	1 160	1/PIPAGT	33,3435	447	1 443	1ORTE	35,3531	931	3 908 920
ZPIPBUF	E6,1535	= 116	2 116 825	1/PIPAI	06,3272	297	1 298	1OSECS	26,2646	805	1 805
ZPRIME	0026	= 73	7 1355 1356	1/ROOTMU	0022	= 1305	5 1277 1287	1OOMST5	23,3040	550	2 549 550
ZREG	1005	75	3 324 353	1/RTLIM	20,3476	978	1 963	11,12	5062	= 169	1 169
ZREGLP	1010	75	2 75 353	1/RTMU	27,3353	1388	1 808	11,14,9	06,2173	138	1 135
ZRUPT	0015	= 39		1/RTMUE	23,2455	517	3 516 810	11DSPIN	40,3311	363	4 320 360
ZSCD	E7,1465	= 117	1 117	1/RTMUM	23,2453	517	1 519	114ALM	07,2222	228	1 229
ZSCREF	0322	= 73	8 715 716	1/SQR3	15,2432	784	2 631 783	12DD	36,3771	1260	1 1258
ZSM	E5,1705	= 95	4 95 1359	1/TMXFIR	5015	= 998	1 994	120MRUPT	06,2041	135	1 137
ZSMD	0322	= 73	5 73 780	1/WIE	23,2255	294	2 294	120MS	5771	= 159	
ZTOCSC	06,3047	161	1 161	1/WLOOP	12,3163	1294	1 1294	13-11,1	41,3725	387	1 386
ZTOMAN	06,3037	161	1 161	1/12TH	26,3145	879	1 881	13,14,15	7707	1203	8 166 1483
ZUNIT	04,3557	1206	5 34 1344	1/16A1	15,3750	= 1092	1 1082	15/16	11,3761	1353	1 1341
ZV	1117	= 78	8 1345 1350	1/16TH	27,3365	= 879	2 857 865	15ADRERS	01,2454	1194	7 1192 1196
Z123	36,3266	1252	1 1253	1/2SECX	5036	= 447	1 443	15BITADR	6221	1114	1 1120
==========				1/24TH	26,3252	881	1 862	17DECML	4375	= 447	
0.5SEC	37,3066	827	1 824	1/3RD	26,3146	879	2 862	17TO20	43,3645	1402	

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SYMBOL	DEF	H	REFERENCES	SYMBOL	DEF	H	REFERENCES	SYMBOL	DEF	H	REFERENCES
18SEC	24,2417	689	1 685	20DEGS-	23,2326	296	1 288	300KFT	23,2461	= 811	1 809
180/8ATT	15,3750	1092	4 1083 1092	20DEGSMN	13,2366	777	1 777	30480RTE	35,3547	931	1 903
19.77DEG	37,2465	571	1 571	20J	37,3464	836	1 835	33DEC	4270	374	2 374 802
19DECML	4374	= 447	1 437	20KFT/S	26,3006	810	1 809	33DPTMON	06,2774	160	
==========				20MRUPT	7700	= 137	3 135 137	33RDMSK	5070	= 159	2 145
2.11SPOT	01,2041	213		20MS	5016	= 982	1 982	34DEC	4256	373	1 373
2.13SPOT	01,2044	213		20OCS	30,3746	713	2 713	36KFT/S	26,3004	810	1 809
2.2SPOT	01,2071	= 212	1 212	20OCSHI	16,2417	725	1 724	360CHECK	12,3134	1294	2 1292
2.3SPOT	01,2030	213	1 212	20OMS	4112	= 165	2 163	360LAMB	12,3473	1299	1 1296
2.5SEC	37,3234	830		21/22REG	0115	= 69	3 315 388	360SW	0206	= 63	3 1292 1294
2.5SPOT	01,2033	213		22DSP8IT	5003	= 50		360SWBIT	5017	= 63	
2.7SPOT	01,2036	213		22DSPFLG	0040	= 50	3 600 605	37BLANK	36,3214	898	1 895
2/3	11,3773	= 1353	1 1341	22SUBSCI	E5,1744	= 97	7 97 568	38TRDEG	13,2362	777	1 777
2BLANK	40,2502	322	6 319 376	25DECML	4113	= 436	2 436	3990DEC	33,2447	= 431	1 426
2CASFLTR	20,3326	974		25NM	26,3222	880	1 860	==========			
2C1HS	26,3272	881	3 855 868	26P50S	26,2000	= 31	1 778	4.11SPOT	01,2124	214	
2D/SDZ	15,3027	1076	2 1074	27T030	43,3653	1402		4.13SPOT	01,2127	214	
2DAPCAS	20,3176	972		270DEG	23,2324	296	1 288	4.15SPOT	01,2132	214	
2DZERO	04,3565	= 1240		290KFT	26,3000	810	1 808	4.17SPOT	01,2135	215	
2EBANK	43,3357	1398	1 1399	==========				4.2SPOT	01,2071	214	2 212 213
2HS	26,3262	881	2 867 872	3.1SEC	04,2415	205	1 198	4.21SPOT	01,2140	215	
2HSGMXSQ	26,3264	881	1 872	3.11SPOT	01,2060	213		4.23SPOT	01,2143	215	
2INTOUT	40,2636	337	1 334	3.13SPOT	01,2063	213		4.25SPOT	01,2146	215	
2J	37,3466	836	1 835	3.15SPOT	01,2066	213		4.27SPOT	01,2151	215	
2JETT	5045	= 1092	2 1085 1086	3.2SPOT	01,2071	= 213	2 212	4.3SPOT	01,2113	214	1 212
2J3RE/J2	13,3744	1354	2 1342	3.3SPOT	01,2047	213	1 212	4.31SPOT	01,2154	215	
2K	5005	= 1204	3 1111 1216	3.5SEC	17,2014	728	1 727	4.33SPOT	01,2157	215	
2K+3	4460	382	1 382	3.5SPOT	01,2052	213		4.35SPOT	01,2162	215	
2NDRETRN	22,3137	415	2 415	3.7SPOT	01,2055	213		4.37SPOT	01,2165	215	
2PHSCHNG	5372	1409	29 259 1068	3/32	11,3757	1353	1 1341	4.4SPOT	01,2077	214	
2PI/M	17,2544	944	1 943	3/4	11,3763	1353	5 34 1352	4.41SPOT	01,2170	215	
2PISC	04,3627	1288	5 559 1295	3/4LOWDP	11,3763	= 34		4.43SPOT	01,2173	215	
2REDOSAT	43,3232	549	1 549	3/5	11,3745	1353	1 1341	4.45SPOT	01,2176	215	
2RNDEND	40,3100	352		3/64	11,3753	1353	1 1341	4.47SPOT	01,2201	216	
2ROUND	40,3070	352	4 349 351	3AXISBIT	5012	= 56		4.5SPOT	01,2116	214	
2RTEB1	35,3541	931	5 908 930	3AXISFLG	0124	= 56	5 391 622	4.51SPOT	01,2204	216	
2SATSTCK	23,3041	550	2 549 550	3CASFLTR	20,3411	976		4.53SPOT	01,2207	216	
2SEC(22)	37,3456	836	1 836	3CSECS	13,3706	1331	1 1331	4.55SPOT	01,2212	216	
2SECS	5042	1201	5 539 1427	3DAPCAS	20,3220	973	1 972	4.57SPOT	01,2215	216	
2T/TCDU	5033	= 1092	1 1081	3DDZ	15,3001	1076	1 1076	4.6SPOT	01,2105	214	
2VEXHUST	17,2004	721	1 720	3J22R2MU	13,3752	1354		4.61SPOT	01,2220	216	
2VISTO2S	22,3567	1509		3MDOT	24,2434	690	2 706 708	4.63SPOT	01,2223	216	
208IAS	40,2602	336	2 335	3SECS	5044	1201		4.65SPOT	01,2226	216	
20DEG-	23,2330	296	1 288	3ZEROS	26,3334	= 879	6 845 869	4.67SPOT	01,2231	216	
20DEGS	06,3261	165	1 164	30RDMSK	06,2743	159	1 139	4.7SPOT	01,2121	214	

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BD BADLY DEFINED CD DEFINITION ASSOCIATED WITH CONFLICT XX MISCELLANEOUS TROUBLE

SYMBOL TABLE LISTING, INCLUDING DEFINITION, HEALTH, PAGE OF DEF, # OF REFS, PAGE OF FIRST REF, PAGE OF LAST REF.

SYMBOL	DEF	H	REFERENCES	SYMBOL	DEF	H	REFERENCES	SYMBOL	DEF	H	REFERENCES
4.71SPOT	01,2234	216		5DEGREES	15,2251	750	1 750	==========			
4.73SPOT	01,2237	216		5SEC	24,3064	699	3 685 694	8KK	E5,1746	=	97 9 97 604
4.75SPOT	01,2242	216		5SECDP	24,3063	699	1 686	8NN	E5,1747	=	97 5 97 607
4.77SPOT	01,2245	217		5SECOND	17,2016	728	2 727	8192AUG	07,3442		1435 1 1435
4D/SDZ	15,3017	1076		500SEC	25,2111	846	1 846	89TEST	40,2062		316 2 315
4D/SLIM	15,3172	1079	2 1076	504AZ	0022	= 1251	3 1249	==========			
4JETT	15,3751	1092	2 1086	504F	0006	= 1251	5 1247 1248	9/16	11,3767		1353 1 1341
4SECS	5045	1201	3 143 1092	504LM	E4,1411	88	3 1243 1341	9,6,4	05,3201		193 1 187
40CST5	24,2421	689		504LPL	0016	= 1251	4 1250	9DWAAA	30,3465		612 1 612
400KET	26,3022	811	2 810	504RM	13,2625	1242	1 1242	9DWAAB	30,3466		612 1 612
==========				504RPR	0000	= 1251	4 1243 1245	9DWAAC	30,3506		612 1 612
5.11SPOT	01,2275	217		540D	36,3767	1260	1 1256	9DWEPCAL	30,3356		610 2 611
5.13SPOT	01,2300	217		59.99SEC	42,3455	353	1 353	9DWEXITX	30,3560		613 1 612
5.15SPOT	01,2303	217		59MIN	42,3454	353	1 352	9DWEXXXA	30,3570		613 1 613
5.17SPOT	01,2306	217		==========				9DWFIG6	30,3424		611 1 611
5.2SPOT	01,2250	217	1 212	6.11SPOT	01,2363	219		9DWI	0012	=	614 11 610 613
5.21SPOT	01,2311	218		6.13SPOT	01,2366	219		9DWI=J	30,3353		610 2 611
5.23SPOT	01,2314	218		6.2SPOT	01,2344	218	1 212	9DWI=JA	30,3442		612 2 613
5.25SPOT	01,2317	218		6.3SPOT	01,2352	219	1 212	9DWID	30,3633		614 4 611 613
5.27SPOT	01,2322	218		6.5SPOT	01,2355	219		9DWJ	0016	=	614 12 610 613
5.3SPOT	01,2264	217	1 212	6.7SPOT	01,2360	219		9DWN	0014	=	614 4 612 613
5.31SPOT	01,2325	218		60D	36,3770	1260	1 1258	9DWN=N+3	30,3536		613 1 612
5.33SPOT	01,2330	218		6SECT5	24,3764	735		9DWNFXFP	30,3511		612 1 612
5.35SPOT	01,2333	218		60GENRET	E6,1773	= 116	7 116 850	9DWP	0010	=	614 7 611 612
5.37SPOT	01,2336	218		60MIN	06,3651	663	6 653 659	9DWSETI2	30,3401		611 1 611
5.4SPOT	01,2256	217		60SECDP	26,2647	805	1 580	9DWSETJ2	30,3420		611 1 611
5.41SPOT	01,2341	218		600MS	07,3626	1442	1 1425	9DWSETWX	30,3533		613 1 613
5.5SPOT	01,2267	217		600SEC	37,2145	459	3 459 673	9DWTESTJ	30,3405		611 1 611
5.6SECS	13,3712	1331	1 1331	600SECS	13,2654	1314	2 213 1314	9DWTO6DW	30,3342		610 2 608
5.7SPOT	01,2272	217		63/64+1	7675	1203		9DWXX	1214	=	614 2 610 613
5/128	11,3771	1353	1 1341	==========				9DW26D	30,3631		614 4 611 613
5/8	13,3754	1354	7 1317 1516	7/12	11,3765	1353	1 1341	9X9LOC1	E5,1444	=	93 1 101
5BLANK	40,2437	321	6 321 375	74K	7711	= 133	1 229	9X9LOC2	E5,1532	=	93 1 101
5BLANK1	40,2460	322		77DECML	33,3127	442	1 434	90SECS	06,2764		159 2 142
5B10	01,2523	1196									

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UNREFERENCED SYMBOL LISTING, INCLUDING DEFINITION, HEALTH, & PAGE OF DEFINITION.

SYMBOL	DEF	H	PAGE
.05GBIT	5015	=	59
.6SECTS	24,3062		699
==========			
-MUDT(M)	37,3454		836
==========			
ABORT	7755	=	1496
ABVAL	00,3201		1180
ACCSABRT	00,3722		1191
ACBOLI	17,2760		1043
ACYCHECK	17,3066		1045
ADDRESS	6052		1109
ADERCOMP	33,3353		446
ADRS+1	43,3627		1402
ADVTKBIT	5006	=	62
ALCGKK	33,2670		439
ALKCG	33,2673		439
ALLOOP3	33,2576		437
AMOONBIT	5016	=	47
APSESBIT	5013	=	62
ASTNBIT	5004	=	60
ASTNFLAG	0154	=	60
ASTNV99P	24,3415		706
ATERSET	34,2473		545
ATOPTHIS	13,2705	=	34
ATTCHBIT	5016	=	61
ATTCHFLG	0166	=	61
ATTDISPR	37,2176		543
AUTOCONT	21,3266		1025
AVEMDBIT	5017	=	65
AVFLBIT	5013	=	51
==========			
BDZCHECK	17,3004		1043
BEEI7	04,3602		1288
BESTTRIM	24,3053		699
BHI7	01,2477		1195
BITS2-10	5053		1201
BITS4,5	21,2207		1004
BITS5-6	5035	=	535
BITS6,8	40,3575		389
BIT13-14	4371	=	1204
BIT14+7	27,2124		392
BLANKCHK	10,3354		1477
BLANKRET	0114	=	69
BMAGX	0042	=	39
BMAGY	0043	=	39
BMAGZ	0044	=	39
BNKCHK	43,3720		1403
BNKOPTN	43,3317		1397
BUSYMASK	10,3751		1483
B12-1	4372	=	379
BSTOBB	01,2512		1195
==========			
CADRMARK	0373		74
CALCDIR	E5,1470	=	98
CALCLEM	34,3604		596
CALC2BIT	5016	=	51
CD*TR*G	23,3503		1365
CDHTAG1	25,2000	=	31
CDRVE	06,2012		134
CDU*NBSM	23,3634		1368
CDU*SMNB	23,3621		1368
CDUANG	E5,1553	=	99
CDUFLAG	E5,1471	=	98
CDULIMIT	E5,1453	=	98
CDUNDX	E5,1546	=	99
CDUREADF	E5,1451	=	98
CDUREADI	E5,1452	=	98
CDUTIMEF	E5,1446	=	98
CDUTIMEI	E5,1444	=	98
CG.CORR	16,3054		948
CHAN	E5,1453	=	98
CHKCTR	37,3077		827
CHKFAIL1	5670		1493
CHKLIST	05,3545		1097
CHKSAB	14,2717		760
CM/ATUP	37,3655		887
CM/DAP2C	20,3675		1068
CM/DSBIT	5016	=	59
CM/DUMPR	15,3711		1090
CM/POSE3	37,3753		888
CM/TRIO	37,3527		884
CMARMBIT	5004	=	58
CMDAPARM	0135	=	57
CMENTR07	05,2075	=	178
CMOONBIT	5004	=	61
CMTR1	37,3657		887
CMTR2	37,3730		888
CNGL	22,2375		405
CNTCHK	27,2361		586
CNTRCHK	43,3470		1399
COARFINE	14,3015		761
COFMAXGO	22,2170		401
COGAFBIT	5014	=	62
COMPMAT	13,2114		511
COMPTBIT	5010	=	56
COPY40.9	16,2370		724
COREOUND	01,2661		1212
COUNTPL	E5,1552	=	99
CPHIBIT	5001	=	46
CRS61.2	34,3435		594
CRS61.2A	34,3516		595
CSCTOZOP	06,3130		162
CS359+	22,3427		667
CULTBIT	5011	=	52
CYCLSHFT	43,3477		1400
CZERO	E6,1702	=	107
==========			
DAPS9	6000	=	27
DAPT5	20,3474		978
DAP1BIT	5001	=	57
DAP2BIT	5002	=	57
DCDUINCR	21,2365		1007
DEC-12	04,3575		1206
DEC-6	04,3574		1206
DEC15	5026	=	879
DEC51	07,3652		1443
DELBARP	20,2656		965
DELBARY	20,3032		968
DELDGAC	16,3335		990
DELRDONE	32,2063		644
DEX2	0144	=	71
DFRNT	40,3271		363
DIMOBIT	5017	=	53
DMENFBIT	5007	=	56
DMPINCP2	30,3110		606
DMPINTEG	30,2432		600
DMPNSUB	7265		1142
DNLSTADR	0332	=	73
DOALARM	5217	=	1496
DOBRATE?	15,2466		1064
DODNADR	05,3537		1096
DODNCHAN	05,3605		1097
DOTIXBR	01,2451		1193
DRFTBIT	5001	=	49
DSKYBIT	5001	=	55
DSKYFLAG	0113	=	55
DSPDECNR	40,3167		360
DSPLV	41,3413		361
DUMPCNIC	27,3025		1377
DUMPFISH	26,3044		812
DUMPP61	26,2261		790
DUMPRPRA	27,3063		1379
DUMPTFF1	27,3146		1383
DUMPTFF2	27,3243		1384
DUMPTRIG	27,2647		816
DUMPVGAM	26,3073		814
DURATION	16,3301		989
DVTHRUSH	5024	=	830
DXTEST	05,3413		953
D21	E6,1670	=	114
D60R9BIT	5016	=	53
==========			
E/BKCALL	13,2036		420
E/CALL	13,2055		421
E/JOBWAK	04,2606		422
E/SWITCH	13,2053		420
EARTCNTR	14,2243		749
EBDVCNTR	24,2000		35
EBMARKDO	07,2000		35
EBMRKBUF	07,2001		35
EBP40TMP	24,2001		35
EBRN1	37,2000		35
EGFLGBIT	5010	=	58
EIGHT	5014	=	1204
EMSD	0055	=	40
END-E3	E3,1777	=	87
END-E4	E4,1777	=	92
END-E5	E5,1777	=	101
END-E6	E6,1777	=	116
END-UE	1377	=	83
ENDCHKG	33,2355		429
ENDDCM	22,2530	=	407
ENDGTSAL	33,3267		445
ENDHMSS	42,3521	=	354
ENDIGN	24,2723		696
ENDJETS	17,3567		1059
ENDLAMB	16,2325		724
ENDMANUV	27,2051		391
ENDMASSP	05,3456		954
ENDMRC	17,2170		938

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SYMBOL	DEF	H	PAGE
ENDNVBSY	04,2605		382
ENDPASTE	4157		357
ENDPINBF	4526	=	383
ENDPINS2	41,3727	=	387
ENDROLL	21,2003		418
ENDRODAT	41,2316		328
ENDSLECT	17,3737	=	1062
ENDSPBIT	5003	=	57
ENDSPOCT	40,3322		364
ENDS40.6	20,2343		731
ENDTVCIN	17,2350		941
ENDVPUSH	6507		1125
ENDV97E	24,3573		709
ENDV97P	24,3513		708
ENDV97T	24,3464		707
ENDV99P	24,3431		706
ENDV99PI	24,3423		706
END2DEC	40,3212		360
ENGONFLG	0123	=	56
ENG2BIT	5005	=	48
ENTPASHI	41,2012		323
EPC5RTE	35,3605		932
ERADFBIT	5003	=	48
ERASFILL	0112		69
ERASWAK1	13,3531		1326
ERASWAK2	13,3533		1326
ERMINUS	40,3553		388
EXECPHS	16,3143		958
EXTENTST	16,3607		994
==========			
FAILDSP	24,3347		705
FALTOF	4404		379
FAZAI	36,3520		1257
FAZBI	36,3616		1258
FCARD1	20,3525		982
FCARD2	20,3526		982
FCARD3	20,3527		982
FCARD4	20,3530		982
FCARD5	20,3531		982
FCARD6	20,3532		982
FCSTART	30,2000	=	32
FDAIDSP1	21,2415		1009
FFTAG5	6000	=	27
FFTAG9	4000	=	27
FIGTIME	35,2300		470
FIG2EXIT	30,2356		599
FINALBIT	5012	=	51
FINEK2	43,2257		243
FIREL00K	15,3577		994
FIRSTBIT	5011	=	50
FIRST3	7707	=	564
FIXCLPAS	40,2303		319
FLGWRD10	0106	=	65
FLGWRD11	0107	=	66
FREECHK	21,2175		1004
FREEFBIT	5015	=	47
FREERET	0144	=	70
F2RTEBIT	5013	=	47
==========			
GAMDIFSW	0136	=	58
GAMDV32	32,3543		926
GAMDV40	32,3556		926
GAMDV45	32,3563		926
GBIASX	F3,1460	=	84
GDTSETUP	20,2277		730
GENMARK	10,3243		1475
GEOCOMPS	E5,1643	=	100
GEOSAVED	E5,1631	=	99
GETANGLE	25,2217		849
GMDIFBIT	5005	=	58
GN/CCODE	5043		1201
GOAGIN	10,3272	=	1483
GODSP	10,2670		1468
GODSPR1	10,2677		1468
GODSP2	10,2671		1468
GOGOMARK	10,2632		1467
GOMARK2R	10,2603		1466
GOMARK3	10,2567		1466
GOMARK3R	10,2606		1466
GOMARS	10,2556		1466
GONEBIT	5006	=	58
GOPERFRS	10,3127		1473
GOPERFS	10,3047		1471
GOPERF2	10,3052		1471
GOXDSP	10,2555	=	1483
GOXDSPFR	10,2600	=	1483
GOXDSPR	10,2575	=	1483
GROUPKIL	04,2205		200
GTSOPNDZ	E5,1655	=	100
GTSOPTSS	33,3633		451
GTSWTLST	E5,1645	=	100
GUESS	33,2016		423
GUESSBIT	5016	=	49
GUESS1	33,2254		426
GYCR5	15,2167		741
GYMDIBIT	5017	=	59
GYMDIFSW	0150	=	59
GYROCTR	0047	=	39
GYTOBETQ	E5,1472	=	98
GONBYBIT	5010	=	60
G21	E6,1672	=	114
==========			
HALFNFLT	23,2267		295
HBCFADR	17,2532		943
HBD11/2	E6,1430		102
HBD12	E6,1431		102
HBD21/2	E6,1435		102
HBD22	E6,1436		102
HBD31/2	E6,1442		103
HBD32	E6,1443		103
HBN11/2	E6,1426		102
HBN12	E6,1427		102
HBN20	E6,1432		102
HBN21/2	E6,1433		102
HBN22	E6,1434		102
HBN30	E6,1437		102
HBN31/2	E6,1440		102
HBN32	E6,1441		102
HINDBIT	5012	=	59
HOLDATT	34,3577		596
==========			
ICORK2	43,2162		241
IDADDTEM	0142	=	70
IDAD3TEM	0152		71
IDLEBIT	5012	=	49
IDLERET1	10,3523		1479
IGNFLAG	0153	=	60
IGNFLBIT	5003	=	60
IMMEDRET	10,3611		1481
IMPULBIT	5007	=	50
IMPULCHK	24,2640		695
IMU/OPT	E5,1450	=	98
IMUBACK	33,2033		423
IMUCAL2	06,2000	=	28
IMUGOOD	07,3521		1438
IMUSEBIT	5010	=	47
IMUTEST	33,2004		423
IMUZERO3	07,2651		1422
INCORBIT	5005	=	56
INCRCDUS	22,3612		1511
INFINBIT	5011	=	62
INRLBIT	5013	=	59
INTFLAG	0227	=	65
INTOTHIS	13,2155		512
INTVEC	E5,1476	=	99
INTYBIT	5014	=	53
INTZ	E5,1504	=	99
INVC107	32,2470		906
IRIGCOMP	06,3331		299
IRIGX	06,3333		299
IRIGY	06,3347		299
IRIGZ	06,3363		299
ISSUP	06,2323		143
ISSWOFF	06,2700		157
ISWRETRN	4753		1105
ITRO	6337		1119
ITR1	6326		1119
ITR10	6111		1110
ITR11	6151		1111
ITR12	6103		1110
ITR14	6206		1113
ITR15	6072		1110
ITR7	6230		1114
ITSWBIT	5002	=	60
==========			
JAMPROC	4257		374
JSWCHBIT	5002	=	46
JZERO	E6,1704	=	107
==========			
KBIT	5017	=	47
KEYCALL	07,2141		226
KILLJETS	16,3702		997
KNOWNBIT	5010	=	58
KPIP	37,3446		836
KRESUME2	21,3155		1022
KV2	E6,1674	=	114
KV3	E6,1702	=	114
K3S1	22,2371		405
K4	22,2372		405
K4SQ	22,2373		405

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SYMBOL	DEF	H	PAGE
==========			
LARMENT	5662		1493
LASTGTS	33,3274		445
LASTTIME	01,3500		1234
LASTXCMD	0035	=	81
LASTYCMD	0035	=	81
LATSWBIT	5014	=	59
LEMNO	05,3374		953
LEMONM	0056	=	40
LEMTEST	05,3370		953
LMOONBIT	5005	=	61
LOADDAP	24,2000	=	31
LODPMAX1	04,3600		1206
LOPC	30,2000	=	32
LOS1	E5,1454	=	98
LOS2	E5,1462	=	98
LOTEMIN	0124	=	69
LOUNITX	04,3563	=	34
LOUNITY	04,3561	=	34
LOUNITZ	04,3557	=	34
LRUPT	0011	=	39
LSTPTR	0144	=	70
LUNABIT	5004	=	52
L350	25,3540		873
==========			
MANUEXIT	34,3564		596
MANUSTAL	22,3110		415
MARKFORM	10,2565		1466
MARKIT1	07,2157		228
MASKREG	E5,1544	=	99
MASS	E6,1475	=	103
MASSBACK	24,3033		698
MAT181	34,3665		597
MAXTST	16,3557		994
MAXVTIM2	15,3433		1085
MCLEANJR	17,2365		941
MDOTFAIL	37,3235		830
METHOD2	22,2210		402
MGLVFBIT	5016	=	57
MIDAVBIT	5016	=	65
MIDFLBIT	5003	=	46
MIDIFBIT	5015	=	64
MINLIMAP	16,3467		992
MINTST	16,3552		994
MKOVBIT	5015	=	55
MKOVFLAG	0110	=	55
MONIT1	41,3232		355
MOONBIT	5004	=	46
MRKIDBIT	5001	=	53
MRKIDFLG	0074	=	53
MRKNVBIT	5007	=	54
MRUPTBIT	5013	=	54
MRUPTFLG	0106	=	54
MSGSCAN1	32,2000	=	32
MU(P)	0032	=	1354
MUM	13,3732	=	1354
MWAITBIT	5005	=	54
MWAITFLG	0100	=	53
M6RTEB28	35,3537		931
==========			
NDCMPTST	41,2436		332
NDRMSBIT	5006	=	60
NEEDLBIT	5007	=	46
NEEDLFUP	16,2746		946
NEG5	41,2115		325
NEG7	5731	=	205
NETZERO	6070		1110
NEWIBIT	5003	=	61
NEXBNKSS	33,3566		451
NEXTBNKS	33,3550		450
NJETSBIT	5001	=	47
NO.13-15	16,3635		995
NO.16-14	16,3656		995
NOBITS	E5,1452	=	98
NOGOM2	22,2725		411
NOMDNLST	05,2107	=	170
NORESET	07,3313		1432
NORFBIT	5005	=	46
NORFINAL	13,3326		1323
NORMTEST	00,3511		1186
NORMUNX1	22,3724		1514
NOSAM	15,2353		783
NOSWBIT	5011	=	58
NRMIDBIT	5003	=	53
NRMIDFLG	0076	=	53
NRMNVBIT	5010	=	54
NRUPTBIT	5014	=	55
NRUPTFLG	0107	=	55
NTRYPRIO	5002	=	844
NUFAZ+10	4126		221
NUVLEM	E3,1652		86
NVSBWAIT	4461		382
NVSUBCOM	4204		370
NWAITBIT	5006	=	54
NWAITFLG	0101	=	54
NXXTBNN	33,3143		443
N2217BIT	5012	=	64
==========			
OCT00010	5014	=	202
OCT00060	21,3034		1019
OCT00077	31,3460		631
OCT00300	21,3035		1019
OCT10000	5003	=	189
OCT10001	7632	=	1204
OCT12	4377	=	689
OCT140	5040	=	1204
OCT203	37,2400		564
OCT217	5762		1496
OCT25	4376	=	1204
OCT27	11,3775		1353
OCT30000	4371	=	189
OCT30002	6440	=	1204
OCT35	24,2431		690
OCT37774	7677		1203
OCT40420	10,3760		1484
OCT53	24,2430		690
OCT67777	10,3757		1484
OCT7777	05,2751		189
OC40200	27,2501		587
OGF	E6,1702	=	114
OLDAZ1	E5,1637	=	100
OLDBODY1	E6,1503	=	115
OLDBODY2	E6,1504	=	115
OLDBODY3	E6,1505	=	115
OMEGACLC	16,2277		721
OMEGAXB	E6,1533	=	104
OMEGAXC	E6,1525	=	104
ONCEMORE	33,3037		441
ONESEK	21,2157		1003
OPDEGIN2	40,3011		350
OPFAILON	06,3235		165
OPTNREG	E5,1473	=	98
OPTX	0036	=	39
OPTXCMD	0054	=	40
OPTYCMD	0053	=	40
ORBWFBIT	5012	=	52
ORDERBIT	5012	=	62
OTHSHIP	23,2423		516
OVERNOUT	25,3577		873
==========			
PACLIM	20,2635		964
PBIASY	E3,1454		84
PBIASZ	E3,1456		84
PCDUDOTS	20,2543		963
PCOPYCYC	20,2672		965
PDAPEND	20,2673		965
PERFCHEK	10,3357		1477
PERFERAS	33,3033		441
PERORLIM	20,2617		964
PFORWARD	20,2620		964
PFRATBIT	5014	=	51
PHASE2	0755		75
PHASE3	0757		75
PHASE4	0761		75
PHASE6	0765		75
PHSBB1	E3,1437		84
PHSBB2	E3,1441		84
PHSBB3	E3,1443		84
PHSBB4	E3,1445		84
PHSBB5	E3,1447		84
PHSBB6	E3,1451		84
PHSCHK2	16,3221		959
PHSNAME2	E3,1440		84
PHSNAME3	E3,1442		84
PHSNAME4	E3,1444		84
PHSNAME6	E3,1450		84
PINBRBIT	5012	=	54
PINTEST	43,2002	=	384
PIPASCFY	E3,1455		84
PIPASCFZ	E3,1457		84
PIPUSE1	07,3162		1429
PITCHANG	0026	=	935
PMINM	35,3455		664
PMISC	20,2717		966
POFFSET	20,2632		964
POINT2	26,3154		879
PON4	33,2237		426
POODAPAD	04,2405		205
POOH	04,2161		200
POS-2.5	24,3761		735

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SYMBOL	DEF	H	PAGE
PDS1/4	11,3755	=	1353
POUT	20,2636		964
PPRECOMP	20,2644		964
PREBJUMP	5361		1404
PRECIBIT	5010	=	52
PREC150	32,2612		909
PREC155	32,2625		909
PREC170	32,2703		910
PREC205	32,3005		911
PRFTRBIT	5006	=	56
PRIODBIT	5002	=	53
PRIODFLG	0075	=	53
PRIO11	5064		1202
PRIO17	5071		1202
PRIO2	5005	=	1204
PRIO23	7660		1202
PRIO34A	7671	=	1003
PRIO36	7673		1202
PROCEDE	06,2075		136
PROCESSW	06,3023		160
PROG22C	30,2103		566
PRONVBIT	5011	=	54
PSTROKER	20,2537		963
PULSEM	15,2275		759
PUTXY	41,2714		344
PUTXYZ	41,2632		343
P17.3	35,3224		560
P20R52JB	37,2367		564
P21	E6,1666	=	114
P21BIT	5004	=	50
P21DSP	37,2110		458
P22MKBIT	5005	=	52
P22OVER	30,2110		566
P23.00	31,2431		619
P23.17	31,2515		621
P23.55	31,2573		621
P23S	4000	=	27
P30PHSI	35,3275		635
P30S	35,2000	=	33
P37N	36,3033		896
P39SWBIT	5007	=	62
P40CLK	24,2340		688
P40GMB	24,2151		685
P40MINOB	24,2262		687
P40PVA	24,2114		684
P40SXTY	24,2123		684
P40TSK	24,2452		690
P40TTOG	24,2135		684
P47/DSP	24,2547		692
P47BOD	24,2542		692
P51FIVE	5022	=	769
P52E	15,2137		740
P67.3	26,2541		802
==========			
QUALITY3	11,3146		1342
QUICKIGN	24,3554		708
QUITBIT	5013	=	64
==========			
RANGER	25,2571		859
RANGERD1	27,2437		587
RATEDEN	16,3444		992
RATENUM	16,3460		992
RATEZRO	20,2204		721
RCSADDR4	04,2413		205
RCSCADR	24,3762		735
RDAPEND	16,3675		996
RDM	13,3764		1354
RDSP	E5,1444	=	99
READPIPS	22,3527		1508
RECAL3	40,3502		377
REDOMANN	27,2002		390
REDO5.31	37,2705		823
REFSMBIT	5003	=	52
REGION6	16,3414		991
REG1TST	16,3350		990
REG2TST	16,3400		991
REG3TST	16,3356		990
REG4TST	16,3404		991
REG5TST	16,3413		991
RELVBIT	5007	=	58
RENDGUID	23,2000	=	31
RENDISP4	34,3332		585
RENDWBIT	5017	=	57
REPLACEP	17,3704		1062
REPLACEY	17,3713		1062
REQEXLOC	41,2207		326
RETROBIT	5002	=	55
RMAG	E3,1765		87
RMM	04,2562		209
ROLLPREP	16,2730		946
ROO	04,2130		199
RPAD1	22,3151	=	1388
RPQFLBIT	5001	=	61
RRECT1	0022	=	85
RSTPAF	34,3732		617
RSTRTST	20,2271		730
RTBCODE1	22,2000	=	30
RTECON	34,2000	=	33
RTENCK3A	31,3731		915
RTE299	36,2507		891
RTE320	36,2562		892
RTE505	36,2755		895
RTE625	36,2774		895
RUPTSTOR	0063	=	68
RVSWBIT	5007	=	60
RWORD	17,2747		1043
R21BIT	5002	=	50
R21CSM1	37,2544		573
R22CABIT	5011	=	64
R22CAFLG	0217	=	64
R23.END	31,3133		626
R23.05	31,2707		623
R23.6	31,3113		626
R23.8	31,3127		626
R30OK	27,3367		1388
R35	31,2000	=	32
R35A	30,2000	=	32
R51.2	14,2536		756
R52A	14,2026		744
R52I	14,2125		745
R53FLBIT	5012	=	47
R53OUT	14,3362		773
R55.1	15,2276		759
R57BIT	5010	=	58
R60FLAG	0126	=	56
R60FLBIT	5014	=	56
R61C1	37,2577		574
==========			
S+2	5016	=	1395
S+3	6214	=	1395
S+4	5015	=	1395
S+5	5022	=	1395
S+6	6211	=	1396
S-2	7715	=	1396
S-3	7714	=	1396
S-4	6061	=	1396
SAMEJETS	16,3623		995
SAVE	E5,1474	=	98
SAVECBIT	5006	=	64
SAVEFLAG	1071	=	1483
SBIT1	5017	=	1395
SBIT10	5006	=	1395
SBIT13	5003	=	1395
SBIT14	5002	=	1395
SBIT2	5016	=	1395
SBIT3	5015	=	1395
SBIT5	5013	=	1395
SBIT6	5012	=	1395
SBIT8	5010	=	1395
SD	22,2370		405
SECAD	22,2016		399
SELFSUPR	40,2000	=	34
SETCLOCK	24,3275		703
SETMARK	10,2750		1469
SETPRIO	10,2732		1469
SETUPGC	33,3162		443
SFCONST1	E5,1477	=	98
SFRET	41,3064		346
SFRET1	41,3046		346
SHAFTA	1161	=	98
SHAXIS	14,2162		746
SHORTMP2	7262		1141
SIDETRAK	25,2716		861
SIGNRET	0125	=	70
SIM2CADR	05,2347		183
SINB	E5,1675	=	95
SLOPEBIT	5015	=	49
SLOWBIT	5003	=	55
SNAPAGN	05,3646		1098
SNAPEND	05,3665		1099
SNGLCD	22,2374		405
SOLNSBIT	5015	=	57
SOLPOS	26,2123		787
SOMEERRR	33,3077		442
SOPTION2	43,3325		1397
SOPTION3	43,3326		1397
SOPTION4	43,3327		1397
SOPTION5	43,3330		1397
SOPTION6	43,3331		1397
SOPTION7	43,3332		1397

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SYMBOL	DEF	H	PAGE
SOPTON10	43,3333		1397
SOUPLY	33,3123		442
SPBIT1	16,2154		719
SPITGYRO	33,3367		446
SPSCODE	5007	=	1420
SPSON	24,2635		695
SPVQUIT	37,3513		883
SQRARG	1077		77
STARTMNV	27,2047		391
STARTSIM	05,2345		183
STARTSTO	6403		1122
STARTSW	05,2344		183
STATEBIT	5013	=	52
STATEST	31,2032	=	35
STATEXIT	0111		69
STBYDUMP	15,2654		1072
STEERBIT	5005	=	50
STOREPL	E5,1430		98
STORHAPO	23,2716		522
STORHPER	23,2730		523
STORT	34,3350		593
STRKCHK	20,3502		981
STRULBIT	5003	=	57
SUPER100	5011	=	1201
SURFBIT	5010	=	62
SWTOVBIT	5001	=	63
SWTOVER	0207	=	63
SXTOPTN	E5,1413	=	98
S2BVTRS	30,3042		605
S2GETUM	30,2430		600
S2INCP1	30,3046		605
S2INTS1	30,2737		604
S2RPTR	30,3000		605
S2RTRP	30,2772		604
S22F244	30,3162		607
S32BIT1	5001	=	66
S32BIT2	5002	=	66
S32BIT3A	5003	=	66
S3229T3B	5004	=	67
S52.2.1	11,2352		774
S52/3	15,2000	=	29
==========			==========
TARG1BIT	5006	=	48
TARG2BIT	5007	=	48
TBASE3	1057		76
TBUILDEX	5031		1201
TCALARM2	43,3266		1396
TCCSM	E3,1622		86
TCLEM	E3,1674		86
TDECAYEX	5032		1201
TEMP	E5,1451	=	98
TEMPADD	E5,1450	=	98
TERMIBIT	5001	=	59
TESTVB	41,2041		324
TETOTHER	E3,1642	=	86
TET1	0036	=	85
TFFSWBIT	5017	=	61
TFFTICK	23,2554		518
TGOCALC	16,2220		720
THRUST	0055	=	40
TICKTPER	23,2511		517
TIMER	E5,1500	=	99
TIMETST	15,3525		1087
TIMRBIT	5005	=	60
TMANUCHK	22,3104		415
TMEXITL	05,3717		1099
TMODE	6446		1124
TMODULO	1345		82
TMRESUME	05,3721		1099
TOLDAZMT	E5,1641	=	100
TOLDAZ1	E5,1641	=	100
TORQINCH	33,3062		441
TRACE1	40,3143		359
TRACE1S	40,3154		359
TRG*SMNB	23,3624		1368
TRTAGXPI	15,3274		1082
TRUNA	1160	=	98
TRUNBIT	5014	=	47
TRUN19A	31,3445		631
TSSR	00,2025		1152
TSTPOINT	23,3730		1371
TVCINIT2	17,2222		938
TVCINIT3	17,2256		939
TVCTMP1	E6,1523	=	104
T5RPTBB	4064		132
T6ADR	1311		81
==========			==========
UPDATE1	27,2000	=	32
UPDNLIST	05,2207	=	170
UPDTMEND	43,2355		246
UPEND73	27,3530		1503
UPERGMC	43,3762		1500
UPERLEM	43,3756		1500
UPLOCBIT	5014	=	61
UPLOCKFL	0164	=	61
UPOK	07,3747		1450
UPPART3	27,3554	=	1503
UPRPT1	07,3730		1450
UPWAKE	27,3546		1503
==========			==========
V(24K)	32,2237		646
V(28K)	32,2233		646
VACSTOR	07,2244		229
VACZ	E4,1630	=	89
VAC1	0401		74
VAC2	0455		74
VAC3	0531		74
VAC4	0605		74
VARSUBL3	31,3451		631
VCVLEM	E3,1666		86
VECSGNAG	22,3772		1515
VEHUPBIT	5010	=	48
VERIFBIT	5015	=	61
VERIFLAG	0165	=	61
VERTDRFT	33,2227		426
VFLAGBIT	5006	=	52
VHFRBIT	5007	=	64
VINTFBIT	5015	=	53
VLAUNS	E5,1472	=	99
VLTEST	25,3057		864
VPDVL	6542		1126
VRECTCSM	E3,1562		86
VRECTLEM	E3,1634		86
VRECT1	0030	=	85
VSTORE	6412		1122
VV/SC	7576		1150
VVXSC	7353		1145
V06N07	10,3721		1483
V06N30S	06,3540		303
V06N45	35,3444		638
V06N50	4661		662
V06N89A	14,2161		746
V16N35	35,3443		638
V37XEQC	04,2323		202
V59FLBIT	5004	=	55
V67FLBIT	5002	=	63
V74	43,2721	=	260
V82EMBIT	5003	=	63
V96ONBIT	5015	=	63
V99EJOB	24,3400		706
V99FLASH	24,3562		709
V99TJOB	24,3406		706
==========			==========
WAIT1/2	16,3312		989
WHICHALF	15,3325		1083
WPLATI	E5,1570	=	99
WPLATO	E5,1474	=	99
WRDRET	0115	=	69
WRTN22	21,3201		1022
==========			==========
XACTALM	43,2114		237
XACTO	43,2116		238
XDELVBIT	5011	=	50
XDIFF	12,2201		1279
XDSPBIT	5017	=	55
XDSPFLAG	0112	=	55
XKEPCSM	E3,1624		86
XKEPLEM	E3,1676		86
XMODULO	1343		82
XPRODUCT	16,2262		721
==========			==========
YACLIM	20,3011		968
YCOPYCYC	20,3046		969
YDAPEND	20,3047		969
YERORLIM	20,2773		967
YFORWARD	20,2774		967
YINTEGRL	20,2745		967
YMISC	20,3073		970
YOFFSET	20,3006		968
YOUT	20,3012		968
YPRECOMP	20,3020		968
YSTROKER	20,2741		967
YWORD	17,2676		1041
YZERO	E6,1704	=	107
==========			==========
ZERINFLT	23,2265		295
ZEROCMDS	21,3753		1036
ZERODP	04,3565	=	1206
ZEROD	26,3334	=	1260
ZMEASBIT	5006	=	46

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SYMBOL	DEF	H	PAGE
ZOPALARM	06,3041		161
ZRUPT	0015	=	39
==========			
OFBANK	43,3343		1398
==========			
1.11SPOT	01,2025		212
1.5SPOT	01,2017		212
1.7SPOT	01,2022		212
1/MINLIM	16,3713		998
1DAPCAS	20,3164		972
1RTEB10	35,3507		931
1RTEB12	35,3511		931
1SECXT	E5,1644	=	100
120MS	5771	=	159
17DECML	4375	=	447
17TO20	43,3645		1402
==========			
2.11SPOT	01,2041		213
2.13SPOT	01,2044		213
2.5SEC	37,3234		830
2.5SPOT	01,2033		213
2.7SPOT	01,2036		213
2CASFLTR	20,3326		974
2DAPCAS	20,3176		972
2DZERO	04,3565	=	1240
2RNDEND	40,3100		352
2V1STO2S	22,3567		1509
22DSPBIT	5003	=	50
27TO30	43,3653		1402
==========			
3.11SPOT	01,2060		213
3.13SPOT	01,2063		213
3.15SPOT	01,2066		213
3.5SPOT	01,2052		213
3.7SPOT	01,2055		213
3/4LOWDP	11,3763	=	34
3AXISBIT	5012	=	56
3CASFLTR	20,3411		976
3J22R2MU	13,3752		1354
3SECS	5044		1201
330PTMON	06,2774		160
360SWBIT	5017	=	63
==========			
4.11SPOT	01,2124		214
4.13SPOT	01,2127		214
4.15SPOT	01,2132		214
4.17SPOT	01,2135		215
4.21SPOT	01,2140		215
4.23SPOT	01,2143		215
4.25SPOT	01,2146		215
4.27SPOT	01,2151		215
4.31SPOT	01,2154		215
4.33SPOT	01,2157		215
4.35SPOT	01,2162		215
4.37SPOT	01,2165		215
==========			
4.45POT	01,2077		214
4.41SPOT	01,2170		215
4.43SPOT	01,2173		215
4.45SPOT	01,2176		215
4.47SPOT	01,2201		216
4.5SPOT	01,2116		214
4.51SPOT	01,2204		216
4.53SPOT	01,2207		216
4.55SPOT	01,2212		216
4.57SPOT	01,2215		216
4.6SPOT	01,2105		214
4.61SPOT	01,2220		216
4.63SPOT	01,2223		216
4.65SPOT	01,2226		216
4.67SPOT	01,2231		216
4.7SPOT	01,2121		214
==========			
4.71SPOT	01,2234		216
4.73SPOT	01,2237		216
4.75SPOT	01,2242		216
4.77SPOT	01,2245		217
4D/SDZ	15,3017		1076
4OCST5	24,2421		689
==========			
5.11SPOT	01,2275		217
5.13SPOT	01,2300		217
5.15SPOT	01,2303		217
5.17SPOT	01,2306		217
5.21SPOT	01,2311		218
5.23SPOT	01,2314		218
5.25SPOT	01,2317		218
5.27SPOT	01,2322		218
5.31SPOT	01,2325		218
5.33SPOT	01,2330		218
5.35SPOT	01,2333		218
5.37SPOT	01,2336		218
5.4SPOT	01,2256		217
5.41SPOT	01,2341		218
5.5SPOT	01,2267		217
5.7SPOT	01,2272		217
5BLANK1	40,2460		322
5B10	01,2523		1196
==========			
6.11SPOT	01,2363		219
6.13SPOT	01,2366		219
6.5SPOT	01,2355		219
6.7SPOT	01,2360		219
6SECT5	24,3764		735
63/64+1	7675		1203
==========			

HEALTH KEY: NORMALLY DEFINED UNLESS FLAGGED AS FOLLOWS:

UN UNDEFINED = DEFINED BY EQUALS J DEFINED BY JOKER OR ERASE ANYWHERE MD MULTIPLY DEFINED
BD BADLY DEFINED CD DEFINITION ASSOCIATED WITH CONFLICT XX MISCELLANEOUS TROUBLE

ERASABLE & EQUALS CROSS-REFERENCE TABLE SHOWING DEFINITION, PAGE OF DEFINITION, AND SYMBOL

DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL
0000	39	A	0010	935	UB	0016	1373	CDELF/2	0026	1307	ITERCTR	0036	614	S22D
0000	46	CPHIFLAG	0010	1241	GAMRP	0016	1373	TFFQ1	0026	1373	TFF1/ALF	0036	1306	T
0000	82	DISPDEX	0010	1251	CVECTR	0016	1379	RPER	0027	39	TIME4	0036	1307	DEP
0000	209	COSTALIN	0010	1251	DVECTR	0017	39	BRUPT	0027	48	UPDATFLG	0036	1373	TFF/RTMU
0000	614	WORKW	0010	1251	SINNODI	0017	47	NJETSFLG	0030	39	TIME5	0037	39	PIPAX
0000	1251	504RPR	0010	1305	ALPHA	0020	39	CYR	0030	41	CHAN30	0037	50	R21MARK
0000	1354	RATT	0010	1306	COGAMIN	0020	48	STIKFLAG	0030	49	IDLEFAIL	0040	39	PIPAY
0001	39	L	0010	1307	MIN	0020	73	COSTH	0030	85	VRECT1	0040	50	22DSPFLG
0001	41	LCHAN	0011	39	LRUPT	0020	750	CSUN	0030	128	RPRE	0040	73	STARM
0001	46	JSWITCH	0011	41	DSALMOUT	0020	1305	ROOTMU	0030	614	S221X3	0040	614	S22RHO
0001	209	ENTRYUPD	0011	47	R53FLAG	0020	1373	NRTERM	0030	1306	XI	0040	1251	COB
0002	39	Q	0012	39	QRUPT	0020	1379	RAPO	0030	1307	COSF	0040	1306	R1
0002	41	QCHAN	0012	41	CHAN12	0021	39	SR	0030	1373	TFFRTALF	0040	1354	TDEC1
0002	46	MIDFLAG	0012	47	F2RTE	0021	48	ERADFLAG	0031	39	TIME6	0040	1373	NRMAG
0002	209	RENDEZVU	0012	614	9DWI	0022	39	CYL	0031	41	CHAN31	0041	39	PIPAZ
0002	935	R	0012	1305	XMAX	0022	48	NODOP01	0031	49	TRACKFLG	0041	50	P21FLAG
0002	935	RCM	0012	1373	TFFDELQ	0022	73	SINTH	0032	39	CDUX	0041	208	NO.MMS
0003	39	EBANK	0013	39	SAMPTIME	0022	85	RRECT1	0032	41	CHAN32	0042	39	BMAGX
0003	41	HISCALAR	0013	41	CHAN13	0022	614	S223X1	0032	49	TRM03FLG	0042	40	LVSQUARE
0003	46	MOONFLAG	0013	47	TRUNFLAG	0022	750	CMOON	0032	128	P/RPRE	0042	50	STEERSW
0003	209	POWERED	0014	41	CHAN14	0022	1251	504A7	0032	463	DELELQ	0042	1251	SOB
0004	39	FBANK	0014	47	FREEFLAG	0022	1305	1/ROOTMU	0032	1251	BVECTR	0042	1306	KEPC1
0004	41	LOSCALAR	0014	614	9DWN	0022	1354	COSPHI/2	0032	1306	S(XI)	0042	1373	TFFX
0004	46	NORFHOR	0014	1306	DCOGA	0022	1373	RTERM	0032	1354	MU(P)	0043	39	BMAGY
0004	209	P22DNLST	0014	1306	XMIN	0023	39	EDOP	0032	1354	TVEC	0043	50	SKIPVHF
0005	39	Z	0014	1307	DELINDEP	0023	48	ENG2FLAG	0032	1373	TFFALFA	0044	39	BMAGZ
0005	41	PYJETS	0014	1354	TAT	0024	39	TIME2	0033	39	CDUY	0044	40	LV
0005	46	ZMEASURE	0014	1373	RMAG1	0024	48	TARG1FLG	0033	41	CHAN33	0044	50	IMPULSW
0005	1003	CHAN5	0015	39	ZRUPT	0024	73	THETA	0033	49	SLOPESW	0044	1261	NORMZI
0006	39	BBANK	0015	41	MNKEYIN	0024	935	YAWANG	0034	39	CDUZ	0044	1306	KEPC2
0006	41	ROLLJETS	0015	47	AMOONFLG	0024	1251	AVECTR	0034	41	DNTM1	0044	1373	TFFTEM
0006	46	NEEDLFLG	0016	39	BANKRUPT	0024	1251	MMATRIX	0034	49	GUESSW	0045	39	INLINK
0006	614	XTMP1	0016	41	NAVKEYIN	0024	1306	X	0034	128	R/APRE	0045	50	XDELVFLG
0006	1003	CHAN6	0016	47	KFLAG	0024	1354	UZ	0034	1306	XSQC(XI)	0046	39	RNRAD
0006	1251	504F	0016	614	9DWJ	0024	1354	VATT1	0034	1373	TFFNP	0046	40	X1
0006	1354	VATT	0016	750	CEARTH	0024	1373	TFFVSQ	0035	39	CDUT	0046	50	ETPIFLAG
0006	1411	BB	0016	755	CSS	0025	39	TIME1	0035	39	OPTY	0046	50	FIRSTFLG
0007	41	SUPERBNK	0016	935	URP	0025	48	R23FLG	0035	41	DNTM2	0046	51	OPTNSW
0007	46	IMUSE	0016	1251	TIMSUBM	0025	48	TARG2FLG	0035	49	AVEGFLAG	0047	39	GYROCMD
0007	170	ERASZERO	0016	1251	504LPL	0026	39	TIME3	0035	81	LASTXCMD	0047	39	GYROCTR
0007	170	SPARE	0016	1305	1/MU	0026	48	VEHUPFLG	0035	81	LASTYCMD	0047	40	X2
0010	39	ARUPT	0016	1306	COGAMAX	0026	73	PDA	0036	39	CDUS	0047	51	FINALFLG
0010	41	QUTO	0016	1307	MAX	0026	73	ZPRIME	0036	39	OPTX	0050	39	CDUXCMD
0010	47	RNDVZFLG	0016	1354	RATT1	0026	119	GAMMAL1	0036	49	DRIFTFLG	0050	40	S1
0010	614	9DWP	0016	1354	URPV	0026	935	PITCHANG	0036	85	TET1	0050	51	AVFLAG

ERASABLE & EQUALS CROSS-REFERENCE TABLE SHOWING DEFINITION, PAGE OF DEFINITION, AND SYMBOL

DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL
0050	1251	RPREXIT	0065	52	CULTFLAG	0106	54	MRUPTFLG	0123	69	SGNOFF	0141	58	R57FLAG
0050	1307	TWEEKIT	0065	68	ITEMP5	0106	65	FLGWRD10	0124	56	3AXISFLG	0141	70	DSREL
0051	39	CDUYCMD	0065	68	NEWLOC	0106	65	RASFLAG	0124	69	CODE	0141	70	POLYRET
0051	40	S2	0065	1411	TEMPSW	0107	55	NRUPTFLG	0124	69	LOTEMIN	0141	70	TEM1
0051	51	PFRATFLG	0066	52	ORBWFLAG	0107	66	FLGWRD11	0124	69	SFTEMP2	0142	58	NOSWITCH
0051	1242	SETREX	0066	68	ITEMP6	0110	55	MKOVFLAG	0125	56	GRRBKFLG	0142	70	DSMAG
0051	1251	EARTHMXX	0066	1411	TEMPSW2	0110	68	EMDOT	0125	70	MIXTEMP	0142	70	IDADDTEM
0052	40	CDUZCMD	0067	52	STATEFLG	0111	69	STATEXIT	0125	70	SIGNRET	0142	70	TEM2
0052	40	QPRET	0067	68	NEWJOB	0112	55	XDSPFLAG	0126	56	R60FLAG	0142	71	DEXDEX
0053	40	CDUTCMD	0070	52	INTYPFLG	0112	69	ERASFILL	0127	56	SOLNSW	0143	58	HIND
0053	40	OPTYCMD	0070	68	RUPTREG1	0113	55	DSKYFLAG	0130	57	MGLVFLAG	0143	70	COUNT
0053	40	TVCYAW	0070	1411	TEMPPR	0114	55	RETROFLG	0130	70	BUF	0143	70	TEM3
0053	51	CALCMAN2	0071	53	VINTFLAG	0114	69	BLANKRET	0130	70	INDEXLOC	0143	71	DEXI
0054	40	CDUSCMD	0071	68	RUPTREG2	0114	69	DSEXIT	0130	70	SWWORD	0143	71	DEX1
0054	40	OPTXCMD	0071	1411	TEMPG2	0114	69	EXITEM	0131	57	RENDWFLG	0144	59	INRLSW
0054	40	TVCPITCH	0072	53	D60R9FLG	0114	69	INTB15+	0131	70	SWBIT	0144	70	DSPWDRET
0054	51	NODOFLAG	0072	68	RUPTREG3	0115	55	SLOWFLG	0132	57	DAPBIT1	0144	70	FREERET
0055	40	EMSD	0072	1411	TEMPP2	0115	69	DECRET	0133	57	DAPBIT2	0144	70	LSTPTR
0055	40	THRUST	0073	53	DIMOFLAG	0115	69	INTBIT15	0133	70	BUF2	0144	70	RELRET
0056	40	LEMONM	0073	68	DSRUPTEM	0115	69	WDRET	0133	71	TERM1TMP	0144	70	SEPMNRET
0056	51	GLOKFAIL	0073	68	KEYTEMP1	0115	69	WRDRET	0134	57	ENTRYDSP	0144	70	SEPSCRET
0057	40	LOCALARM	0073	68	RUPTREG4	0115	69	21/22REG	0134	57	STRULLSW	0144	70	TEM4
0057	52	REFSMFLG	0073	1411	TEMPBBCN	0116	55	V59FLAG	0135	57	CMDAPARM	0144	71	DEX2
0060	40	BANKALRM	0074	46	FLAGWRD0	0116	69	ADDRWD	0135	70	DMPNTEMP	0145	59	LATSW
0060	52	LUNAFLAG	0074	53	MRKIDFLG	0117	56	INCORFLG	0135	70	MPTEMP	0145	70	TEM5
0061	52	P22MKFLG	0074	68	STATE	0117	69	CHAR	0136	58	GAMDIFSW	0145	71	NOUNADD
0061	68	EXECTEM1	0075	47	FLAGWRD1	0117	69	DECOUNT	0136	70	DOTINC	0145	71	RTNSAVER
0061	68	ITEMP1	0075	53	PRIODFLG	0117	69	ERCNT	0136	70	DVSIGN	0146	59	.05GSW
0061	68	WAITEXIT	0076	49	FLAGWRD2	0117	69	POLISH	0136	70	ENTRET	0146	71	NNADTEM
0061	1411	TEMPG	0076	53	NRMIDFLG	0117	69	UPDATRET	0136	70	ESCAPE	0147	59	CM/DSTBY
0062	52	VFLAG	0077	51	FLAGWRD3	0120	56	PRFTRKAT	0136	323	ENTEXIT	0147	71	NNTYPTEM
0062	68	EXECTEM2	0077	53	PDSPFLAG	0120	56	RNGSCFLG	0137	58	GONEPAST	0150	59	GYMDIFSW
0062	68	ITEMP2	0100	53	FLAGWRD4	0120	69	FIXLOC	0137	70	DOTRET	0150	71	IDAD1TEM
0062	68	WAITBANK	0100	53	MWAITFLG	0121	56	DMENFLG	0137	70	DVNORMCT	0151	59	TERMIFLG
0062	1411	TEMPP	0101	54	NWAITFLG	0121	69	OVFIND	0137	70	ESCAPE2	0151	71	IDAD2TEM
0063	68	ITEMP3	0101	55	FLAGWRD5	0122	56	COMPUTER	0137	70	INREL	0152	59	ITSWICH
0063	68	NEWPRIO	0102	54	MRKNVFLG	0122	69	DECTEM	0137	70	WDCNT	0152	71	IDAD3TEM
0063	68	RUPTSTOR	0102	57	FLAGWRD6	0122	69	DISTEM	0140	58	RELVELSW	0153	60	IGNFLAG
0063	68	WAITADR	0102	844	CM/FLAGS	0122	69	NOUNTEM	0140	70	DSPMMTEM	0153	71	RUTMXTEM
0063	1411	TEMPNM	0103	54	NRMNVFLG	0122	69	SGNON	0140	70	MATINC	0154	60	ASTNFLAG
0064	52	PRECIFLG	0103	59	FLAGWRD7	0122	69	VBIJF	0140	70	MAXDVSW	0154	72	MPAC
0064	68	ITEMP4	0104	54	PRONVFLG	0123	56	ENGONFLG	0140	70	MIXBR	0154	1326	STALTEM
0064	68	LOCCTR	0104	61	FLAGWRD8	0123	69	HITEMIN	0140	70	POLYCNT	0154	1419	TEMPPHS
0064	68	WAITTEMP	0105	54	PINBRFLG	0123	69	NVTEMP	0141	58	EGSW	0154	1484	FACEREG
0064	1411	TEMPBB	0105	63	FLAGWRD9	0123	69	SFTEMP1	0141	58	KNOWNFLG	0155	60	TIMRFLAG

ERASABLE & EQUALS CROSS-REFERENCE TABLE SHOWING DEFINITION, PAGE OF DEFINITION, AND SYMBOL

DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL
0155	1419	TEMP2G	0213	63	V94FLAG	0334	73	IDATALST	0744	74	COSCDUY	1037	76	NVQTEM
0155	1484	PLAYTEM1	0214	63	SAVECFLG	0334	1099	CTLIST	0746	74	COSCDUZ	1040	76	NVBNKTEM
0156	60	NORMSW	0215	64	VHFRFLAG	0335	73	DNTMGOTO	0750	74	COSCDUX	1041	76	VERBSAVE
0156	1419	POINTER	0216	64	SOURCFLG	0336	73	DUMPLOC	0752	75	-PHASE1	1042	76	CADRSTOR
0157	60	RVSW	0217	64	R22CAFLG	0336	73	TMINDEX	0753	75	PHASE1	1043	76	DSPLIST
0157	1419	TEMPSWCH	0220	64	N22ORN17	0336	1099	DNECADR	0754	75	-PHASE2	1044	76	EXTVBACT
0157	1483	COPMPAC	0221	64	QUITFLAG	0337	73	DNO	0755	75	PHASE2	1045	76	DSPTEM1
0157	1484	PLAYTEM3	0222	64	R31FLAG	0337	1099	SUBLIST	0756	75	-PHASE3	1045	76	NORMTEM1
0160	60	GONEBY	0223	64	MID1FLAG	0340	73	DNTMBUFF	0757	75	PHASE3	1050	76	DSPTEM2
0160	1483	TEMPOR2	0224	64	MIDAVFLG	0354	73	MKNDX	0760	75	-PHASE4	1051	76	DSPTEMX
0160	1484	PLAYTEM4	0225	65	AVEMIDSW	0355	73	MKT2T1	0761	75	PHASE4	1051	76	OPTIONX
0161	1483	OUTHERE	0227	65	INTFLAG	0357	73	MKCDUY	0762	75	-PHASE5	1053	76	TBASE1
0162	60	V37FLAG	0236	66	REINTFLG	0360	73	MKCDUS	0763	75	PHASE5	1054	76	PHSPRDT1
0162	337	MPAC+6	0245	66	S32.1F1	0361	73	MKCDUZ	0764	75	-PHASE6	1055	76	TBASE2
0162	1483	GENMASK	0246	66	S32.1F2	0362	73	MKCDUT	0765	75	PHASE6	1056	76	PHSPRDT2
0163	72	MODE	0247	66	S32.1F3A	0363	73	MKCDUX	0766	75	CDUSPOT	1057	76	TBASE3
0163	1483	USERPRIO	0250	66	S32.1F3B	0364	73	EBUF2	0766	75	CDUSPOTY	1060	76	PHSPRDT3
0164	61	UPLOCKFL	0300	72	COMPNUMB	0366	74	RESTREG	0770	75	CDUSPOTZ	1060	205	MMTEMP
0164	72	LOC	0300	72	QMAJ	0367	74	NVWORD	0772	75	CDUSPOTX	1061	76	TBASE4
0164	1483	COPINDEX	0301	72	MARKINDX	0370	74	MARKNV	0774	75	MINDEX	1061	205	BASETEMP
0165	61	VERIFLAG	0301	72	UPOLDMOD	0371	74	NVSAVE	0775	75	MMNUMBER	1062	76	PHSPRDT4
0165	72	BANKSET	0302	72	BESTI	0372	74	CADRFLSH	0776	75	DSPCNT	1063	76	TBASE5
0165	1483	MPAC2SAV	0302	72	UPVERB	0373	74	CADRMARK	0777	75	DSPCOUNT	1064	76	PHSPRDT5
0166	61	ATTCHFLG	0303	72	BESTJ	0374	74	TEMPFLSH	1000	75	DECBRNCH	1065	76	TBASE6
0166	72	PUSHLOC	0303	72	UPCOUNT	0375	74	FAILREG	1001	75	VERBREG	1066	76	PHSPRDT6
0167	61	TFFSW	0304	72	CMTMTIME	0400	74	VAC1USE	1002	75	NOUNREG	1067	77	EBANKSAV
0167	72	PRIORITY	0304	72	STARIND	0401	74	VAC1	1003	75	XREG	1067	1483	DSPFLG
0170	61	RPQFLAG	0304	72	UPBUFF	0454	74	VAC2USE	1004	75	YREG	1070	77	MARKEBAN
0172	61	NEWIFLG	0305	72	SW/NDX	0455	74	VAC2	1005	75	ZREG	1070	1483	MARKFLAG
0173	34	MOONTHIS	0306	73	XSCREF	0530	74	VAC3USE	1006	75	XREGLP	1071	77	EBANKTEM
0173	61	CMOONFLG	0306	73	XSMD	0531	74	VAC3	1007	75	HITEMOUT	1071	1483	SAVEFLAG
0174	35	MOONOTH	0314	73	YSCREF	0604	74	VAC4USE	1007	75	YREGLP	1072	77	MARK2PAC
0174	61	LMOONFLG	0314	73	YSMD	0605	74	VAC4	1010	75	LOTEMOUT	1073	77	R1SAVE
0175	62	ADVTRK	0322	73	ZSCREF	0660	74	VAC5USE	1010	75	ZREGLP	1074	77	OLDBT1
0176	62	P39/79SW	0322	73	ZSMD	0661	74	VAC5	1011	76	MODREG	1074	77	1/PIPADT
0177	62	SURFFLAG	0324	72	ENDBUF	0705	1419	GOLOC	1012	76	DSPLOCK	1075	77	HALFY
0200	62	INFINFLG	0325	72	V1	0734	74	KEYTEMP2	1013	76	REQRET	1075	77	TEMK
0201	62	ORDERSW	0327	72	A0	0734	74	RUPTAGN	1014	76	LOADSTAT	1076	77	ROOTRET
0202	62	APSESW	0330	72	INTWAK1Q	0735	74	STARCODE	1015	76	CLPASS	1076	77	SQ
0203	62	COGAFLAG	0330	72	UPTEMP	0736	74	SINCDU	1016	76	NOUT	1077	77	SQRARG
0204	63	V96ONFLG	0330	1332	INTWAKUQ	0736	74	SINCDUY	1017	76	NOUNCADR	1100	78	TDEC
0206	63	360SW	0331	72	UPVERBSV	0736	74	STARALGN	1020	76	MONSAVE	1102	78	COLREG
0207	63	SWTOVER	0332	73	DNLSTADR	0740	74	SINCDUZ	1021	76	MONSAVE1	1103	78	LANDLAT
0211	63	V82EMFLG	0332	73	DNLSTCOD	0742	74	SINCDUX	1022	76	MONSAVE2	1103	78	LAT
0212	63	MAXDBFLG	0333	73	DUMPCNT	0744	74	COSCDU	1023	76	DSPTAB	1105	78	LONG

ERASABLE & EQUALS CROSS-REFERENCE TABLE SHOWING DEFINITION, PAGE OF DEFINITION, AND SYMBOL

DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL
1107	78	ALT	1214	614	9DWXX	1316	81	WTOPTION	E3,1434	84	LONGEXIT	E3,1552	85	XKEP
1111	78	YV	1222	79	AVEGEXIT	1317	81	ZOPTCNT	E3,1436	84	PHSNAME1	E3,1552	96	XPREV
1117	78	ZV	1222	79	AVGEXIT	1320	81	IMODES30	E3,1437	84	PHSBB1	E3,1554	86	RRECTCSM
1125	78	VHFCNT	1222	80	RCL	1321	81	IMODES33	E3,1440	84	PHSNAME2	E3,1554	86	RRECTHIS
1126	78	MARKCTR	1224	79	TEMX	1322	81	IMUCADR	E3,1441	84	PHSBB2	E3,1562	86	VRECTCSM
1126	78	TRKMKCNT	1224	80	MARKTIME	1322	81	MODECADR	E3,1442	84	PHSNAME3	E3,1570	86	TETCSM
1127	78	IRETURN1	1225	79	TEMY	1323	81	OPTCADR	E3,1443	84	PHSBB3	E3,1570	86	TETTHIS
1127	78	P30/RET	1226	79	TEMZ	1324	81	RADCADR	E3,1444	84	PHSNAME4	E3,1572	86	DELTACSM
1130	78	RATEINDX	1226	80	VTEMP	1325	81	ATTCADR	E3,1445	84	PHSBB4	E3,1600	86	NUVCSM
1131	78	OPTION1	1227	79	PIPCTR	1327	81	ATTPRIO	E3,1446	84	PHSNAME5	E3,1606	86	RCVCSM
1132	78	OPTION2	1230	79	PIPAGE	1330	81	MARKSTAT	E3,1447	84	PHSBB5	E3,1614	86	VCVCSM
1133	78	LONGCADR	1231	79	RN1	1331	81	OPTMODES	E3,1450	84	PHSNAME6	E3,1622	86	TCCSM
1135	78	LONGBASE	1234	80	UM	1332	81	HOLDFLAG	E3,1451	84	PHSBB6	E3,1624	86	XKEPCSM
1137	78	LONGTIME	1237	79	VN1	1333	81	CPHIX	E3,1452	84	PBIASX	E3,1626	86	RRECTLEM
1141	78	DELAYLOC	1242	80	MARKDATA	1336	81	TEVENT	E3,1452	84	PIPABIAS	E3,1626	86	RRECTOTH
1145	78	NVWORD1	1244	80	USTAR	1336	81	TLIFTOFF	E3,1453	84	PIPASCF	E3,1634	86	VRECTLEM
1146	78	TEMPR60	1245	79	PIPTIME1	1340	82	NORMEX	E3,1453	84	PIPASCFX	E3,1642	86	T-OTHER
1147	78	PRIOTIME	1247	79	GDT1/2	1341	82	CDUCHKWD	E3,1454	84	PBIASY	E3,1642	86	TETLEM
1150	78	TIME2SAV	1252	80	WIXA	1342	82	TRUNBIAS	E3,1455	84	PIPASCFY	E3,1642	86	TETOTHER
1150	79	POINTEX	1253	80	WIXB	1343	82	XMODULO	E3,1456	84	PBIASZ	E3,1644	86	DELTALEM
1151	79	VHFTIME	1254	80	ZIXA	1345	82	TMODULO	E3,1457	84	PIPASCFZ	E3,1652	86	NUVLEM
1152	78	SCALSAVE	1255	79	GOBL1/2	1347	82	EPSILONT	E3,1460	84	GBIASX	E3,1660	86	RCVLEM
1154	78	REDOCTR	1255	80	ZIXB	1351	83	RTED1	E3,1460	84	NBDX	E3,1666	86	VCVLEM
1155	78	CPHI	1256	80	DELTAX	1353	83	DVTHRESH	E3,1461	84	NBDY	E3,1674	86	TCLEM
1155	78	THETAD	1256	80	TRIPA	1354	83	HORIZALT	E3,1462	85	NBDZ	E3,1676	86	XKEPLEM
1155	79	RDOTREF	1256	80	VHFRANGE	1356	83	ALTVAR	E3,1463	85	ADIAX	E3,1700	86	X789
1156	78	CTHETA	1256	614	S22UUT	1357	82	SELFERAS	E3,1464	85	ADIAY	E3,1706	86	TEPHEM
1157	78	CPSI	1261	80	TEMPVAR	1357	82	SFAIL	E3,1465	85	ADIAZ	E3,1706	87	TIMSUBO
1157	79	VREF	1263	80	ENTRYVN	1360	82	ERESTORE	E3,1466	85	ADSRAX	E3,1711	86	AZO
1160	79	DESOPTT	1263	80	PADLONG	1361	82	SELFRET	E3,1467	85	ADSRAY	E3,1713	86	-AYO
1160	98	TRUNA	1265	80	LIFTTEMP	1362	82	SMODE	E3,1470	85	ADSRAZ	E3,1713	86	UNITW
1161	79	DESOPTS	1267	80	TEPHEM1	1363	82	ALMCADR	E3,1471	85	COMMAND	E3,1715	86	AXO
1161	98	SHAFTA	1272	80	PGNCSALT	1365	82	ERCOUNT	E3,1471	85	GCOMP	E3,1721	86	R-OTHER
1162	79	DELV	1272	80	UCL	1366	82	SCOUNT	E3,1474	85	CDUIND	E3,1727	86	V-OTHER
1162	79	DELVX	1300	80	TEMPOR1	1371	82	SKEEP1	E3,1477	85	GCOMPSW	E3,1735	86	REFSMMAT
1164	79	DELVY	1302	80	DSRUPTSW	1372	82	SKEEP2	E3,1500	85	DIFEQCNT	E3,1757	87	UNITR
1166	79	DELVZ	1303	80	OPTIND	1373	82	SKEEP3	E3,1501	85	UPSVFLAG	E3,1765	87	RMAG
1170	79	RN	1304	80	LGYRO	1374	82	SKEEP4	E3,1502	85	RRECT	E3,1767	87	EK1VAL
1176	79	VN	1305	80	COMMANDO	1375	82	SKEEP5	E3,1510	85	VRECT	E3,1767	727	K1VAL
1204	79	PIPTIME	1307	81	ZONE	1376	82	SKEEP6	E3,1516	85	TET	E3,1771	87	EK2VAL
1206	79	GDT/2	1310	81	T6LOC	1377	82	SKEEP7	E3,1520	85	TDELTAV	E3,1771	727	K2VAL
1206	80	CSMPOS	1311	81	T6ADR	1377	83	END-UE	E3,1526	85	TNUV	E3,1773	87	EK3VAL
1214	79	GOBL/2	1312	81	T5LOC	E3,1400	84	LST1	E3,1534	85	RCV	E3,1773	727	K3VAL
1214	80	LEMPOS	1314	81	SWSAMPLE	E3,1410	84	LST2	E3,1542	85	VCV	E3,1774	87	FANG
1214	614	S22UOFF	1315	81	DESOPMOD	E3,1432	84	RSBBQ	E3,1550	85	TC	E3,1776	87	E3J22R2M

ERASABLE & EQUALS CROSS-REFERENCE TABLE SHOWING DEFINITION, PAGE OF DEFINITION, AND SYMBOL

DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL
E3,1777	87	END-E3	E4,1670	89	ORIGEX	E4,1770	91	SUBEXIT	E5,1454	98	LOS1	E5,1552	99	COUNTPL
E3,1777	87	E32C31RM	E4,1671	89	RQVV	E4,1771	92	VONE'	E5,1454	99	ALX1S	E5,1553	99	COUANG
E4,1400	88	WRENDPOS	E4,1677	89	RPSV	E4,1777	92	END-E4	E5,1455	99	CMPX1	E5,1554	93	XNB1
E4,1400	92	TRANSM1	E4,1705	89	XKEPNEW	E4,1777	92	INTVAR	E5,1456	99	ALK	E5,1560	99	DELM
E4,1401	88	WRENDVEL	E4,1707	89	ALPHAM	E5,1400	93	W	E5,1460	99	THETAX	E5,1562	93	YNB1
E4,1402	88	RMAX	E4,1711	89	TAU.	E5,1400	98	AZIMUTH	E5,1460	100	THETAX1	E5,1570	93	EMATRIX
E4,1403	88	VMAX	E4,1713	89	DT/2	E5,1402	98	LATITUDE	E5,1462	98	LOS2	E5,1570	93	ZNB1
E4,1404	88	WORBPOS	E4,1715	90	P21TIME	E5,1404	98	ERVECTOR	E5,1466	99	THETAN	E5,1570	99	WPLATI
E4,1405	88	WORBVEL	E4,1717	90	EGRESS	E5,1412	98	LENGTHOT	E5,1466	100	THETAN1	E5,1576	93	SAVQR52
E4,1406	88	S22WSUBL	E4,1720	90	HPERMIN	E5,1413	98	LOSVEC	E5,1470	98	CALCDIR	E5,1577	99	RESTARPT
E4,1407	88	RPVAR	E4,1720	90	RANGE	E5,1413	98	SXTOPTN	E5,1471	98	CDUFLAG	E5,1600	93	PLANVEC
E4,1411	88	504LM	E4,1720	90	RHOSB	E5,1421	98	NDXCTR	E5,1472	98	GYTOBETQ	E5,1606	93	TSIGHT
E4,1417	88	EMSALT	E4,1720	634	WWPOS	E5,1422	98	PIPINDEX	E5,1472	99	VLAUNS	E5,1610	93	DELTAR
E4,1421	88	ATIGINC	E4,1722	90	GAMMASB	E5,1423	98	POSITON	E5,1473	98	OPTNREG	E5,1610	93	DVLOS
E4,1422	92	ALFDK	E4,1722	90	RPADTEM	E5,1424	98	QPLAC	E5,1474	98	SAVE	E5,1610	93	TINTSOI
E4,1423	88	PTIGINC	E4,1722	90	RRATE	E5,1425	98	QPLACE	E5,1474	99	FILDELV	E5,1610	94	IT
E4,1425	88	RLS	E4,1722	634	WWVEL	E5,1426	98	QPLACES	E5,1474	99	WPLATO	E5,1610	94	STARSAV1
E4,1433	88	TIMEMO	E4,1724	90	RTHETA	E5,1427	98	RUN	E5,1474	100	FILDELV1	E5,1610	101	UP1
E4,1436	88	VECDEM	E4,1724	90	TSTART82	E5,1430	98	STOREPL	E5,1476	99	INTVEC	E5,1612	93	DELTTIME
E4,1532	88	RESO	E4,1724	634	WWOPT	E5,1431	98	SOUTHDR	E5,1476	100	INTVEC1	E5,1614	93	TARGTIME
E4,1540	89	VESO	E4,1726	90	RONE	E5,1431	98	TARG1/2	E5,1477	98	SFCONST1	E5,1616	93	UNRM
E4,1546	89	OMEGAES	E4,1726	90	RPASS36	E5,1432	98	TAZEL1	E5,1500	99	INTY	E5,1616	94	STARSAV2
E4,1550	89	PBODY	E4,1734	90	UNP36	E5,1440	98	TEMPTIME	E5,1500	99	TIMER	E5,1616	94	THETZERO
E4,1551	89	ALPHAV	E4,1734	90	VONE	E5,1442	98	TMARK	E5,1502	99	ANGZ	E5,1616	94	US
E4,1557	89	BETAV	E4,1742	90	BASETIME	E5,1444	93	9X9LOC1	E5,1502	99	DATAPL	E5,1616	101	VPASS2
E4,1565	89	PHIV	E4,1742	90	OPTIONY	E5,1444	98	CDUTIMEI	E5,1504	99	INTZ	E5,1620	94	TFI
E4,1573	89	PSIV	E4,1742	90	V82FLAGS	E5,1444	98	GENPL	E5,1506	99	ANGY	E5,1622	94	DELVEE
E4,1601	89	FV	E4,1742	91	URONE	E5,1444	99	AINLA	E5,1510	99	ANGX	E5,1624	93	ULOS
E4,1607	89	BETAM	E4,1743	90	TFF	E5,1444	99	RDSP	E5,1512	99	DRIFTO	E5,1624	94	HP
E4,1611	89	H	E4,1745	90	-TPER	E5,1444	99	WANGO	E5,1514	99	DRIFTI	E5,1624	101	RPASS2
E4,1613	89	GMODE	E4,1747	90	THETA(1)	E5,1444	101	DELVEET1	E5,1520	99	VLAUN	E5,1626	94	TFO
E4,1614	89	IRETURN	E4,1751	91	HAPOX	E5,1446	98	CDUTIMEF	E5,1522	99	ACCWD	E5,1630	94	HPO
E4,1615	89	NORMGAM	E4,1753	91	HPERX	E5,1446	99	WANGI	E5,1530	99	POSNV	E5,1631	99	GEOSAVED
E4,1616	89	VECTAB	E4,1755	91	AOPTIME	E5,1450	98	IMU/OPT	E5,1532	93	9X9LOC2	E5,1631	100	GEOSAVE1
E4,1624	89	BASEOTP	E4,1755	91	RSP-RREC	E5,1450	98	TEMPADD	E5,1532	99	DPIPAY	E5,1632	93	ACTCENT
E4,1624	89	VACX	E4,1757	91	LANDLONG	E5,1450	99	TORQNDX	E5,1532	101	VACT2	E5,1632	94	DELVEO
E4,1626	89	VACY	E4,1761	91	LANDALT	E5,1450	99	WANGT	E5,1536	99	DPIPAZ	E5,1632	99	PREMTRXC
E4,1630	89	VACZ	E4,1763	91	HAPO	E5,1451	98	CDUREADF	E5,1540	99	ALTIM	E5,1632	100	PREMTRX1
E4,1640	89	BASEOTV	E4,1763	91	KT	E5,1451	98	TEMP	E5,1540	101	RACT1	E5,1632	101	DIFFALT
E4,1640	89	ERADM	E4,1763	91	NOMTPI	E5,1452	98	CDUREADI	E5,1541	99	ALTIMS	E5,1633	99	LAUNCHAZ
E4,1642	89	INCORPEX	E4,1765	91	HPER	E5,1452	98	NOBITS	E5,1542	99	ALDK	E5,1633	100	LUNCHAZ1
E4,1654	89	BASETHP	E4,1765	91	VERBNOUN	E5,1452	99	DRIFTT	E5,1544	99	MASKREG	E5,1634	93	DELVTPI
E4,1662	89	BASETHV	E4,1766	91	QSAVED	E5,1452	101	RACT2	E5,1546	99	CDUNDX	E5,1634	93	TDEC2
E4,1662	89	RPQV	E4,1767	91	RTRN	E5,1453	98	CDULIMIT	E5,1546	101	T1TOT2	E5,1634	94	MAGVTPI
E4,1670	89	KEPRTN	E4,1770	91	RGEXIT	E5,1453	98	CHAN	E5,1547	99	RESULTCT	E5,1634	101	TCDH

ERASABLE & EQUALS CROSS-REFERENCE TABLE SHOWING DEFINITION, PAGE OF DEFINITION, AND SYMBOL

DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL
E5,1634	614	S22RL	E5,1677	95	YSM	E5,1757	95	OGC	E6,1445	103	TEMPDAP	E6,1511	112	COSM
E5,1635	99	NEWAZMTH	E5,1703	96	VTARGTAG	E5,1757	95	SAX	E6,1447	103	CNTR	E6,1512	108	KMPTEMP
E5,1635	100	NEWAZ1	E5,1704	96	VTARGET	E5,1757	96	RDESIRED	E6,1450	103	OGAD	E6,1512	112	SINO
E5,1636	93	DELVTPF	E5,1705	95	ZSM	E5,1761	95	IGC	E6,1451	103	RWORD1	E6,1513	108	WTEMP
E5,1636	94	RELDELV	E5,1706	97	TDPOS	E5,1761	96	DELDEP	E6,1452	103	RWORD2	E6,1513	108	XNDX1
E5,1636	101	TCSI	E5,1712	96	RTNAPSE	E5,1761	96	TERRLAMB	E6,1453	103	PWORD1	E6,1513	112	COSO
E5,1637	99	OLDAZMTH	E5,1712	96	RTNLAMB	E5,1763	95	MGC	E6,1454	103	PWORD2	E6,1514	108	XNDX2
E5,1637	100	OLDAZ1	E5,1712	96	RTNTR	E5,1763	96	DEPREV	E6,1455	103	YWORD1	E6,1514	112	SINOCOSM
E5,1640	93	POSTTPI	E5,1712	96	RTNTT	E5,1763	96	TPREV	E6,1456	103	YWORD2	E6,1515	108	DELTEMPX
E5,1640	94	T3TOT4	E5,1713	95	XDC	E5,1765	95	STAR	E6,1457	103	BLAST	E6,1515	108	EDOT
E5,1640	101	TTPIO	E5,1713	95	XNB	E5,1773	95	SAC	E6,1461	103	BLAST1	E6,1515	108	YNDX
E5,1641	100	TOLDAZMT	E5,1713	96	U2	E5,1775	95	PAC	E6,1463	103	BLAST2	E6,1515	112	COSOCOSM
E5,1641	100	TOLDAZ1	E5,1714	97	TDVEL	E5,1777	95	QMIN	E6,1465	103	T5PHASE	E6,1516	104	VARST5
E5,1642	93	END-W	E5,1721	95	YDC	E5,1777	101	END-E5	E6,1466	103	DAPDATR1	E6,1516	108	ZNDX
E5,1642	96	DELX	E5,1721	95	YNB	E6,1400	102	WMIDPOS	E6,1467	103	DAPDATR2	E6,1517	108	AERR
E5,1642	97	OMEGAM1	E5,1721	96	MAGVEC2	E6,1401	102	WMIDVEL	E6,1470	103	IXX	E6,1517	108	DELTEMPY
E5,1643	100	GEOCOMPS	E5,1721	96	R2	E6,1402	102	RVAR	E6,1471	103	IAVG	E6,1517	108	RINDEX
E5,1643	100	GEOCOMP1	E5,1722	97	Z1	E6,1404	102	RVARMIN	E6,1472	103	IAVG/TLX	E6,1520	108	EDOTVEL
E5,1644	96	DELT	E5,1723	96	UR1	E6,1407	102	LADPAD	E6,1473	103	LEMMASS	E6,1520	108	PINDEX
E5,1644	100	1SECXT	E5,1727	95	ZDC	E6,1410	102	LODPAD	E6,1474	103	CSMMASS	E6,1521	108	DELTEMPZ
E5,1644	100	1SECXT1	E5,1727	95	ZNB	E6,1411	102	ALFAPAD	E6,1475	103	MASS	E6,1521	108	YINDEX
E5,1645	100	GTSWTLST	E5,1731	96	SNTH	E6,1412	102	ETDECAY	E6,1475	103	WEIGHT/G	E6,1522	104	LASTMASP
E5,1645	100	GTSWTLT1	E5,1733	96	CSTH	E6,1413	102	ESTROKER	E6,1476	103	AK	E6,1522	108	AERRVEL
E5,1646	96	URRECT	E5,1735	95	CULTRIX	E6,1414	102	EKPRIME	E6,1476	113	PAXERR	E6,1522	108	NRJETS
E5,1646	100	ERECTIME	E5,1735	95	STARAD	E6,1416	102	EKTLX/I	E6,1477	103	AK1	E6,1523	104	TVCTMP1
E5,1646	100	ERECTIM1	E5,1735	95	VEARTH	E6,1421	102	EREPFRAC	E6,1500	103	AK2	E6,1523	108	ADBVEL
E5,1647	100	ERCOMP	E5,1735	96	1-CSTH	E6,1423	102	PACTOFF	E6,1501	103	RCSFLAGS	E6,1523	108	NPJETS
E5,1647	100	ERCOMP1	E5,1737	96	CSTH-RHO	E6,1424	102	YACTOFF	E6,1502	103	T5TEMP	E6,1524	108	NYJETS
E5,1650	97	OMEGAM2	E5,1741	96	P	E6,1425	102	HBN10	E6,1503	103	EDRIVEX	E6,1525	104	OMEGAC
E5,1654	96	RCNORM	E5,1743	95	VSUN	E6,1426	102	HBN11/2	E6,1503	115	OLDBODY1	E6,1525	104	OMEGAXC
E5,1655	100	GTSOPNDZ	E5,1743	96	R1A	E6,1427	102	HBN12	E6,1504	103	EDRIVEY	E6,1525	104	TVCRCS
E5,1655	100	ZERONDX	E5,1744	97	22SUBSCL	E6,1430	102	HBD11/2	E6,1504	115	OLDBODY2	E6,1525	108	WBODY
E5,1655	100	ZERONDX1	E5,1745	96	VVEC	E6,1431	102	HBD12	E6,1505	104	EDRIVEZ	E6,1525	116	ASPS(TM)
E5,1656	96	RVEC	E5,1745	97	CXOFF	E6,1432	102	HBN20	E6,1505	115	OLDBODY3	E6,1527	104	OMEGAYC
E5,1656	96	R1VEC	E5,1746	97	8KK	E6,1433	102	HBN21/2	E6,1506	104	INTTEMP	E6,1527	108	WBODY1
E5,1656	97	OMEGAM3	E5,1747	97	8NN	E6,1434	102	HBN22	E6,1506	104	PHI333	E6,1531	104	OMEGAZC
E5,1656	100	PEREDLAY	E5,1750	97	S22LOC	E6,1435	102	HBD21/2	E6,1506	108	SPNDX	E6,1531	108	WBODY2
E5,1664	96	R2VEC	E5,1751	95	VMOON	E6,1436	102	HBD22	E6,1506	112	CALFA	E6,1533	104	OMEGAB
E5,1664	97	HOLDW	E5,1751	97	LANDMARK	E6,1437	102	HBN30	E6,1507	104	PSI333	E6,1533	104	OMEGAXB
E5,1671	95	XSM	E5,1752	97	HORIZON	E6,1440	102	HBN31/2	E6,1507	108	DPNDX	E6,1533	107	OGARATE
E5,1672	96	TDESIRED	E5,1753	96	ECC	E6,1441	102	HBN32	E6,1507	112	SALFA	E6,1533	108	ADOT
E5,1673	95	-COSB	E5,1753	97	IDOFLMK	E6,1442	103	HBD31/2	E6,1510	104	TEMP333	E6,1533	116	XPIPBUF
E5,1674	96	GEOMSGN	E5,1754	97	TRUNION	E6,1443	103	HBD32	E6,1510	108	KMPAC	E6,1534	116	YPIPBUF
E5,1675	95	SINB	E5,1755	96	RTNPRM	E6,1444	103	V97VCNTR	E6,1510	112	SINM	E6,1535	104	OMEGAYB
E5,1675	96	UN	E5,1756	96	SGNRDOT	E6,1445	103	MRKRTMP	E6,1511	104	VARST0	E6,1535	108	ADOT1

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DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL
E6,1535	116	ZPIPBUF	E6,1573	113	RAXERR	E6,1624	105	YCMD	E6,1656	110	RMANNDX	E6,1674	114	KV2
E6,1536	116	XOLDBUF	E6,1574	105	STROKER	E6,1624	109	J/M1	E6,1657	106	BUNKER	E6,1675	111	-DELAOG
E6,1537	104	OMEGAZB	E6,1574	109	THETADZ	E6,1624	113	JETEM2	E6,1657	110	PMANNDX	E6,1676	106	CNTRTMP
E6,1537	108	ADOT2	E6,1574	116	Q7	E6,1625	105	T5IVCDT	E6,1660	106	REVS	E6,1676	111	-DELAIG
E6,1537	116	YOLDBUF	E6,1575	105	PERRB	E6,1625	109	J/M2	E6,1660	110	YMANNDX	E6,1677	106	STRKTTMP
E6,1540	116	ZOLDBUF	E6,1575	109	DELCDUX	E6,1626	105	MDT	E6,1661	106	CARD	E6,1677	111	-DELAMG
E6,1541	104	PTMP1	E6,1577	105	YERRB	E6,1626	109	RACFAIL	E6,1661	111	AOG	E6,1700	106	DELBRTMP
E6,1541	108	MERRORX	E6,1577	109	DELCDUY	E6,1627	109	RBDFAIL	E6,1661	114	BCDU	E6,1700	111	CMDAPMOD
E6,1543	104	PTMP2	E6,1601	105	DELPBAR	E6,1630	109	ACORBD	E6,1661	114	POLYNUM	E6,1700	114	SATRLRT
E6,1543	108	MERRORY	E6,1601	109	DELCDUZ	E6,1631	109	XTRANS	E6,1662	106	OGANDW	E6,1701	111	PREL
E6,1545	104	PTMP3	E6,1603	105	DELYBAR	E6,1632	109	CH31TEMP	E6,1662	111	AIG	E6,1702	106	ERRBTMP
E6,1545	108	MERRORZ	E6,1603	109	DCDU	E6,1633	109	CHANTEMP	E6,1663	106	OGAPAST	E6,1702	107	BZERO
E6,1547	104	PTMP4	E6,1603	112	ALFACOM	E6,1634	105	KPRIMEDT	E6,1663	111	AMG	E6,1702	107	CZERO
E6,1547	108	DFT	E6,1604	112	BETACOM	E6,1634	109	T5TIME	E6,1664	106	OGA	E6,1702	111	QREL
E6,1550	108	DFT1	E6,1605	105	PDELOFF	E6,1635	109	RHO	E6,1664	106	OGAERR	E6,1702	114	KV3
E6,1551	104	PTMP5	E6,1605	112	TOFF	E6,1636	105	KTLX/I	E6,1664	111	ROLL/180	E6,1702	114	OGF
E6,1551	108	DFT2	E6,1606	112	TBITS	E6,1636	109	RHO1	E6,1664	114	KSPNDX	E6,1702	115	RPSTART
E6,1552	108	DRHO	E6,1607	105	YDELOFF	E6,1637	105	TENMDOT	E6,1665	106	DELOGART	E6,1703	111	RREL
E6,1553	105	PTMP6	E6,1607	112	TON2	E6,1637	109	RHO2	E6,1665	111	ALFA/180	E6,1703	115	POLYSTOP
E6,1554	108	DRHO1	E6,1610	112	T2BITS	E6,1640	105	1/CONACC	E6,1665	114	KDPNDX	E6,1704	106	CMDTMP
E6,1555	105	YTMP1	E6,1611	105	TTMP1	E6,1640	109	AMGB1	E6,1666	106	SGNRT	E6,1704	107	JZERO
E6,1556	109	DRHO2	E6,1611	107	PHASETMP	E6,1641	105	VARK	E6,1666	111	BETA/180	E6,1704	107	YZERO
E6,1557	105	YTMP2	E6,1611	109	DTHETASM	E6,1641	109	AMGB4	E6,1666	114	KV1	E6,1704	111	BETADOT
E6,1560	109	ATTSEC	E6,1611	112	OUTTAG	E6,1642	105	REPFRAC	E6,1666	114	MFISYM	E6,1704	115	BODY3
E6,1561	105	YTMP3	E6,1612	112	NUJET	E6,1642	110	AMGB5	E6,1666	114	NCDU	E6,1705	111	PHIDOT
E6,1561	109	TAU	E6,1613	105	TTMP2	E6,1643	105	VCNTR	E6,1666	114	P21	E6,1705	115	BODY2
E6,1562	109	TAU1	E6,1613	107	RTRNLOC	E6,1643	110	AMGB7	E6,1666	114	TMFI	E6,1706	106	TMP1
E6,1563	105	YTMP4	E6,1613	112	-VT/180	E6,1644	105	TVCPHASE	E6,1666	114	TMIS	E6,1706	111	OLDELP
E6,1563	109	TAU2	E6,1614	112	LCX/360	E6,1644	110	AMGB8	E6,1667	106	DELOGA	E6,1706	115	BODY1
E6,1564	109	BIAS	E6,1615	105	DAP1	E6,1645	105	PCDUYPST	E6,1667	111	AOG/PIP	E6,1707	111	OLDELQ
E6,1565	105	YTMP5	E6,1615	112	XD/360	E6,1645	110	CAPSI	E6,1670	106	I	E6,1707	115	SPOLYARG
E6,1565	109	BIAS1	E6,1616	112	VSQ/4API	E6,1646	105	PCDUZPST	E6,1670	111	AIG/PIP	E6,1710	106	TMP2
E6,1566	109	BIAS2	E6,1617	105	DAP2	E6,1646	110	CDUXD	E6,1670	114	D21	E6,1710	111	OLDELR
E6,1567	105	YTMP6	E6,1617	109	ATTKALMN	E6,1647	105	MCDUYDOT	E6,1671	106	IOGARATE	E6,1710	113	VECQTEMP
E6,1567	109	ERRORX	E6,1617	112	JNDX	E6,1650	105	MCDUZDOT	E6,1671	111	AMG/PIP	E6,1710	114	BRATE
E6,1567	113	VDT/180	E6,1620	109	KMJ	E6,1650	110	CDUYD	E6,1671	114	NEXTIME	E6,1710	114	COFSKEW
E6,1570	109	ERRORY	E6,1620	112	JNDX1	E6,1651	106	TVCEXPHS	E6,1672	106	PACTTMP	E6,1710	115	VDISP
E6,1570	113	-VT/180E	E6,1621	105	DAP3	E6,1652	106	MASSTMP	E6,1672	111	ROLL/PIP	E6,1711	111	JETAG
E6,1571	105	ROLLFIRE	E6,1621	109	KMJ1	E6,1652	110	CDUZD	E6,1672	114	G21	E6,1712	106	TMP3
E6,1571	109	ERRORZ	E6,1621	113	TON1	E6,1653	106	VCNTRTMP	E6,1672	114	TTEMP	E6,1712	111	TUSED
E6,1572	105	ROLLWORD	E6,1622	109	KMJ2	E6,1654	106	STRKTIME	E6,1673	111	ALFA/PIP	E6,1712	115	HDISP
E6,1572	109	THETADX	E6,1622	113	T1BITS	E6,1654	110	SLOPE	E6,1673	114	POLYLOC	E6,1713	111	PAXERR1
E6,1572	113	QAXERR	E6,1623	105	PCMD	E6,1655	106	CADDY	E6,1674	106	YACTTMP	E6,1714	106	TMP4
E6,1573	105	TEMREG	E6,1623	109	J/M	E6,1655	110	ADB	E6,1674	111	BETA/PIP	E6,1714	111	ROLLTM
E6,1573	109	THETADY	E6,1623	113	CM/SAVE	E6,1656	106	N	E6,1674	114	BIASTEMP	E6,1714	115	HDOTDISP

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DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL
E6,1715	111	ROLLC	E7,1412	117	TIG	E7,1501	117	R53EXIT	E7,1607	118	DIFF	E7,1646	118	TEM1B
E6,1716	106	TMP5	E7,1412	128	SPRTETIG	E7,1501	118	UNI	E7,1611	118	DIFFOLD	E7,1647	127	DT21PR
E6,1716	114	CAM	E7,1414	117	RTARG	E7,1501	121	BVECTOR	E7,1611	122	VIPRIME	E7,1650	118	MM
E6,1716	114	TM	E7,1422	117	DELLT4	E7,1501	121	N49DISP	E7,1611	123	VPPREC	E7,1650	121	USSTAR
E6,1716	115	BOOSTEMP	E7,1424	117	ECSTEER	E7,1501	129	RDOTV	E7,1612	121	UBAR1	E7,1651	118	GRAD
E6,1717	112	ROLLHOLD	E7,1425	117	DVTOTAL	E7,1501	614	S22UMRL	E7,1612	129	P21BASEV	E7,1651	127	MAMAX1
E6,1720	106	TMP6	E7,1425	117	END-DELV	E7,1502	117	MARK2DWN	E7,1613	118	FACTOR	E7,1652	118	FX
E6,1720	112	JETEM	E7,1425	121	DEL	E7,1502	123	INTIME	E7,1615	118	FACT1	E7,1653	118	LEQ
E6,1720	114	MIS	E7,1425	121	MFI	E7,1503	129	VACT1	E7,1617	118	FACT2	E7,1653	123	DELVSAB
E6,1721	115	SATRATE	E7,1425	121	MFS	E7,1504	123	ITCTR	E7,1617	122	VTPRIME	E7,1653	127	MAMAX2
E6,1722	106	COEFFADR	E7,1427	117	TGO	E7,1507	118	UNITV	E7,1617	123	RPPREC	E7,1655	118	DHOOK
E6,1722	112	GAMA	E7,1431	117	DVCNTR	E7,1511	129	VPASS1	E7,1620	121	UBAR2	E7,1655	123	TINT
E6,1723	106	N10	E7,1432	117	DELVREF	E7,1515	118	VFL	E7,1620	129	P21ALT	E7,1655	123	TPASS4
E6,1723	112	GAMDOT	E7,1447	117	NOMTIG	E7,1523	118	TIME/RTO	E7,1621	118	VSQUARE	E7,1655	127	R(T2)/
E6,1724	112	POSEXIT	E7,1447	121	END-KALC	E7,1523	121	DELTAQ	E7,1622	129	P21VFL	E7,1655	129	T2TOT3
E6,1725	112	CM/GYMDT	E7,1447	121	TX789	E7,1525	118	-VREL	E7,1623	118	LAD	E7,1656	121	SRRETURN
E6,1725	115	SATSW	E7,1447	122	DELTEED	E7,1525	121	VARIANCE	E7,1624	129	P21GAM	E7,1657	118	AHOOKDV
E6,1726	112	HEADSUP	E7,1451	117	END-SVCR	E7,1530	121	RCLP	E7,1625	118	LOD	E7,1657	123	QTEMP
E6,1726	115	BIASAK	E7,1451	117	XSCD	E7,1533	118	OLDUYA	E7,1625	122	+MGA	E7,1660	123	TTOGO
E6,1727	112	P63FLAG	E7,1451	118	RTINIT	E7,1536	121	GRP2SVQ	E7,1626	121	RZC	E7,1661	119	DVL
E6,1731	115	SATSCALE	E7,1451	122	DELEL	E7,1537	121	SVMRKDAT	E7,1627	118	L/DCMINR	E7,1662	123	TTPI
E6,1742	107	NBRCYCLS	E7,1453	122	SECMAX	E7,1537	122	DELVOV	E7,1627	122	COZY4	E7,1663	119	A1
E6,1742	114	COF	E7,1455	121	GAMMA	E7,1537	122	RACT3	E7,1631	118	KLAT	E7,1663	127	RD
E6,1743	107	NBRCYCLP	E7,1455	122	XXXALT	E7,1541	118	URH	E7,1631	123	END-IN/M	E7,1664	124	DELVCTL
E6,1744	107	DELVSUM	E7,1457	117	YSCD	E7,1541	118	UXA/2	E7,1631	123	RPASS4	E7,1664	124	END-P30S
E6,1750	114	SCAXIS	E7,1457	118	RTEAST	E7,1545	122	VACT3	E7,1631	123	RTIG	E7,1664	124	VGBODY
E6,1752	107	DELVSUMP	E7,1457	121	OMEGA	E7,1545	129	UNVEC	E7,1631	127	RTEDVD	E7,1664	125	P30/31RT
E6,1756	114	POINTVSM	E7,1457	122	VG	E7,1547	118	UYA/2	E7,1633	118	L/D	E7,1664	125	TITER
E6,1764	114	AM	E7,1457	124	DV47TEMP	E7,1553	122	RPASS3	E7,1633	127	RTEGAM2D	E7,1664	125	TSTRT
E6,1766	114	RAD	E7,1457	129	POSTCSI	E7,1555	118	UZA/2	E7,1634	121	VZC	E7,1664	129	CSIALRM
E6,1770	115	GENRET	E7,1461	129	DELVCSI	E7,1561	122	VPASS3	E7,1635	118	L/D1	E7,1665	119	VBARS
E6,1770	116	TEMPROLL	E7,1463	129	DELDV	E7,1563	118	UBX/2	E7,1635	127	RCON	E7,1665	127	DRCON
E6,1771	115	SAVBNK	E7,1465	117	ZSCD	E7,1567	122	RINIT	E7,1637	118	D	E7,1666	125	S22WUNL
E6,1771	116	TEMPALFA	E7,1465	118	RTNORM	E7,1567	123	VAPREC	E7,1637	123	VPASS4	E7,1666	129	DELVEET2
E6,1772	115	SAVEDCDU	E7,1465	122	VRPREV	E7,1571	118	UBY/2	E7,1637	123	VTIG	E7,1667	119	COSG/2
E6,1772	116	TEMPBETA	E7,1465	129	GAMPREV	E7,1575	122	VINIT	E7,1637	127	R(T1)/	E7,1667	125	S22TOFF
E6,1773	116	60GENRET	E7,1467	129	DVPREV	E7,1575	123	RAPREC	E7,1641	118	DLEWD	E7,1667	127	RPRE,
E6,1774	116	S61DT	E7,1471	129	HAFPAI	E7,1577	118	UBZ/2	E7,1642	121	UCLSTAR	E7,1671	119	VS1
E6,1775	116	R61CNTR	E7,1471	129	POSTCDH	E7,1603	121	DATATEST	E7,1643	118	K2ROLL	E7,1671	125	S22TPRIM
E6,1776	116	P37RANGE	E7,1473	117	VEL/C	E7,1603	121	TRUNX	E7,1645	118	GOTOADDR	E7,1671	127	V(T1)/
E6,1777	116	END-E6	E7,1473	118	RT	E7,1603	122	RTARG1	E7,1645	123	DELVEET3	E7,1672	124	P40TMP
E7,1400	117	LAT(SPL)	E7,1473	122	TNIT	E7,1603	129	P21ORIG	E7,1645	123	DELVSIN	E7,1673	119	V
E7,1402	117	LNG(SPL)	E7,1473	129	VACT4	E7,1604	121	UBAR0	E7,1645	123	E2	E7,1673	125	S22EORM
E7,1404	117	DELVLVC	E7,1475	122	TNITPREV	E7,1604	129	P21BASER	E7,1645	123	VGTEMP	E7,1674	124	DELVIMU
E7,1404	117	DELVSLV	E7,1477	122	AXISCODE	E7,1605	118	DTEAROT	E7,1645	127	R(T1)	E7,1674	125	MARKDOWN

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DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL
E7,1675	119	LATANG	E7,1730	119	ASKEP	E7,1770	120	GAMMAEI	4375	431	DEC17	5003	53	NRMIDBIT
E7,1675	119	XRNGERR	E7,1730	119	ASPS	E7,1771	119	JJ	4375	447	17DECML	5003	55	SLOWBIT
E7,1677	119	RDOT	E7,1730	124	QTEMP1	E7,1772	120	VGDISP	4376	1204	OCT25	5003	57	ENDSPBIT
E7,1677	127	V2(T1)/	E7,1731	119	ASP1	E7,1774	126	COGA	4376	1502	UP21	5003	57	STRULBIT
E7,1701	119	THETAH	E7,1731	124	T-TO-ADD	E7,1774	126	INDEP	4377	689	OCT12	5003	60	IGNFLBIT
E7,1702	124	CSTEER	E7,1731	127	NN2	E7,1776	126	EPSILONL	4377	998	-ROLL1	5003	61	NEWIBIT
E7,1703	119	ALP	E7,1732	119	ASPUP	E7,1777	129	END-E7	4377	1069	CM/SWIC2	5003	63	V82EMBIT
E7,1703	125	RM	E7,1732	119	TTE1	E7,1777	129	WHOCARES	4377	1204	TEN	5003	66	S32BIT3A
E7,1703	125	S22RTNEX	E7,1733	119	ASPDWN	4000	27	FFTAG1	4526	383	ENDPINBF	5003	189	OCT10000
E7,1704	124	BDT	E7,1733	127	RTENCKEX	4000	27	FFTAG10	5000	1200	LIMITS	5003	978	ERRLIM
E7,1704	125	Q611	E7,1734	119	ASP3	4000	27	FFTAG12	5001	46	CPHIBIT	5003	1204	PRIO10
E7,1704	125	STARSAV3	E7,1734	120	ALTI	4000	27	FFTAG2	5001	47	NJETSBIT	5003	1204	QUARTER
E7,1705	119	C/DO	E7,1734	126	MRKBUF2	4000	27	FFTAG3	5001	49	DRFTBIT	5003	1395	SBIT13
E7,1705	125	Q6111	E7,1734	127	CONICX1	4000	27	FFTAG4	5001	53	MRKIDBIT	5004	46	MOONBIT
E7,1705	127	DV	E7,1735	127	T2	4000	27	FFTAG7	5001	55	DSKYBIT	5004	48	NOPO1BIT
E7,1706	125	SAVEPOS	E7,1736	120	HDOT	4000	27	FFTAG8	5001	57	DAP1BIT	5004	50	P21BIT
E7,1707	119	DO	E7,1737	127	UR1/	4000	27	FFTAG9	5001	59	TERMIBIT	5004	52	LUNABIT
E7,1707	127	V(T2)/	E7,1743	126	DELTEE	4000	27	P23S	5001	61	RPQFLBIT	5004	53	PDSPFBIT
E7,1711	119	Q2	E7,1743	126	ELEV	4000	27	P30SUBS	5001	63	SWTOVBIT	5004	55	V59FLBIT
E7,1712	124	UT	E7,1745	126	RTX1	4000	27	STOPRAT	5001	66	S32BIT1	5004	58	CMARMBIT
E7,1713	119	RTGO	E7,1745	126	XRS	4056	132	UPRPTBB	5001	1081	HALFPR	5004	60	ASTNBIT
E7,1713	119	RTGON64	E7,1745	127	UV1/	4105	1204	OCT60000	5001	1204	NEGMAX	5004	61	CMOONBIT
E7,1713	120	RTGON67	E7,1745	128	UH/	4112	165	200MS	5001	1204	VLOADCOD	5004	63	MAXDBBIT
E7,1714	126	SAVEVEL	E7,1746	126	RTX2	4113	436	25DECML	5001	1395	SBIT15	5004	67	S3229T3B
E7,1715	119	DNRNGERR	E7,1747	126	RTMU	4160	1483	VERBMASK	5002	46	JSWCHBIT	5004	1204	PRIO4
E7,1715	127	T1	E7,1747	126	THETL	4215	370	PINSUPBT	5002	48	STIKBIT	5004	1395	SBIT12
E7,1717	119	KAT	E7,1751	126	RTSR1/MU	4270	802	OCT41	5002	50	R21BIT	5005	46	NORFBIT
E7,1717	127	PCDN	E7,1751	126	TF	4317	374	ENDBLFF	5002	51	GLOKFBIT	5005	48	ENG2BIT
E7,1720	124	VGPREV	E7,1753	126	CENTANG	4333	1178	FOURTEEN	5002	53	PRIODBIT	5005	50	STEERBIT
E7,1720	124	VGTIG	E7,1753	126	DELHITE	4333	1178	OCT16	5002	55	RETROBIT	5005	52	P22MKBIT
E7,1721	119	GMAX	E7,1753	127	BETA1	4334	1200	OCT11	5002	57	DAP2BIT	5005	54	MWAITBIT
E7,1721	127	X(T1)	E7,1755	127	P(T1)	4334	1204	NINE	5002	60	ITSWBIT	5005	56	INCORBIT
E7,1722	119	VMAGI	E7,1755	129	RPASS1	4362	233	OCT37	5002	63	V67FLBIT	5005	58	GMDIFBIT
E7,1722	126	PRAXIS	E7,1756	127	CEPA	4364	1115	FBANKMSK	5002	65	INTFLBIT	5005	60	TIMRBIT
E7,1723	127	T12	E7,1760	127	PHI2	4364	1204	BANKMASK	5002	66	S32BIT2	5005	61	LMOONBIT
E7,1723	128	X(T2)PRE	E7,1762	127	SPRTEX	4364	1396	-MAXADRS	5002	844	NTRYPRIO	5005	63	V94FLBIT
E7,1724	118	LEWD	E7,1763	127	VNSTORE	4371	189	OCT30000	5002	1092	KTRCS	5005	1204	EBANK4
E7,1724	119	VIO	E7,1763	129	LOOPCT	4371	1204	BIT13-14	5002	1204	HALF	5005	1204	PRIO2
E7,1725	126	MRKBUF1	E7,1764	127	BETA12	4371	1204	PRIO30	5002	1204	POS1/2	5005	1204	2K
E7,1725	127	DELTAT	E7,1765	127	NN1	4372	379	B12-1	5002	1204	PRIO20	5005	1395	SBIT11
E7,1725	128	X(T2)	E7,1765	129	NN	4373	1396	S8BITS	5002	1395	SBIT14	5006	46	ZMEASBIT
E7,1726	119	L/DCALC	E7,1766	119	VL	4374	431	DEC57	5003	46	MIDFLBIT	5006	48	TARG1BIT
E7,1726	119	TTE	E7,1766	120	VPRED	4374	447	19DECML	5003	48	ERADFBIT	5006	50	SKIPVBIT
E7,1726	124	F	E7,1770	119	GAMMAL	4374	944	NINETEEN	5003	50	22DSPBIT	5006	52	VFLAGBIT
E7,1727	127	NN1A	E7,1770	119	PREDANG	4374	1204	OCT23	5003	52	REFSMBIT	5006	54	NWAITBIT

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DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL
5006	56	PRFTRBIT	5012	47	R53FLBIT	5015	998	1/TMXFIR	5024	165	OCT13	5731	205	NEG7
5006	58	GONEBIT	5012	49	IDLEBIT	5015	1204	FOUR	5024	830	DVTHRUSH	5731	1396	S-7
5006	60	NDRMSBIT	5012	51	FINALBIT	5015	1395	S+4	5024	1204	NOUTCON	5771	159	120MS
5006	62	ADVTKBIT	5012	52	ORBWFBIT	5015	1395	SBIT3	5025	742	ALRM15	5771	1040	TWELVE
5006	64	SAVECBIT	5012	54	PINBRBIT	5016	47	AMOONBIT	5025	769	PRFMSTAQ	5771	1442	BITS3&4
5006	1204	PRIO1	5012	56	3AXISBIT	5016	49	GUESSBIT	5025	1178	THIRTEEN	6000	27	DAPS9
5006	1395	SBIT10	5012	59	HINDBIT	5016	51	CALC2BIT	5026	879	DEC15	6000	27	FFTAG13
5007	46	NEEDLBIT	5012	60	V37FLBIT	5016	53	D60R9BIT	5027	165	OCTHIRTY	6000	27	FFTAG5
5007	48	R23BIT	5012	62	ORDERBIT	5016	57	MGLVFBIT	5027	1442	BITS4-5	6000	27	FFTAG6
5007	48	TARG2BIT	5012	64	N2217BIT	5016	59	CM/DSBIT	5033	270	MIXCON	6043	1419	OCT177
5007	50	IMPULBIT	5012	165	OCT40	5016	61	ATTCHBIT	5033	1092	2T/TCDU	6056	1204	VLOAD*
5007	54	MRKNVBIT	5012	1395	SBIT6	5016	65	MIDAVBIT	5033	1396	CNTRCON	6061	1049	=-4
5007	56	OMFNFBIT	5013	47	F2RTEBIT	5016	982	20MS	5033	1442	BITS4&6	6061	1396	S-4
5007	58	RELVBIT	5013	49	TRACKBIT	5016	1204	TWO	5035	535	BITS5-6	6211	773	SIGHTSIX
5007	60	RVSWBIT	5013	51	AVFLBIT	5016	1395	S+2	5036	447	1/2SECX	6211	1204	SIX
5007	62	P39SWBIT	5013	52	STATEBIT	5016	1395	SBIT2	5036	1446	OCT62	6211	1396	S+6
5007	64	VHFRBIT	5013	54	MRUPTBIT	5016	1500	UP72	5037	998	+ROLL2	6214	35	DELAYNUM
5007	1395	SBIT9	5013	56	GRRBKBIT	5017	47	KBIT	5037	1204	OCT120	6214	540	POWDNCOD
5007	1420	SPSCODE	5013	59	INRLBIT	5017	49	AVEGBIT	5040	1204	OCT140	6214	1204	LOW2
5010	47	IMUSEBIT	5013	62	APSESBIT	5017	51	NODOBIT	5041	431	1SECX	6214	1204	THREE
5010	48	VEHUPBIT	5013	64	QUITBIT	5017	53	DIMOBIT	5045	1092	2JETT	6214	1395	S+3
5010	52	PRECIBIT	5013	1395	SBIT5	5017	55	XDSPBIT	5051	1204	EBANK3	6214	1500	UP73
5010	54	NRMNVBIT	5014	47	TRUNBIT	5017	57	RENDWBIT	5051	1396	ERASCON6	6440	1204	OCT30002
5010	56	COMPTBIT	5014	49	TRM03BIT	5017	59	GYMDIBIT	5054	35	ERASID	6710	1130	Q+2
5010	58	EGFLGBIT	5014	51	PFRATBIT	5017	61	IFFSWBIT	5054	1396	S10BITS	6711	1404	TCQ
5010	58	KNOWNBIT	5014	53	INTYBIT	5017	63	360SWBIT	5057	844	EBAOG	7632	1204	OCT10001
5010	58	R57BIT	5014	55	NRUPTBIT	5017	65	AVEMDBIT	5057	1204	EBANK6	7665	998	T6SCALE
5010	60	GONBYBIT	5014	56	R60FLBIT	5017	1204	ONE	5060	844	EBENTRY	7671	1003	PRIO34A
5010	62	SURFFBIT	5014	59	LATSWBIT	5017	1395	S+1	5062	169	11,12	7671	1204	B12T14
5010	64	SOURCBIT	5014	61	UPLOCBIT	5017	1395	SBIT1	5062	1396	SBNK03	7700	137	20MRUPT
5010	1395	SBIT8	5014	62	COGAFBIT	5017	1500	UP71	5066	1411	OCT14000	7707	564	FIRST3
5010	1442	IMUSEFLG	5014	64	R31FLBIT	5020	1396	S-ZERO	5067	159	OCT15000	7707	597	FURST3
5011	47	RNDVZBIT	5014	202	OCT00010	5021	209	DNLADP00	5070	159	33RDMSK	7707	1483	PINMASK
5011	49	UPDATBIT	5014	1204	EIGHT	5021	769	P51ZERO	5070	193	IM33INIT	7710	1099	MINB12
5011	50	FIRSTBIT	5014	1395	SBIT4	5021	1395	S+ZERO	5074	999	SPCOS1	7711	133	74K
5011	50	XDELVBIT	5015	47	FREEFBIT	5021	1500	UP70	5074	999	SPCOS2	7714	1396	S-3
5011	52	CULTBIT	5015	49	SLOPEBIT	5022	193	NUMGRPS	5075	999	SPSIN1	7715	1049	=-2
5011	54	PRONVBIT	5015	53	VINTFBIT	5022	769	P51FIVE	5075	999	SPSIN2	7715	1396	S-2
5011	56	ENGONBIT	5015	55	MKOVBIT	5022	998	+ROLL1	5217	448	GEOSTRT4	7715	1419	MINUS2
5011	58	NOSWBIT	5015	57	SOLNSBIT	5022	1395	S+5	5217	1496	DOALARM	7716	1204	MINUS1
5011	62	INFINBIT	5015	59	.05GBIT	5022	1502	UPDTPHAS	5333	159	GLOCKOK	7716	1204	NEG1
5011	64	R22CABIT	5015	61	VERIFBIT	5023	362	DSPMSK	5526	1484	LINUS	7716	1396	S-1
5011	66	REINTBIT	5015	63	V96ONBIT	5023	1204	LOW3	5534	238	ENDEXTVB	7755	1496	ABORT
5011	1201	SUPER100	5015	64	MID1FBIT	5023	1396	S+7	5534	238	TERMEXTV	00,2000	27	DLAYJOB
5011	1395	SBIT7	5015	978	1/ERRLIM	5023	1485	OCT7	5534	1483	ENDEXT	01,2000	27	RESTART

ERASABLE & EQUALS CROSS-REFERENCE TABLE SHOWING DEFINITION, PAGE OF DEFINITION, AND SYMBOL

DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL
01,2000	212	PRDTTAB	05,2052	173	CMCSTA02	10,2000	28	OPTDRV	14,3067	766	P53	23,2000	31	P11FOUR
01,2001	212	CADRTAB	05,2052	175	CMRENDO2	10,2000	28	PHASETAB	15,2000	29	ETRYDAP	23,2000	31	P20S2
01,2071	212	1.2SPOT	05,2052	178	CMENTRO2	10,2000	28	P60S4	15,2000	29	P50S	23,2000	31	RENDGUID
01,2071	212	2.2SPOT	05,2052	179	CMPG2202	10,2000	28	SXTMARK1	15,2000	29	S52/3	23,2000	31	R30LOC
01,2071	213	3.2SPOT	05,2057	173	CMCSTA03	10,2555	1483	GOXDSP	15,2000	738	P54	23,2461	811	300KFT
01,2543	1199	SW/	05,2057	175	CMRENDO3	10,2561	1483	GOXDSPF	15,3750	1092	1/16A1	24,2000	31	CSIPROG7
04,2000	27	CONICS1	05,2057	178	CMENTRO3	10,2575	1483	GOXDSPR	15,3753	1092	-VMT/180	24,2000	31	LOADDAP
04,2000	27	CSI/CDH1	05,2057	179	CMPG2203	10,2600	1483	GOXDSPFR	15,3754	1092	BUFLIM	24,2000	31	P40S
04,2000	27	IMUCAL1	05,2061	173	CMCSTA04	10,3272	1483	GOAGIN	16,2000	29	P40S1	25,2000	31	CDHTAG1
04,2000	27	INTPRET2	05,2061	175	CMRENDO4	10,3312	1483	GOPLAY	16,2000	30	DAPROLL	25,2000	31	REENTRY
04,2000	27	PINBALL4	05,2061	178	CMENTRO4	11,2000	28	ORBITAL	16,2000	30	P23S1	26,2000	31	EPHEM
04,2000	27	VERB37	05,2061	180	CMPG2204	11,2000	28	ORBITAL1	16,2000	30	P50S2	26,2000	31	INTPRET1
04,2000	28	E/PROG	05,2063	173	CMCSTA05	11,2000	29	CSIPROG5	16,2000	30	RTE2	26,2000	31	PLANTIN
04,2000	28	MIDDGIM	05,2063	176	CMRENDO5	11,2000	29	INTINIT1	16,3257	960	TVCADDR	26,2000	31	P05P06
04,2000	28	STBLEORB	05,2072	173	CMCSTA06	11,2000	29	INTVEL	17,2000	30	DAPS4	26,2000	31	P60S
04,2011	365	MODROUTB	05,2072	176	CMRENDO6	11,2000	29	S52/2	17,2000	30	DAPS5	26,2000	31	P60S1
04,2416	206	FCADRMM1	05,2072	180	CMPG2206	11,3755	1353	DQUARTER	17,2000	30	DAPS7	26,2000	31	P60S2
04,2457	207	PREMM1	05,2075	173	CMCSTA07	11,3755	1353	POS1/4	17,2000	30	P50S3	26,2000	31	P60S3
04,2520	208	EPREMM1	05,2075	176	CMRENDO7	11,3763	34	3/4LOWDP	17,3737	1062	ENDSLECT	26,2000	31	REENTRY1
04,2521	208	ONLADMM1	05,2075	178	CMENTRO7	11,3773	1353	2/3	20,2000	30	DAPS1	26,2000	31	26P50S
04,3557	34	LOUNITZ	05,2075	180	CMPG2207	12,2000	29	CONICS	20,2000	30	DAPS2	26,2642	802	SERVCAD2
04,3561	34	LOUNITY	05,2107	170	NOMDNLST	12,2000	29	CSI/CDH2	20,2000	30	DAPS6	26,3145	881	LATSLOPE
04,3563	34	LODPHALF	05,2107	173	CMCSTADL	12,2000	29	CSIPROG2	20,2000	30	MANUSTUF	26,3312	881	Q7MIN
04,3563	34	LOUNITX	05,2143	175	CMRENDDL	12,2000	29	MODCHG2	20,2000	30	R36CM	26,3324	34	HIDP1/4
04,3563	1206	HALFDP	05,2207	170	UPDNLIST	13,2000	29	CDHTAGS	20,2000	30	VAC5LOC	26,3324	880	VMIN
04,3563	1239	DP1/2	05,2207	177	CMENTRDL	13,2000	29	E/PROG1	21,2000	30	DAPS3	26,3324	881	FOURTH
04,3563	1251	1B1	05,2266	179	CMPG22DL	13,2000	29	INTINIT	21,2000	30	KALCMON3	26,3324	1388	TFF1/4
04,3565	34	LO6ZEROS	05,2651	189	GOPROG2	13,2000	29	LATLONG	21,2000	30	MYSUBS	26,3326	34	HIUNITZ
04,3565	1206	ZERODP	06,2000	28	CSIPROG	13,2000	29	MODCHG3	22,2000	30	APOPERI	26,3330	34	HIUNITY
04,3565	1240	2DZERO	06,2000	28	IMUCAL2	13,2000	29	ORBITAL2	22,2000	30	CSIPROG3	26,3332	34	HIDPHALF
04,3565	1288	KEPZERO	06,2000	28	IMUCOMP	13,2000	29	P76LOC	22,2000	30	DAPS8	26,3332	34	HIUNITX
04,3565	1353	DPZERO	06,2000	28	T4RUP	13,2000	29	SR52/1	22,2000	30	KALCMON1	26,3332	35	THISAXIS
04,3576	1305	LDPOSMAX	06,2665	158	ICDUFAIL	13,2705	34	ATOPTHIS	22,2000	30	KALCMON2	26,3332	447	GEOCONS5
04,3611	34	LODP1/4	06,2665	158	IMUFAIL	13,2720	35	MOVATHIS	22,2000	30	P40S5	26,3332	880	Q19
04,3614	1288	BEE19	07,2000	28	CSIPROG6	13,2760	34	ATOPOTH	22,2000	30	RTBCODES	26,3332	881	HALVE
04,3620	1288	BEE22	07,2000	28	KEYRUPT	13,3071	35	THISPREC	22,2000	30	RTBCODE1	26,3332	881	1/GMAX
05,2000	28	CDHTAG	07,2000	28	MODESW	13,3105	34	OTHPREC	22,2530	407	ENDDCM	26,3332	1205	DPHALF
05,2000	28	DAPMASS	07,2000	28	R02	13,3732	1354	MUM	22,2737	412	LOCSKIRT	26,3334	34	HI6ZEROS
05,2000	28	DOWNTELM	07,2000	28	SXTMARKE	14,2000	29	CSI/CDH3	22,3151	1388	RPAD1	26,3334	879	3ZEROS
05,2000	28	FRANDRES	07,2000	28	XANG	14,2000	29	MEASINC2	23,2000	31	COMGEOM1	26,3334	1260	ZEROD
05,2001	171	CMPOWEDL	07,3073	1442	IMUFIN20	14,2000	29	P50S1	23,2000	31	CSIPROG4	26,3334	1388	TFFZEROS
05,2043	173	CMCSTA01	07,3573	1441	OPTSTALL	14,2000	29	RT53	23,2000	31	INFLIGHT	27,2000	31	MANUVER
05,2043	175	CMRENDO1	10,2000	28	COMGEOM2	14,2000	29	STARTAB	23,2000	31	POWFLITE	27,2000	31	MANUVER1
05,2043	177	CMENTRO1	10,2000	28	CSIPROG8	14,2225	749	LOCSAM	23,2000	31	POWFLIT1	27,2000	31	TOF-FF
05,2043	179	CMPG2201	10,2000	28	DISPLAYS	14,2714	759	R54	23,2000	31	POWFLIT2	27,2000	31	TOF-FF1

ERASABLE & EQUALS CROSS-REFERENCE TABLE SHOWING DEFINITION, PAGE OF DEFINITION, AND SYMBOL

DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL	DEF	PAGE	SYMBOL
27,2000	32	P40S2	30,2000	32	LOWSUPER	32,2000	32	RTE	36,2000	33	P17S	40,3600	389	ENDPINS1
27,2000	32	P60S5	30,2000	32	P20S1	33,2000	32	TESTLEAD	36,2000	33	RTE1	41,2000	34	PINBALL2
27,2000	32	R22S1	30,2000	32	P20S6	33,2000	33	IMUCAL	36,2000	33	S3435LOC	41,2000	34	R36LM
27,2000	32	UPDATE1	30,2000	32	P40S3	33,2447	431	3990DEC	37,2000	33	BODYATT	41,2616	334	ENDRTOUT
27,2000	32	UPDATE2	30,2000	32	R35A	34,2000	33	P11ONE	37,2000	33	CDHTAG3	41,3230	349	ENDRUTIN
27,2000	32	VECPT	31,2000	32	CDHTAG2	34,2000	33	P20S3	37,2000	33	P11TWO	41,3727	387	ENDPINS2
27,3352	1387	TCDANZIG	31,2000	32	CSIPROG9	34,2000	33	P20S4	37,2000	33	P20S	42,2000	34	EXTVBS
27,3365	879	C1/16	31,2000	32	P22S	34,2000	33	RTECON	37,2000	33	RENDEZ	42,2000	34	PINBALL3
27,3365	879	1/16TH	31,2000	32	P30S1A	34,3572	618	R63COMP	37,2000	33	SERVICES	42,2000	34	R36LM1
27,3371	879	BARELY1	31,2000	32	RTE3	35,2000	33	CSI/CDH	40,2000	33	PINSUPER	42,2000	34	SBAND
27,3373	1500	UPPART2	31,2000	32	RT23	35,2000	33	INTINIT2	40,2000	34	PINBALL1	42,3521	354	ENDHMSS
27,3512	1502	UPSTORE	31,2000	32	R31	35,2000	33	MEASINC3	40,2000	34	R36CM1	43,2000	34	EXTVERBS
27,3554	1503	UPPART3	31,2000	32	R34	35,2000	33	P17S1	40,2000	34	SELFSUPR	43,2000	34	SELFCHEC
27,3703	1506	UPOUT	31,2000	32	R35	35,2000	33	P30S	40,3227	361	ENDECVN	43,2002	384	PINTEST
27,3704	1502	UPOUT4	31,2032	35	STATEST	35,2000	33	P30S1	40,3412	368	ENDRELDS	43,2174	242	OPTCOARV
30,2000	32	FCSTART	32,2000	32	DELRSPL1	35,2000	33	RTECON1	40,3441	375	ENDBSUB1	43,2721	260	V74
30,2000	32	IMUSUPER	32,2000	32	IMUCAL3	36,2000	33	MEASINC	40,3441	1404	DSPMMJOB	43,2762	263	GOSHOSUM
30,2000	32	LOPC	32,2000	32	MSGSCAN1	36,2000	33	MEASINC1						

SUMMARY OF SYMBOL TABLE LISTINGS

5014 DEFINED NORMALLY

2203 DEFINED BY EQUALS

TOTAL: 7217

MEMORY TYPE & AVAILABILITY DISPLAY

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    0000 TO    0057  SPECIAL OR NONEXISTENT MEMORY
                0060  AVAILABLE ERASABLE MEMORY
    0061 TO    1377  RESERVED ERASABLE MEMORY

E3,1400 TO E3,1774  RESERVED SWITCHABLE ERASABLE MEMORY
E3,1775 TO E3,1777  AVAILABLE SWITCHABLE ERASABLE MEMORY
E4,1400 TO E4,1550  RESERVED SWITCHABLE ERASABLE MEMORY
E4,1551 TO E4,1777  AVAILABLE SWITCHABLE ERASABLE MEMORY
E5,1400 TO E5,1652  RESERVED SWITCHABLE ERASABLE MEMORY
E5,1653 TO E5,1777  AVAILABLE SWITCHABLE ERASABLE MEMORY
E6,1400 TO E6,1540  RESERVED SWITCHABLE ERASABLE MEMORY
E6,1541 TO E6,1777  AVAILABLE SWITCHABLE ERASABLE MEMORY
E7,1400 TO E7,1425  RESERVED SWITCHABLE ERASABLE MEMORY
E7,1426 TO E7,1777  AVAILABLE SWITCHABLE ERASABLE MEMORY

    4000 TO    5775  RESERVED FIXED MEMORY
    5776 TO    5777  AVAILABLE FIXED MEMORY
    6000 TO    7777  RESERVED FIXED MEMORY

00,2000 TO 00,3772  RESERVED SWITCHABLE FIXED MEMORY
00,3773 TO 00,3777  AVAILABLE SWITCHABLE FIXED MEMORY
01,2000 TO 01,3772  RESERVED SWITCHABLE FIXED MEMORY
01,3773 TO 01,3777  AVAILABLE SWITCHABLE FIXED MEMORY
02,2000 TO 03,3777  SPECIAL OR NONEXISTENT MEMORY

04,2000 TO 04,3761  RESERVED SWITCHABLE FIXED MEMORY
04,3762 TO 04,3777  AVAILABLE SWITCHABLE FIXED MEMORY
05,2000 TO 06,3772  RESERVED SWITCHABLE FIXED MEMORY
06,3773 TO 06,3777  AVAILABLE SWITCHABLE FIXED MEMORY
07,2000 TO 14,3763  RESERVED SWITCHABLE FIXED MEMORY
14,3764 TO 14,3777  AVAILABLE SWITCHABLE FIXED MEMORY
15,2000 TO 15,3757  RESERVED SWITCHABLE FIXED MEMORY
15,3760 TO 15,3777  AVAILABLE SWITCHABLE FIXED MEMORY
16,2000 TO 16,3722  RESERVED SWITCHABLE FIXED MEMORY
16,3723 TO 16,3777  AVAILABLE SWITCHABLE FIXED MEMORY
17,2000 TO 17,3741  RESERVED SWITCHABLE FIXED MEMORY
17,3742 TO 17,3777  AVAILABLE SWITCHABLE FIXED MEMORY
20,2000 TO 20,3742  RESERVED SWITCHABLE FIXED MEMORY
20,3743 TO 20,3777  AVAILABLE SWITCHABLE FIXED MEMORY
21,2000 TO 21,3767  RESERVED SWITCHABLE FIXED MEMORY
21,3770 TO 21,3777  AVAILABLE SWITCHABLE FIXED MEMORY
22,2000 TO 23,3774  RESERVED SWITCHABLE FIXED MEMORY
23,3775 TO 23,3777  AVAILABLE SWITCHABLE FIXED MEMORY
24,2000 TO 24,3767  RESERVED SWITCHABLE FIXED MEMORY
24,3770 TO 24,3777  AVAILABLE SWITCHABLE FIXED MEMORY
25,2000 TO 25,3776  RESERVED SWITCHABLE FIXED MEMORY
        25,3777     AVAILABLE SWITCHABLE FIXED MEMORY
26,2000 TO 27,3765  RESERVED SWITCHABLE FIXED MEMORY
27,3766 TO 27,3777  AVAILABLE SWITCHABLE FIXED MEMORY
30,2000 TO 30,3752  RESERVED SWITCHABLE FIXED MEMORY
30,3753 TO 30,3777  AVAILABLE SWITCHABLE FIXED MEMORY
31,2000 TO 31,3763  RESERVED SWITCHABLE FIXED MEMORY
31,3764 TO 31,3777  AVAILABLE SWITCHABLE FIXED MEMORY
32,2000 TO 32,3772  RESERVED SWITCHABLE FIXED MEMORY
32,3773 TO 32,3777  AVAILABLE SWITCHABLE FIXED MEMORY
33,2000 TO 34,3765  RESERVED SWITCHABLE FIXED MEMORY
34,3766 TO 34,3777  AVAILABLE SWITCHABLE FIXED MEMORY
35,2000 TO 35,3772  RESERVED SWITCHABLE FIXED MEMORY
35,3773 TO 35,3777  AVAILABLE SWITCHABLE FIXED MEMORY
36,2000 TO 36,3774  RESERVED SWITCHABLE FIXED MEMORY
36,3775 TO 36,3777  AVAILABLE SWITCHABLE FIXED MEMORY
37,2000 TO 37,3775  RESERVED SWITCHABLE FIXED MEMORY
37,3776 TO 37,3777  AVAILABLE SWITCHABLE FIXED MEMORY
40,2000 TO 40,3772  RESERVED SWITCHABLE FIXED MEMORY
40,3773 TO 40,3777  AVAILABLE SWITCHABLE FIXED MEMORY
41,2000 TO 42,3774  RESERVED SWITCHABLE FIXED MEMORY
42,3775 TO 42,3777  AVAILABLE SWITCHABLE FIXED MEMORY
43,2000 TO 43,3770  RESERVED SWITCHABLE FIXED MEMORY
43,3771 TO 43,3777  AVAILABLE SWITCHABLE FIXED MEMORY

44,2000 TO 57,3777  SPECIAL OR NONEXISTENT MEMORY

60,2000 TO 67,3777  AVAILABLE SWITCHABLE FIXED MEMORY

70,2000 TO 73,3777  SPECIAL OR NONEXISTENT MEMORY
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ROUTINE:	COUNT	DATA FOR ROUTINE'S LAST REACH:			TOTAL:	CUMUL	
	REF	0 LAST TO 27:			0	0	0
BANKSUM	REF	1 LAST 27 TO 131:			65	65	65
00/DELAY	REF	1 LAST 1488 TO 1490:			30	30	95
00/INTER	REF	2 LAST 1152 TO 1192:			971	986	1081
01/EXEC	REF	1 LAST 1211 TO 1220:			272	272	1353
01/INTER	REF	1 LAST 1192 TO 1200:			157	157	1510
01/RSROU	REF	3 LAST 1418 TO 1420:			55	168	1678
01/RSTAB	REF	1 LAST 212 TO 221:			249	249	1927
01/WAIT	REF	2 LAST 1234 TO 1236:			31	170	2097
02/ALARM	REF	2 LAST 1495 TO 1499:			58	99	2196
02/BANK	REF	1 LAST 1103 TO 1107:			76	76	2272
02/COMST	REF	1 LAST 431 TO 434:			18	18	2290
02/DSPLA	REF	1 LAST 1465 TO 1465:			16	16	2306
02/EXEC	REF	2 LAST 1220 TO 1223:			6	65	2371
02/EXTVB	REF	1 LAST 1491 TO 1493:			19	19	2390
02/FCONS	REF	1 LAST 1200 TO 1202:			62	62	2452
02/FLAG	REF	1 LAST 1486 TO 1488:			32	32	2484
02/IMODE	REF	1 LAST 1420 TO 1421:			5	5	2489
02/INTER	REF	1 LAST 1207 TO 1208:			32	32	2521
02/PHASE	REF	4 LAST 1413 TO 1414:			4	104	2625
02/PIN	REF	6 LAST 382 TO 385:			37	246	2871
02/P00	REF	1 LAST 194 TO 194:			4	4	2875
02/P20	REF	1 LAST 632 TO 632:			0	0	2875
02/RSROU	REF	2 LAST 1417 TO 1418:			10	17	2892
02/RUPTS	REF	1 LAST 131 TO 133:			58	58	2950
02/TRAN	REF	1 LAST 1490 TO 1491:			15	15	2965
02/T4RPT	REF	1 LAST 133 TO 134:			12	12	2977
02/V37	REF	1 LAST 197 TO 197:			2	2	2979
02/WAIT	REF	2 LAST 1232 TO 1234:			24	82	3061
03/DAPEN	REF	1 LAST 1065 TO 1065:			6	6	3067
03/FCONS	REF	1 LAST 1202 TO 1205:			32	32	3099
03/FLAG	REF	1 LAST 1485 TO 1486:			27	27	3126
03/INTER	REF	2 LAST 1119 TO 1152:			732	937	4063
04/CONIC	REF	3 LAST 1305 TO 1313:			16	109	4172
04/EXTVB	REF	1 LAST 247 TO 247:			13	13	4185
04/MIDG	REF	1 LAST 493 TO 496:			61	61	4246
04/P00	REF	2 LAST 200 TO 200:			15	24	4270
04/P07	REF	1 LAST 422 TO 422:			5	5	4275
04/P3879	REF	1 LAST 526 TO 535:			225	225	4500
04/R02	REF	1 LAST 1443 TO 1446:			17	17	4517
04/R33	REF	1 LAST 246 TO 247:			26	26	4543
04/V37	REF	2 LAST 200 TO 209:			299	403	4946
05/DLIST	REF	1 LAST 170 TO 183:			226	226	5172
05/DPROG	REF	1 LAST 1096 TO 1103:			173	173	5345
05/MASP	REF	1 LAST 953 TO 958:			91	91	5436
05/START	REF	1 LAST 183 TO 194:			430	430	5866
06/ICOMP	REF	1 LAST 297 TO 315:			247	247	6113
06/T4RPT	REF	2 LAST 134 TO 166:			680	690	6803
07/IMODE	REF	1 LAST 1421 TO 1443:			555	555	7358
07/KEYUP	REF	1 LAST 1449 TO 1465:			68	68	7426
07/PIN	REF	2 LAST 382 TO 382:			7	16	7442
07/SXTMK	REF	1 LAST 222 TO 234:			287	287	7729
07/XANG	REF	1 LAST 558 TO 559:			46	46	7775
10/DSPLA	REF	2 LAST 1494 TO 1495:			9	660	8435
10/GEOM	REF	1 LAST 289 TO 291:			35	35	8470
10/PHASE	REF	2 LAST 1411 TO 1413:			66	75	8545
10/SXT	REF	2 LAST 167 TO 168:			26	42	8587
10/SXTMK	REF	1 LAST 234 TO 236:			28	28	8615
10/S62.3	REF	1 LAST 818 TO 822:			34	34	8649
10/T4RPT	REF	2 LAST 168 TO 170:			49	89	8738
11/INITV	REF	1 LAST 487 TO 493:			174	174	8912
11/ORBIT	REF	1 LAST 1334 TO 1355:			816	816	9728
11/SR521	REF	1 LAST 775 TO 780:			156	156	9884
12/CONIC	REF	3 LAST 1292 TO 1305:			491	970	10854
13/INTIN	REF	2 LAST 1313 TO 1327:			467	497	11351
13/LT-LG	REF	1 LAST 1236 TO 1243:			159	159	11510
13/P07	REF	1 LAST 420 TO 422:			27	27	11537
13/P76	REF	1 LAST 511 TO 515:			96	96	11633
13/S52.2	REF	1 LAST 774 TO 775:			26	26	11659
14/ICONS	REF	1 LAST 1206 TO 1207:			19	19	11678
14/INCOR	REF	1 LAST 1260 TO 1277:			51	51	11729
14/INFLT	REF	1 LAST 763 TO 766:			39	39	11768
14/PICAP	REF	1 LAST 752 TO 756:			127	127	11895
14/P5153	REF	1 LAST 766 TO 772:			165	165	12060
14/R50	REF	2 LAST 761 TO 763:			75	119	12179
14/R51	REF	1 LAST 756 TO 759:			114	114	12293
14/R53	REF	1 LAST 772 TO 774:			63	63	12356
14/STARS	REF	1 LAST 1389 TO 1395:			223	223	12579
14/S50	REF	1 LAST 749 TO 752:			90	90	12669
15/DAPEN	REF	3 LAST 1070 TO 1096:			655	721	13390

ROUTINE:	COUNT	DATA FOR ROUTINE'S LAST REACH:		TOTAL:	CUMUL
15/P52	REF	1 LAST	738 TO 744:	215	215 13605
15/R52	REF	1 LAST	744 TO 749:	140	140 13745
15/R55	REF	1 LAST	759 TO 760:	27	27 13772
15/S52.3	REF	1 LAST	780 TO 781:	18	18 13790
16/ROLL	REF	1 LAST	989 TO 999:	278	278 14068
16/RSRT	REF	1 LAST	958 TO 962:	90	90 14158
16/R56	REF	1 LAST	781 TO 786:	117	117 14275
16/S40.1	REF	1 LAST	710 TO 712:	91	91 14366
16/S40.8	REF	1 LAST	719 TO 721:	87	87 14453
16/S40.9	REF	1 LAST	723 TO 726:	85	85 14538
16/TVCX	REF	1 LAST	946 TO 953:	144	144 14682
16/40.13	REF	1 LAST	726 TO 727:	65	65 14747
17/DAPJS	REF	1 LAST	1039 TO 1063:	629	629 15376
17/S40.8	REF	1 LAST	721 TO 721:	10	10 15386
17/40.13	REF	1 LAST	727 TO 729:	8	8 15394
20/DAPEN	REF	1 LAST	1066 TO 1070:	86	86 15480
20/DAPS	REF	1 LAST	962 TO 981:	489	489 15969
20/R36	REF	1 LAST	502 TO 505:	126	126 16095
20/STRK	REF	1 LAST	981 TO 989:	73	73 16168
20/S40.6	REF	1 LAST	729 TO 731:	70	70 16238
20/S40.8	REF	1 LAST	721 TO 723:	32	32 16270
20/S41.2	REF	1 LAST	731 TO 735:	149	149 16419
21/DAPAM	REF	1 LAST	1025 TO 1037:	333	333 16752
21/DAPMS	REF	1 LAST	999 TO 1002:	35	35 16787
21/DAPRC	REF	1 LAST	1002 TO 1025:	611	611 17398
21/RCSUP	REF	1 LAST	735 TO 738:	22	22 17420
22/DAPEX	REF	1 LAST	1037 TO 1039:	33	33 17453
22/KALC	REF	4 LAST	414 TO 420:	179	713 18166
22/PERAP	REF	1 LAST	496 TO 502:	78	78 18244
22/RTB	REF	1 LAST	1508 TO 1508:	206	206 18450
22/S41.1	REF	1 LAST	717 TO 719:	14	14 18464
23/GEOM	REF	2 LAST	291 TO 297:	109	218 18682
23/ICONS	REF	1 LAST	1205 TO 1206:	16	16 18698
23/INFLT	REF	1 LAST	1355 TO 1365:	186	186 18884
23/POWFL	REF	1 LAST	1365 TO 1376:	187	187 19071
23/R30	REF	1 LAST	515 TO 522:	221	221 19292
23/SR30S	REF	1 LAST	522 TO 526:	62	62 19354
23/STTKE	REF	1 LAST	549 TO 551:	61	61 19415
23/ZOSUB	REF	1 LAST	576 TO 579:	55	55 19470
24/P21	REF	1 LAST	457 TO 463:	108	108 19578
24/P40	REF	2 LAST	693 TO 710:	527	682 20260
24/P41	REF	1 LAST	688 TO 691:	106	106 20366
24/P47	REF	1 LAST	691 TO 693:	58	58 20424
24/R03	REF	1 LAST	253 TO 254:	50	50 20474
24/S40.1	REF	1 LAST	712 TO 714:	67	67 20541
24/S40.2	REF	1 LAST	714 TO 717:	117	117 20658
24/TVNG	REF	1 LAST	735 TO 735:	4	4 20662
25/ENTRY	REF	2 LAST	853 TO 879:	844	1020 21682
26/ENTRY	REF	2 LAST	879 TO 883:	111	152 21834
26/EPHEM	REF	1 LAST	786 TO 789:	71	71 21905
26/LUROT	REF	1 LAST	1243 TO 1252:	204	204 22109
26/P05	REF	1 LAST	1447 TO 1449:	32	32 22141
26/P06	REF	1 LAST	1446 TO 1447:	47	47 22188
26/P61	REF	1 LAST	789 TO 792:	61	61 22249
26/P62	REF	1 LAST	792 TO 795:	57	57 22306
26/P63	REF	1 LAST	795 TO 797:	22	22 22328
26/P64	REF	1 LAST	797 TO 798:	6	6 22334
26/P65	REF	1 LAST	798 TO 799:	27	27 22361
26/P66	REF	1 LAST	799 TO 800:	4	4 22365
26/P67	REF	1 LAST	800 TO 803:	36	36 22401
26/S61.1	REF	1 LAST	803 TO 808:	69	69 22470
26/S61.2	REF	1 LAST	808 TO 818:	179	179 22649
27/INTIN	REF	1 LAST	1332 TO 1334:	54	54 22703
27/P27	REF	1 LAST	1500 TO 1508:	248	248 22951
27/R60	REF	1 LAST	390 TO 394:	86	86 23037
27/R62	REF	1 LAST	398 TO 399:	11	11 23048
27/TFF	REF	1 LAST	1376 TO 1389:	268	268 23316
27/VECPT	REF	1 LAST	394 TO 398:	130	130 23446
30/P22	REF	1 LAST	565 TO 570:	202	202 23648
31/P37	REF	1 LAST	890 TO 899:	374	374 24022
31/R31	REF	1 LAST	505 TO 511:	218	218 24240
31/S23	REF	1 LAST	619 TO 632:	593	593 24833
32/P30	REF	2 LAST	646 TO 652:	72	186 25019
32/RTE	REF	2 LAST	904 TO 934:	876	994 26013
33/COMST	REF	2 LAST	439 TO 442:	161	475 26488
33/P03	REF	1 LAST	450 TO 452:	60	60 26548
33/P01	REF	1 LAST	442 TO 444:	47	47 26595
33/P02	REF	3 LAST	454 TO 457:	40	331 26926
33/P03	REF	3 LAST	453 TO 454:	18	124 27050
34/COMST	REF	1 LAST	452 TO 452:	26	26 27076

ROUTINE:	COUNT	DATA FOR ROUTINE'S LAST REACH:	TOTAL:	CUMUL
34/CRS61	REF	1 LAST 592 TO 598:	231	231 27307
34/CSI	REF	1 LAST 663 TO 683:	672	672 27979
34/P11	REF	2 LAST 544 TO 549:	138	406 28385
34/R22	REF	1 LAST 579 TO 592:	500	500 28885
34/R63	REF	1 LAST 617 TO 619:	41	41 28926
35/INTIN	REF	1 LAST 1327 TO 1332:	164	164 29090
35/LUORB	REF	1 LAST 598 TO 617:	774	774 29864
35/P17	REF	1 LAST 559 TO 562:	75	75 29939
35/P30	REF	1 LAST 636 TO 639:	82	82 30021
35/P3272	REF	1 LAST 652 TO 658:	99	99 30120
35/P3373	REF	1 LAST 658 TO 663:	111	111 30231
35/P34	REF	1 LAST 635 TO 636:	31	31 30262
35/P3474	REF	1 LAST 463 TO 468:	111	111 30373
35/P3575	REF	2 LAST 683 TO 684:	0	515 30888
35/S30S	REF	1 LAST 639 TO 643:	75	75 30963
36/INCOR	REF	2 LAST 1256 TO 1260:	196	334 31297
36/P11	REF	1 LAST 543 TO 544:	68	68 31365
36/TPI	REF	1 LAST 551 TO 558:	322	322 31687
37/CMBAT	REF	1 LAST 883 TO 890:	195	195 31882
37/P20	REF	1 LAST 562 TO 565:	80	80 31962
37/R21	REF	1 LAST 572 TO 574:	57	57 32019
37/R57	REF	1 LAST 570 TO 572:	53	53 32072
37/R61	REF	1 LAST 574 TO 576:	38	38 32110
37/SERV	REF	1 LAST 822 TO 844:	375	375 32485
40/EXTVB	REF	1 LAST 632 TO 635:	100	100 32585
40/PIN	REF	10 LAST 388 TO 390:	56	896 33481
41/PIN	REF	8 LAST 385 TO 388:	76	983 34464
42/INIT	REF	1 LAST 937 TO 946:	259	259 34723
42/NOUNS	REF	1 LAST 270 TO 285:	561	561 35284
42/PIN	REF	2 LAST 352 TO 355:	92	238 35522
42/ROS	REF	1 LAST 934 TO 937:	80	80 35602
43/EXTVB	REF	4 LAST 254 TO 270:	283	614 36216
43/P27	REF	1 LAST 1499 TO 1500:	32	32 36248
43/SELF	REF	1 LAST 1395 TO 1404:	314	314 36562

PARAGRAPHS GENERATED FOR THIS ASSEMBLY; ADDRESS LIMITS AND THE MANUFACTURING LOCATION CODE ARE SHOWN FOR EACH

4000	TO 4377	PARAGRAPH # 010	ROPE MODULE 1, SIDE A, SENSE LINE SET 5 (WIRES 65- 80)
4400	TO 4777	PARAGRAPH # 011	ROPE MODULE 1, SIDE B, SENSE LINE SET 5 (WIRES 65- 80)
5000	TO 5377	PARAGRAPH # 012	ROPE MODULE 1, SIDE A, SENSE LINE SET 6 (WIRES 81- 96)
5400	TO 5777	PARAGRAPH # 013	ROPE MODULE 1, SIDE B, SENSE LINE SET 6 (WIRES 81- 96)
6000	TO 6377	PARAGRAPH # 014	ROPE MODULE 1, SIDE A, SENSE LINE SET 7 (WIRES 97-112)
6400	TO 6777	PARAGRAPH # 015	ROPE MODULE 1, SIDE B, SENSE LINE SET 7 (WIRES 97-112)
7000	TO 7377	PARAGRAPH # 016	ROPE MODULE 1, SIDE A, SENSE LINE SET 8 (WIRES 113-128)
7400	TO 7777	PARAGRAPH # 017	ROPE MODULE 1, SIDE B, SENSE LINE SET 8 (WIRES 113-128)
00,2000	TO 00,2377	PARAGRAPH # 020	ROPE MODULE 1, SIDE A, SENSE LINE SET 1 (WIRES 1- 16)
00,2400	TO 00,2777	PARAGRAPH # 021	ROPE MODULE 1, SIDE B, SENSE LINE SET 1 (WIRES 1- 16)
00,3000	TO 00,3377	PARAGRAPH # 022	ROPE MODULE 1, SIDE A, SENSE LINE SET 2 (WIRES 17- 32)
00,3400	TO 00,3777	PARAGRAPH # 023	ROPE MODULE 1, SIDE B, SENSE LINE SET 2 (WIRES 17- 32)
01,2000	TO 01,2377	PARAGRAPH # 024	ROPE MODULE 1, SIDE A, SENSE LINE SET 3 (WIRES 33- 48)
01,2400	TO 01,2777	PARAGRAPH # 025	ROPE MODULE 1, SIDE B, SENSE LINE SET 3 (WIRES 33- 48)
01,3000	TO 01,3377	PARAGRAPH # 026	ROPE MODULE 1, SIDE A, SENSE LINE SET 4 (WIRES 49- 64)
01,3400	TO 01,3777	PARAGRAPH # 027	ROPE MODULE 1, SIDE B, SENSE LINE SET 4 (WIRES 49- 64)
04,2000	TO 04,2377	PARAGRAPH # 040	ROPE MODULE 1, SIDE A, SENSE LINE SET 9 (WIRES 129-144)
04,2400	TO 04,2777	PARAGRAPH # 041	ROPE MODULE 1, SIDE B, SENSE LINE SET 9 (WIRES 129-144)
04,3000	TO 04,3377	PARAGRAPH # 042	ROPE MODULE 1, SIDE A, SENSE LINE SET 10 (WIRES 145-160)
04,3400	TO 04,3777	PARAGRAPH # 043	ROPE MODULE 1, SIDE B, SENSE LINE SET 10 (WIRES 145-160)
05,2000	TO 05,2377	PARAGRAPH # 044	ROPE MODULE 1, SIDE A, SENSE LINE SET 11 (WIRES 161-176)
05,2400	TO 05,2777	PARAGRAPH # 045	ROPE MODULE 1, SIDE B, SENSE LINE SET 11 (WIRES 161-176)
05,3000	TO 05,3377	PARAGRAPH # 046	ROPE MODULE 1, SIDE A, SENSE LINE SET 12 (WIRES 177-192)
05,3400	TO 05,3777	PARAGRAPH # 047	ROPE MODULE 1, SIDE B, SENSE LINE SET 12 (WIRES 177-192)
06,2000	TO 06,2377	PARAGRAPH # 050	ROPE MODULE 2, SIDE A, SENSE LINE SET 1 (WIRES 1- 16)
06,2400	TO 06,2777	PARAGRAPH # 051	ROPE MODULE 2, SIDE B, SENSE LINE SET 1 (WIRES 1- 16)
06,3000	TO 06,3377	PARAGRAPH # 052	ROPE MODULE 2, SIDE A, SENSE LINE SET 2 (WIRES 17- 32)
06,3400	TO 06,3777	PARAGRAPH # 053	ROPE MODULE 2, SIDE B, SENSE LINE SET 2 (WIRES 17- 32)
07,2000	TO 07,2377	PARAGRAPH # 054	ROPE MODULE 2, SIDE A, SENSE LINE SET 3 (WIRES 33- 48)
07,2400	TO 07,2777	PARAGRAPH # 055	ROPE MODULE 2, SIDE B, SENSE LINE SET 3 (WIRES 33- 48)
07,3000	TO 07,3377	PARAGRAPH # 056	ROPE MODULE 2, SIDE A, SENSE LINE SET 4 (WIRES 49- 64)
07,3400	TO 07,3777	PARAGRAPH # 057	ROPE MODULE 2, SIDE B, SENSE LINE SET 4 (WIRES 49- 64)
10,2000	TO 10,2377	PARAGRAPH # 060	ROPE MODULE 2, SIDE A, SENSE LINE SET 5 (WIRES 65- 80)
10,2400	TO 10,2777	PARAGRAPH # 061	ROPE MODULE 2, SIDE B, SENSE LINE SET 5 (WIRES 65- 80)
10,3000	TO 10,3377	PARAGRAPH # 062	ROPE MODULE 2, SIDE A, SENSE LINE SET 6 (WIRES 81- 96)
10,3400	TO 10,3777	PARAGRAPH # 063	ROPE MODULE 2, SIDE B, SENSE LINE SET 6 (WIRES 81- 96)
11,2000	TO 11,2377	PARAGRAPH # 064	ROPE MODULE 2, SIDE A, SENSE LINE SET 7 (WIRES 97-112)
11,2400	TO 11,2777	PARAGRAPH # 065	ROPE MODULE 2, SIDE B, SENSE LINE SET 7 (WIRES 97-112)
11,3000	TO 11,3377	PARAGRAPH # 066	ROPE MODULE 2, SIDE A, SENSE LINE SET 8 (WIRES 113-128)
11,3400	TO 11,3777	PARAGRAPH # 067	ROPE MODULE 2, SIDE B, SENSE LINE SET 8 (WIRES 113-128)
12,2000	TO 12,2377	PARAGRAPH # 070	ROPE MODULE 2, SIDE A, SENSE LINE SET 9 (WIRES 129-144)
12,2400	TO 12,2777	PARAGRAPH # 071	ROPE MODULE 2, SIDE B, SENSE LINE SET 9 (WIRES 129-144)
12,3000	TO 12,3377	PARAGRAPH # 072	ROPE MODULE 2, SIDE A, SENSE LINE SET 10 (WIRES 145-160)

PARAGRAPHS GENERATED FOR THIS ASSEMBLY; ADDRESS LIMITS AND THE MANUFACTURING LOCATION CODE ARE SHOWN FOR EACH

12,3400	TO 12,3777	PARAGRAPH # 073	ROPE MODULE 2, SIDE B, SENSE LINE SET 10 (WIRES 145-160)
13,2000	TO 13,2377	PARAGRAPH # 074	ROPE MODULE 2, SIDE A, SENSE LINE SET 11 (WIRES 161-176)
13,2400	TO 13,2777	PARAGRAPH # 075	ROPE MODULE 2, SIDE B, SENSE LINE SET 11 (WIRES 161-176)
13,3000	TO 13,3377	PARAGRAPH # 076	ROPE MODULE 2, SIDE A, SENSE LINE SET 12 (WIRES 177-192)
13,3400	TO 13,3777	PARAGRAPH # 077	ROPE MODULE 2, SIDE B, SENSE LINE SET 12 (WIRES 177-192)
14,2000	TO 14,2377	PARAGRAPH # 100	ROPE MODULE 3, SIDE A, SENSE LINE SET 1 (WIRES 1- 16)
14,2400	TO 14,2777	PARAGRAPH # 101	ROPE MODULE 3, SIDE B, SENSE LINE SET 1 (WIRES 1- 16)
14,3000	TO 14,3377	PARAGRAPH # 102	ROPE MODULE 3, SIDE A, SENSE LINE SET 2 (WIRES 17- 32)
14,3400	TO 14,3777	PARAGRAPH # 103	ROPE MODULE 3, SIDE B, SENSE LINE SET 2 (WIRES 17- 32)
15,2000	TO 15,2377	PARAGRAPH # 104	ROPE MODULE 3, SIDE A, SENSE LINE SET 3 (WIRES 33- 48)
15,2400	TO 15,2777	PARAGRAPH # 105	ROPE MODULE 3, SIDE B, SENSE LINE SET 3 (WIRES 33- 48)
15,3000	TO 15,3377	PARAGRAPH # 106	ROPE MODULE 3, SIDE A, SENSE LINE SET 4 (WIRES 49- 64)
15,3400	TO 15,3777	PARAGRAPH # 107	ROPE MODULE 3, SIDE B, SENSE LINE SET 4 (WIRES 49- 64)
16,2000	TO 16,2377	PARAGRAPH # 110	ROPE MODULE 3, SIDE A, SENSE LINE SET 5 (WIRES 65- 80)
16,2400	TO 16,2777	PARAGRAPH # 111	ROPE MODULE 3, SIDE B, SENSE LINE SET 5 (WIRES 65- 80)
16,3000	TO 16,3377	PARAGRAPH # 112	ROPE MODULE 3, SIDE A, SENSE LINE SET 6 (WIRES 81- 96)
16,3400	TO 16,3777	PARAGRAPH # 113	ROPE MODULE 3, SIDE B, SENSE LINE SET 6 (WIRES 81- 96)
17,2000	TO 17,2377	PARAGRAPH # 114	ROPE MODULE 3, SIDE A, SENSE LINE SET 7 (WIRES 97-112)
17,2400	TO 17,2777	PARAGRAPH # 115	ROPE MODULE 3, SIDE B, SENSE LINE SET 7 (WIRES 97-112)
17,3000	TO 17,3377	PARAGRAPH # 116	ROPE MODULE 3, SIDE A, SENSE LINE SET 8 (WIRES 113-128)
17,3400	TO 17,3777	PARAGRAPH # 117	ROPE MODULE 3, SIDE B, SENSE LINE SET 8 (WIRES 113-128)
20,2000	TO 20,2377	PARAGRAPH # 120	ROPE MODULE 3, SIDE A, SENSE LINE SET 9 (WIRES 129-144)
20,2400	TO 20,2777	PARAGRAPH # 121	ROPE MODULE 3, SIDE B, SENSE LINE SET 9 (WIRES 129-144)
20,3000	TO 20,3377	PARAGRAPH # 122	ROPE MODULE 3, SIDE A, SENSE LINE SET 10 (WIRES 145-160)
20,3400	TO 20,3777	PARAGRAPH # 123	ROPE MODULE 3, SIDE B, SENSE LINE SET 10 (WIRES 145-160)
21,2000	TO 21,2377	PARAGRAPH # 124	ROPE MODULE 3, SIDE A, SENSE LINE SET 11 (WIRES 161-176)
21,2400	TO 21,2777	PARAGRAPH # 125	ROPE MODULE 3, SIDE B, SENSE LINE SET 11 (WIRES 161-176)
21,3000	TO 21,3377	PARAGRAPH # 126	ROPE MODULE 3, SIDE A, SENSE LINE SET 12 (WIRES 177-192)
21,3400	TO 21,3777	PARAGRAPH # 127	ROPE MODULE 3, SIDE B, SENSE LINE SET 12 (WIRES 177-192)
22,2000	TO 22,2377	PARAGRAPH # 130	ROPE MODULE 4, SIDE A, SENSE LINE SET 1 (WIRES 1- 16)
22,2400	TO 22,2777	PARAGRAPH # 131	ROPE MODULE 4, SIDE B, SENSE LINE SET 1 (WIRES 1- 16)
22,3000	TO 22,3377	PARAGRAPH # 132	ROPE MODULE 4, SIDE A, SENSE LINE SET 2 (WIRES 17- 32)
22,3400	TO 22,3777	PARAGRAPH # 133	ROPE MODULE 4, SIDE B, SENSE LINE SET 2 (WIRES 17- 32)
23,2000	TO 23,2377	PARAGRAPH # 134	ROPE MODULE 4, SIDE A, SENSE LINE SET 3 (WIRES 33- 48)
23,2400	TO 23,2777	PARAGRAPH # 135	ROPE MODULE 4, SIDE B, SENSE LINE SET 3 (WIRES 33- 48)
23,3000	TO 23,3377	PARAGRAPH # 136	ROPE MODULE 4, SIDE A, SENSE LINE SET 4 (WIRES 49- 64)
23,3400	TO 23,3777	PARAGRAPH # 137	ROPE MODULE 4, SIDE B, SENSE LINE SET 4 (WIRES 49- 64)
24,2000	TO 24,2377	PARAGRAPH # 140	ROPE MODULE 4, SIDE A, SENSE LINE SET 5 (WIRES 65- 80)
24,2400	TO 24,2777	PARAGRAPH # 141	ROPE MODULE 4, SIDE B, SENSE LINE SET 5 (WIRES 65- 80)
24,3000	TO 24,3377	PARAGRAPH # 142	ROPE MODULE 4, SIDE A, SENSE LINE SET 6 (WIRES 81- 96)
24,3400	TO 24,3777	PARAGRAPH # 143	ROPE MODULE 4, SIDE B, SENSE LINE SET 6 (WIRES 81- 96)
25,2000	TO 25,2377	PARAGRAPH # 144	ROPE MODULE 4, SIDE A, SENSE LINE SET 7 (WIRES 97-112)
25,2400	TO 25,2777	PARAGRAPH # 145	ROPE MODULE 4, SIDE B, SENSE LINE SET 7 (WIRES 97-112)
25,3000	TO 25,3377	PARAGRAPH # 146	ROPE MODULE 4, SIDE A, SENSE LINE SET 8 (WIRES 113-128)
25,3400	TO 25,3777	PARAGRAPH # 147	ROPE MODULE 4, SIDE B, SENSE LINE SET 8 (WIRES 113-128)

PARAGRAPHS GENERATED FOR THIS ASSEMBLY; ADDRESS LIMITS AND THE MANUFACTURING LOCATION CODE ARE SHOWN FOR EACH

26,2000	TO 26,2377	PARAGRAPH # 150	ROPE MODULE 4, SIDE A, SENSE LINE SET 9 (WIRES 129-144)
26,2400	TO 26,2777	PARAGRAPH # 151	ROPE MODULE 4, SIDE B, SENSE LINE SET 9 (WIRES 129-144)
26,3000	TO 26,3377	PARAGRAPH # 152	ROPE MODULE 4, SIDE A, SENSE LINE SET 10 (WIRES 145-160)
26,3400	TO 26,3777	PARAGRAPH # 153	ROPE MODULE 4, SIDE B, SENSE LINE SET 10 (WIRES 145-160)
27,2000	TO 27,2377	PARAGRAPH # 154	ROPE MODULE 4, SIDE A, SENSE LINE SET 11 (WIRES 161-176)
27,2400	TO 27,2777	PARAGRAPH # 155	ROPE MODULE 4, SIDE B, SENSE LINE SET 11 (WIRES 161-176)
27,3000	TO 27,3377	PARAGRAPH # 156	ROPE MODULE 4, SIDE A, SENSE LINE SET 12 (WIRES 177-192)
27,3400	TO 27,3777	PARAGRAPH # 157	ROPE MODULE 4, SIDE B, SENSE LINE SET 12 (WIRES 177-192)
30,2000	TO 30,2377	PARAGRAPH # 160	ROPE MODULE 5, SIDE A, SENSE LINE SET 1 (WIRES 1- 16)
30,2400	TO 30,2777	PARAGRAPH # 161	ROPE MODULE 5, SIDE B, SENSE LINE SET 1 (WIRES 1- 16)
30,3000	TO 30,3377	PARAGRAPH # 162	ROPE MODULE 5, SIDE A, SENSE LINE SET 2 (WIRES 17- 32)
30,3400	TO 30,3777	PARAGRAPH # 163	ROPE MODULE 5, SIDE B, SENSE LINE SET 2 (WIRES 17- 32)
31,2000	TO 31,2377	PARAGRAPH # 164	ROPE MODULE 5, SIDE A, SENSE LINE SET 3 (WIRES 33- 48)
31,2400	TO 31,2777	PARAGRAPH # 165	ROPE MODULE 5, SIDE B, SENSE LINE SET 3 (WIRES 33- 48)
31,3000	TO 31,3377	PARAGRAPH # 166	ROPE MODULE 5, SIDE A, SENSE LINE SET 4 (WIRES 49- 64)
31,3400	TO 31,3777	PARAGRAPH # 167	ROPE MODULE 5, SIDE B, SENSE LINE SET 4 (WIRES 49- 64)
32,2000	TO 32,2377	PARAGRAPH # 170	ROPE MODULE 5, SIDE A, SENSE LINE SET 5 (WIRES 65- 80)
32,2400	TO 32,2777	PARAGRAPH # 171	ROPE MODULE 5, SIDE B, SENSE LINE SET 5 (WIRES 65- 80)
32,3000	TO 32,3377	PARAGRAPH # 172	ROPE MODULE 5, SIDE A, SENSE LINE SET 6 (WIRES 81- 96)
32,3400	TO 32,3777	PARAGRAPH # 173	ROPE MODULE 5, SIDE B, SENSE LINE SET 6 (WIRES 81- 96)
33,2000	TO 33,2377	PARAGRAPH # 174	ROPE MODULE 5, SIDE A, SENSE LINE SET 7 (WIRES 97-112)
33,2400	TO 33,2777	PARAGRAPH # 175	ROPE MODULE 5, SIDE B, SENSE LINE SET 7 (WIRES 97-112)
33,3000	TO 33,3377	PARAGRAPH # 176	ROPE MODULE 5, SIDE A, SENSE LINE SET 8 (WIRES 113-128)
33,3400	TO 33,3777	PARAGRAPH # 177	ROPE MODULE 5, SIDE B, SENSE LINE SET 8 (WIRES 113-128)
34,2000	TO 34,2377	PARAGRAPH # 200	ROPE MODULE 5, SIDE A, SENSE LINE SET 9 (WIRES 129-144)
34,2400	TO 34,2777	PARAGRAPH # 201	ROPE MODULE 5, SIDE B, SENSE LINE SET 9 (WIRES 129-144)
34,3000	TO 34,3377	PARAGRAPH # 202	ROPE MODULE 5, SIDE A, SENSE LINE SET 10 (WIRES 145-160)
34,3400	TO 34,3777	PARAGRAPH # 203	ROPE MODULE 5, SIDE B, SENSE LINE SET 10 (WIRES 145-160)
35,2000	TO 35,2377	PARAGRAPH # 204	ROPE MODULE 5, SIDE A, SENSE LINE SET 11 (WIRES 161-176)
35,2400	TO 35,2777	PARAGRAPH # 205	ROPE MODULE 5, SIDE B, SENSE LINE SET 11 (WIRES 161-176)
35,3000	TO 35,3377	PARAGRAPH # 206	ROPE MODULE 5, SIDE A, SENSE LINE SET 12 (WIRES 177-192)
35,3400	TO 35,3777	PARAGRAPH # 207	ROPE MODULE 5, SIDE B, SENSE LINE SET 12 (WIRES 177-192)
36,2000	TO 36,2377	PARAGRAPH # 210	ROPE MODULE 6, SIDE A, SENSE LINE SET 1 (WIRES 1- 16)
36,2400	TO 36,2777	PARAGRAPH # 211	ROPE MODULE 6, SIDE B, SENSE LINE SET 1 (WIRES 1- 16)
36,3000	TO 36,3377	PARAGRAPH # 212	ROPE MODULE 6, SIDE A, SENSE LINE SET 2 (WIRES 17- 32)
36,3400	TO 36,3777	PARAGRAPH # 213	ROPE MODULE 6, SIDE B, SENSE LINE SET 2 (WIRES 17- 32)
37,2000	TO 37,2377	PARAGRAPH # 214	ROPE MODULE 6, SIDE A, SENSE LINE SET 3 (WIRES 33- 48)
37,2400	TO 37,2777	PARAGRAPH # 215	ROPE MODULE 6, SIDE B, SENSE LINE SET 3 (WIRES 33- 48)
37,3000	TO 37,3377	PARAGRAPH # 216	ROPE MODULE 6, SIDE A, SENSE LINE SET 4 (WIRES 49- 64)
37,3400	TO 37,3777	PARAGRAPH # 217	ROPE MODULE 6, SIDE B, SENSE LINE SET 4 (WIRES 49- 64)
40,2000	TO 40,2377	PARAGRAPH # 220	ROPE MODULE 6, SIDE A, SENSE LINE SET 5 (WIRES 65- 80)
40,2400	TO 40,2777	PARAGRAPH # 221	ROPE MODULE 6, SIDE B, SENSE LINE SET 5 (WIRES 65- 80)
40,3000	TO 40,3377	PARAGRAPH # 222	ROPE MODULE 6, SIDE A, SENSE LINE SET 6 (WIRES 81- 96)
40,3400	TO 40,3777	PARAGRAPH # 223	ROPE MODULE 6, SIDE B, SENSE LINE SET 6 (WIRES 81- 96)
41,2000	TO 41,2377	PARAGRAPH # 224	ROPE MODULE 6, SIDE A, SENSE LINE SET 7 (WIRES 97-112)

PARAGRAPHS GENERATED FOR THIS ASSEMBLY; ADDRESS LIMITS AND THE MANUFACTURING LOCATION CODE ARE SHOWN FOR EACH

41,2400	TO 41,2777	PARAGRAPH # 225	ROPE MODULE 6, SIDE B, SENSE LINE SET 7 (WIRES 97-112)
41,3000	TO 41,3377	PARAGRAPH # 226	ROPE MODULE 6, SIDE A, SENSE LINE SET 8 (WIRES 113-128)
41,3400	TO 41,3777	PARAGRAPH # 227	ROPE MODULE 6, SIDE B, SENSE LINE SET 8 (WIRES 113-128)
42,2000	TO 42,2377	PARAGRAPH # 230	ROPE MODULE 6, SIDE A, SENSE LINE SET 9 (WIRES 129-144)
42,2400	TO 42,2777	PARAGRAPH # 231	ROPE MODULE 6, SIDE B, SENSE LINE SET 9 (WIRES 129-144)
42,3000	TO 42,3377	PARAGRAPH # 232	ROPE MODULE 6, SIDE A, SENSE LINE SET 10 (WIRES 145-160)
42,3400	TO 42,3777	PARAGRAPH # 233	ROPE MODULE 6, SIDE B, SENSE LINE SET 10 (WIRES 145-160)
43,2000	TO 43,2377	PARAGRAPH # 234	ROPE MODULE 6, SIDE A, SENSE LINE SET 11 (WIRES 161-176)
43,2400	TO 43,2777	PARAGRAPH # 235	ROPE MODULE 6, SIDE B, SENSE LINE SET 11 (WIRES 161-176)
43,3000	TO 43,3377	PARAGRAPH # 236	ROPE MODULE 6, SIDE A, SENSE LINE SET 12 (WIRES 177-192)
43,3400	TO 43,3777	PARAGRAPH # 237	ROPE MODULE 6, SIDE B, SENSE LINE SET 12 (WIRES 177-192)

OCTAL LISTING FOR PARAGRAPH # 010, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

4000	00004 0	34054 1	56006 1	12526 0	52011 0	00006 1	31311 0	52006 0
4010	52011 0	40030 0	65036 1	14065 1	52011 0	34055 0	56006 1	13416 0
4020	52011 0	34063 0	56006 1	12000 1	52011 0	34056 0	56006 1	13673 1
4030	52011 0	34057 1	56006 1	12104 1	52011 0	34056 0	56006 1	13716 0
4040	52011 0	34060 0	56006 1	13521 0	52011 0	34061 1	56006 1	12504 0
4050	52011 0	34062 1	56006 1	15336 0	C: 12063 1	C: 02063 0	C: 16060 0	C: 16067 1
4060	C: 12060 1	C: 56067 0	C: 04060 0	C: 14062 0	C: 04060 0	00006 1	65337 0	00006 1
4070	31313 1	52006 0	C: 04025 1	C: 10003 0	C: 14031 0	C: 20033 0	C: 24017 1	C: 30036 1
4100	C: 34034 1	C: 40023 1	C: 44035 1	C: 50037 0	C: 54000 0	C: 60000 1	05412 0	C: 00014 1
4110	04701 0	C: 10000 0	C: 00024 1	C: 00031 0	00004 0	54001 1	50002 0	30000 1
4120	24002 0	60000 1	54061 1	10001 1	14133 0	14133 0	24000 1	54001 1
4130	40025 1	50061 0	55051 0	40001 1	50061 0	52751 0	00003 1	00002 0
4140	34160 1	71022 1	00006 1	14145 1	04146 0	31020 1	54023 1	30023 0
4150	04662 1	C: 62337 1	35021 1	55013 0	31022 0	04271 1	04157 0	05217 0
4160	C: 37600 0	04400 1	41041 1	55013 0	04662 1	C: 62337 1	04701 0	C: 62002 1
4170	22007 0	54123 0	35002 0	71021 1	61012 0	10000 0	00002 0	35017 1
4200	60002 0	55037 0	23022 0	04220 0	34215 0	56006 1	00006 1	04007 1
4210	55040 0	34215 0	00006 1	01007 1	02000 0	C: 62101 0	53040 0	05227 0
4220	35001 0	55021 1	00002 0	22002 0	04234 0	04240 0	30001 0	75054 1
4230	60004 0	55042 1	05175 1	05217 0	11042 1	04243 0	00002 0	04243 0
4240	11043 0	04243 0	00002 0	05721 0	C: 01206 1	34215 0	00006 1	01007 1
4250	34256 1	55013 0	44374 1	54777 1	04701 0	C: 61355 0	C: 00042 1	34215 0
4260	00006 1	01007 1	34270 0	55013 0	44374 1	54777 1	04701 0	C: 61347 0
4270	C: 00041 1	75023 1	54123 0	35002 0	71021 1	61012 0	10000 0	00002 0
4300	24002 0	10123 0	14304 0	00002 0	22002 0	34316 1	56006 1	00006 1
4310	04007 1	52131 0	34215 0	00006 1	01007 1	03412 0	C: 60101 1	55017 1
4320	54003 0	74373 0	65051 0	54145 0	00002 0	31017 0	14320 0	54003 0
4330	74373 0	65051 0	00002 0	C: 00016 0	C: 00011 1	C: 00004 0	54020 1	40020 1
4340	40020 1	40020 1	40020 1	56020 0	00002 0	54022 0	40022 0	40022 0
4350	40022 0	40022 0	56022 1	00002 0	60000 1	60000 1	60000 1	60000 1
4360	60000 1	00002 0	C: 00037 0	C: 01740 0	C: 76000 0	05134 1	05245 1	05324 1
4370	05147 0	C: 30000 1	C: 03777 0	C: 00377 1	C: 00023 0	C: 00021 1	C: 00025 0	C: 00012 1

OCTAL LISTING FOR PARAGRAPH # 011, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

4400	35011 1	00006 1	05011 1	00002 0	45011 0	00006 1	03011 1	00002 0
4410	35013 0	00006 1	05011 1	00002 0	00006 1	30025 0	52014 0	00002 0
4420	00006 1	30156 0	20156 1	60154 1	26154 0	54007 1	00002 0	54162 0
4430	00002 0	54135 1	10000 0	30135 0	17257 1	14433 0	45021 0	54154 0
4440	54155 1	54156 1	00002 0	35012 1	00006 1	05011 1	00002 0	45012 0
4450	00006 1	03011 1	00002 0	44460 0	60002 0	60004 0	04701 0	C: 10577 0
4460	C: 02003 0	22007 0	54123 0	35002 0	71021 1	61012 0	10000 0	14471 0
4470	14200 0	24002 0	14453 0	56002 0	54144 1	45002 1	00004 0	71021 1
4500	55021 1	11043 0	04504 1	04507 1	35021 1	57043 1	05201 1	00003 1
4510	45013 1	00006 1	03011 1	35021 1	55012 1	00144 0	56002 0	54144 1
4520	11043 0	04523 1	04507 1	35021 1	55012 1	00144 0	35021 1	55575 0
4530	55576 0	55525 0	55526 0	55564 0	45001 1	71501 0	55501 0	35021 1
4540	55577 1	55600 1	55601 0	55602 0	55527 1	55530 1	55531 0	55532 0
4550	55565 1	55566 1	00002 0	00004 0	00006 1	00004 0	54001 1	00006 1
4560	06004 0	00006 1	14566 1	00006 1	00004 0	54001 1	44777 0	60001 0
4570	00006 1	14554 0	00006 1	00003 1	00002 0	00006 1	23767 0	55765 0
4600	34610 1	56004 0	55063 1	31765 1	04662 1	C: 20720 0	14106 0	14611 1
4610	04603 0	31063 0	54004 1	01767 0	C: 01445 0	C: 01467 0	C: 01472 1	C: 01473 0
4620	C: 01521 0	C: 04055 0	00006 1	34626 1	15227 1	C: 02653 0	C: 66107 1	00006 1
4630	23770 0	05560 1	C: 00050 1	35060 1	54003 0	35003 1	55424 0	35005 1
4640	54003 0	01770 0	00006 1	23770 0	05546 0	C: 00050 1	01770 0	00006 1
4650	23770 0	05546 0	C: 00031 0	05546 0	C: 00027 1	01770 0	C: 01413 0	C: 01415 0
4660	C: 01513 1	C: 01462 0	52134 0	50002 0	30000 1	24002 0	54001 1	22004 0
4670	75054 1	56002 0	52134 0	50002 0	02000 0	56134 1	56004 0	56134 1
4700	00133 0	56002 0	50000 1	30000 1	54004 1	75054 1	56002 0	50002 0
4710	12000 1	35054 0	70133 1	60134 1	00002 0	54135 1	56004 0	00006 1
4720	04007 1	56135 0	75054 1	56001 0	00004 0	00006 1	01007 1	50001 0
4730	32000 0	56135 0	00006 1	01007 1	00003 1	54004 1	30135 0	00002 0
4740	52073 1	50002 0	30000 1	24002 0	54001 1	22004 0	75054 1	56002 0
4750	52073 1	50002 0	02000 0	56073 0	56004 0	56073 0	00072 1	54164 0
4760	35010 0	54023 1	30006 1	54165 1	50002 0	30000 1	54004 1	75054 1
4770	56002 0	56164 1	14707 1	00006 1	01007 1	00002 0	C: 37777 1	C: 37777 1

OCTAL LISTING FOR PARAGRAPH # 012, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

5000	C: 57777 1	C: 40000 0	C: 20000 0	C: 10000 0	C: 04000 0	C: 02000 0	C: 01000 0	C: 00400 0
5010	C: 00200 0	C: 00100 0	C: 00040 0	C: 00020 0	C: 00010 0	C: 00004 0	C: 00002 0	C: 00001 0
5020	C: 77777 0	C: 00000 1	C: 00005 1	C: 00007 0	C: 00013 0	C: 00015 0	C: 00017 1	C: 00030 1
5030	C: 00032 0	C: 00045 0	C: 00046 0	C: 00050 1	C: 00055 1	C: 00060 1	C: 00062 0	C: 00120 1
5040	C: 00140 1	C: 00144 0	C: 00310 0	C: 00401 1	C: 00454 1	C: 00620 0	C: 00777 0	C: 01124 1
5050	C: 01211 1	C: 01400 1	C: 01426 0	C: 01776 0	C: 01777 1	C: 02177 1	C: 02400 1	C: 03000 1
5060	C: 03400 0	C: 05000 1	C: 06000 1	C: 07000 0	C: 11000 1	C: 13000 0	C: 14000 1	C: 15000 0
5070	C: 16000 0	C: 17000 1	C: 17770 1	C: 21000 1	65002 0	55075 0	15100 1	41075 0
5100	60000 1	55075 0	15113 0	57075 1	51075 1	65000 1	40000 0	61075 1
5110	55075 0	15113 0	15131 0	00006 1	71075 0	55076 0	00006 1	75047 0
5120	67706 1	00006 1	71076 0	67666 0	00006 1	71075 0	20001 1	55075 0
5130	00002 0	50000 1	45000 0	00002 0	00004 0	65226 1	54063 0	00006 1
5140	50002 0	30001 0	52066 0	35225 1	56004 0	54061 1	12650 1	00004 0
5150	54063 0	00006 1	50002 0	30001 0	52066 0	35225 1	56004 0	12626 0
5160	56002 0	67715 0	56002 0	15154 0	22002 0	35225 1	56006 1	12727 0
5170	40164 0	54001 1	35225 1	54006 0	12726 1	54164 0	35225 1	54004 1
5200	13017 0	00004 0	54065 0	45016 1	26002 1	35225 1	56004 0	13044 0
5210	00004 0	54063 0	35225 1	56006 1	54165 1	30002 0	13113 0	35225 1
5220	54004 1	13124 1	30061 0	54004 1	16710 0	C: 02626 1	C: 00110 1	56001 0
5230	00006 1	01007 1	54006 0	00001 0	C: 77677 1	00004 0	54001 1	34777 1
5240	26002 1	30006 1	00006 1	04007 1	56001 0	00004 0	00006 1	65261 1
5250	56002 0	54061 1	00006 1	50061 0	30001 0	54063 0	35266 0	56006 1
5260	13246 0	05721 0	C: 01204 0	52062 1	65016 0	52006 0	C: 02063 0	50002 0
5270	30000 1	24002 0	56002 0	54063 0	30006 1	00006 1	04007 1	54001 1
5300	35303 1	54061 1	15256 1	15322 0	C: 72471 0	C: 73714 1	10076 1	15324 0
5310	15324 0	15312 0	11322 1	17717 0	15317 0	17717 0	17717 0	37672 0
5320	05134 1	C: 03542 1	C: 14063 1	15324 0	10734 0	35266 0	54006 0	13423 0
5330	30016 0	00006 1	01007 1	00006 1	22012 1	30016 0	56006 1	52011 0
5340	00003 1	50017 1	53140 1	00006 1	50002 0	30001 0	53134 1	00006 1
5350	35353 1	52006 0	C: 03461 1	C: 02063 0	50002 0	30000 1	24002 0	55011 1
5360	35363 1	22006 1	14704 1	C: 20440 0	50002 0	40000 0	61011 0	00006 1
5370	16710 0	16706 1	00004 0	50002 0	30000 1	24002 0	54072 0	75023 1

OCTAL LISTING FOR PARAGRAPH # 013. WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

5400	60000 1	54071 0	30072 1	75072 0	00006 1	75004 1	56072 1	75001 1
5410	54066 0	15415 0	00004 0	35017 1	54066 0	50002 0	30000 1	24002 0
5420	54065 0	00006 1	35425 1	52006 0	C: 02451 0	C: 20063 0	22073 0	22006 1
5430	22073 0	75066 0	10000 0	15474 1	30062 0	75011 0	10000 0	15461 0
5440	50061 0	31052 1	54070 1	30062 0	75010 1	10000 0	15465 1	30002 0
5450	54063 0	30006 1	00006 1	04007 1	54064 1	35460 0	22073 0	52006 0
5460	C: 02537 1	50002 0	30000 1	24002 0	15442 1	00006 1	50002 0	30001 0
5470	52064 1	35016 0	26002 1	15455 1	75004 1	10000 0	15461 0	15440 0
5500	22706 0	22006 1	50000 1	30001 0	22006 1	22706 0	13573 1	22706 0
5510	22006 1	22706 0	00006 1	50000 1	30001 0	22706 0	22006 1	22706 0
5520	13701 0	35021 1	54032 1	54033 0	54034 1	00002 0	54162 0	40160 1
5530	70162 0	50161 1	26160 1	00002 0	04701 0	C: 20553 0	35021 1	55044 1
5540	00004 0	45017 0	70100 1	54100 1	00003 1	00002 0	30002 0	05564 0
5550	40000 0	00006 1	04001 1	50061 0	54074 0	22063 1	00003 1	00001 0
5560	30002 0	05564 0	70001 1	15553 0	65017 1	00004 0	54063 0	35026 0
5570	54061 1	50063 1	27777 0	54001 1	35021 1	00006 1	10061 1	52062 1
5600	50061 0	30074 1	54001 1	50062 0	45001 1	00002 0	00004 0	54061 1
5610	50002 0	60000 1	50000 1	30000 1	54001 1	30061 0	50002 0	60001 0
5620	50000 1	22000 1	10061 1	15607 1	16710 0	45013 1	71044 1	55044 1
5630	05217 0	00004 0	47704 1	71036 1	65001 0	55036 1	41331 0	75011 0
5640	27331 0	00003 1	00002 0	00004 0	41036 1	77704 1	27036 1	15641 0
5650	00004 0	30002 0	55363 1	50002 0	30000 1	54001 1	30006 1	00006 1
5660	04007 1	55364 0	30002 0	54061 1	30164 1	54057 1	30165 0	54060 0
5670	10375 1	15674 0	22375 0	15706 1	10376 1	15700 1	22376 0	15711 1
5700	30377 1	74777 0	10000 0	15715 0	22377 1	15711 1	41036 1	77765 0
5710	27036 1	56061 0	00003 1	50000 1	00001 0	30001 0	65001 0	54377 0
5720	15711 1	00004 0	30002 0	55363 1	04662 1	C: 40000 0	51363 0	30000 1
5730	05655 1	C: 77770 1	35012 1	70103 1	10000 0	07766 1	05560 1	C: 00067 0
5740	05560 1	C: 00236 0	05560 1	C: 00054 0	04662 1	C: 12501 0	07767 0	00004 0
5750	30002 0	55363 1	04662 1	C: 40000 0	35756 0	05730 0	C: 01103 1	00004 0
5760	30002 0	05652 0	C: 00217 0	01363 0	00004 0	54001 1	30002 0	55363 1
5770	05656 1	C: 00014 1	01363 0	C: 05773 1	C: 05774 0	CKSM 51322 0	@	@

OCTAL LISTING FOR PARAGRAPH # 014, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD. "∅" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

6000	30007 0	00006 1	01006 0	00006 1	01005 0	00002 0	00003 1	00006 1
6010	22164 1	30006 1	54165 1	75001 1	54115 0	54023 1	16037 1	22006 1
6020	16011 0	00006 1	50116 1	30001 0	52155 1	35021 1	54156 1	54163 1
6030	30165 0	54006 0	10023 1	16046 1	10067 1	15170 0	24164 1	50164 1
6040	30000 1	10000 0	16331 1	C: 00177 0	54023 1	76043 1	54020 1	10020 1
6050	16216 0	16712 1	75017 0	10000 0	16115 0	50164 1	40001 1	10000 0
6060	16164 0	C: 77773 1	24164 1	54116 0	66220 1	10000 0	67712 1	16074 0
6070	30120 1	26116 0	50020 0	76242 1	00006 1	66105 0	75054 1	65054 0
6100	56116 1	60115 1	54004 1	50020 0	76242 1	74373 0	65051 0	56116 1
6110	54003 0	50020 0	76242 1	37702 0	54020 1	30120 1	54130 1	24164 1
6120	50164 1	40000 0	10000 0	24130 0	16125 0	54116 0	77711 0	00006 1
6130	16133 1	30115 1	26116 0	50130 0	40046 1	26116 0	77713 1	00006 1
6140	16153 1	77711 0	00006 1	16155 1	30116 1	54004 1	75054 1	65005 1
6150	54116 0	50020 0	36242 0	30120 1	16161 0	35051 0	56116 1	54003 0
6160	74373 0	26116 0	50020 0	36242 0	34374 0	70020 1	66171 0	10000 0
6170	16202 0	C: 77767 1	66061 0	10000 0	50000 1	46213 0	16204 0	50163 0
6200	46211 1	16204 0	50163 0	46213 0	26166 1	54116 0	50020 0	76242 1
6210	C: 00002 0	C: 00006 1	C: 00006 1	C: 00002 0	C: 00003 1	C: 00006 1	10020 1	16232 0
6220	C: 77722 0	24164 1	50164 1	30000 1	54117 1	35055 1	54004 1	70020 1
6230	50000 1	16303 0	54004 1	10020 1	50000 1	12000 1	10163 1	12017 1
6240	12017 1	12121 0	C: 00122 0	16454 0	17040 0	17624 1	17350 1	16652 1
6250	16437 0	16021 0	17573 0	16450 1	16567 1	16472 1	17303 1	16526 1
6260	16575 1	17306 1	17565 1	17543 0	17546 0	17552 0	17570 0	16720 0
6270	16716 0	17005 1	17300 1	17427 0	17374 1	16754 0	17031 0	16744 1
6300	16300 0	17541 1	17562 0	12371 1	12376 0	12401 1	12405 0	12411 0
6310	12417 0	12433 0	12442 0	12425 1	12436 0	12514 1	12521 1	12474 0
6320	12534 0	12543 0	12504 0	30165 0	54004 1	24164 1	50164 1	40000 0
6330	67716 0	54116 0	74372 1	56116 1	77671 1	00006 1	75013 1	50000 1
6340	16341 0	06371 1	16030 0	06363 1	16030 0	06366 1	16030 0	06371 1
6350	16427 1	06371 1	16113 0	06371 1	16432 0	06371 1	16435 1	06371 1
6360	35030 1	54020 1	16221 1	50120 1	40046 1	16370 1	50120 1	40047 0
6370	26116 0	40116 0	65034 0	10000 0	30120 1	16402 0	35051 0	56116 1

OCTAL LISTING FOR PARAGRAPH # 015, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

6400	54003 0	74373 0	26116 0	00006 1	30155 0	50116 1	52001 1	10163 1
6410	16423 0	00002 0	00006 1	30160 0	50116 1	52003 0	00006 1	30162 1
6420	50116 1	52005 0	00002 0	30156 0	50116 1	54002 1	00002 0	37701 0
6430	54020 1	16055 0	35001 0	54020 1	16055 0	36056 1	16114 1	50116 1
6440	30002 0	54156 1	00006 1	50116 1	30001 0	52155 1	35017 1	16027 0
6450	22007 0	50116 1	30000 1	16024 0	00006 1	50116 1	30001 0	52155 1
6460	00006 1	50116 1	30003 1	52160 1	00006 1	50116 1	30005 1	52162 0
6470	45017 0	16027 0	00006 1	50116 1	30001 0	52155 1	50166 0	52001 1
6500	50163 0	36213 1	26166 1	10163 1	16521 0	16517 0	54163 1	54156 1
6510	52160 1	50166 0	51775 0	52162 0	50166 0	51777 1	16030 0	54156 1
6520	16030 0	54163 1	56156 0	50166 0	53777 0	16030 0	00006 1	50116 1
6530	30001 0	52155 1	50166 0	52001 1	50163 0	36213 1	26166 1	10163 1
6540	16557 1	16460 1	00006 1	50116 1	30003 1	52160 1	50166 0	51775 0
6550	00006 1	50116 1	30005 1	52162 0	50166 0	51777 1	16030 0	00006 1
6560	50116 1	30003 1	52160 1	30156 0	50166 0	53777 0	16464 0	24164 1
6570	50164 1	30000 1	50116 1	54000 0	16030 0	24164 1	50164 1	30000 1
6600	50116 1	60000 1	54004 1	75054 1	50000 1	32000 0	54117 1	30165 0
6610	74364 0	64364 1	60164 1	50120 1	54052 1	30117 0	77711 0	00006 1
6620	16631 1	30165 0	54006 0	30117 0	54004 1	75054 1	65005 1	54164 0
6630	16011 0	30117 0	66220 1	10000 0	30117 0	16644 0	30120 1	60117 0
6640	50000 1	30000 1	54117 1	16616 1	54003 0	74373 0	50000 1	31400 1
6650	54117 1	16616 1	50164 1	30001 0	50116 1	60000 1	54004 1	75054 1
6660	50000 1	32000 0	54117 1	16616 1	30165 0	54004 1	50164 1	30001 0
6670	54117 1	16616 1	10154 0	00002 0	16676 1	16710 0	10155 1	00002 0
6700	16702 0	16710 0	10156 1	00002 0	16706 1	16710 0	50002 0	00001 0
6710	50002 0	00002 0	30165 0	54006 0	50164 1	00001 0	35001 0	16721 1
6720	34371 0	26116 0	00006 1	50116 1	00003 1	20160 1	00006 1	16731 0
6730	06763 0	00006 1	50116 1	00005 1	20162 0	00006 1	16740 0	06760 0
6740	00006 1	50116 1	00001 0	16747 1	00006 1	50116 1	30001 0	20155 1
6750	00006 1	16030 0	06766 0	16030 0	00006 1	50116 1	40001 1	16747 1
6760	54001 1	35022 1	16765 1	54001 1	36214 0	56001 0	50000 1	45000 0
6770	54130 1	00006 1	24000 1	50001 0	26155 1	54007 1	35021 1	60130 0

OCTAL LISTING FOR PARAGRAPH # 016. WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD. "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

7000	50001 0	26154 0	54007 1	00002 0	17121 0	00006 1	50116 1	30003 1
7010	52160 1	00006 1	40001 1	20160 1	00006 1	17017 1	06763 0	00006 1
7020	50116 1	30005 1	52162 0	00006 1	40001 1	20162 0	00006 1	17031 0
7030	06760 0	00006 1	50116 1	30001 0	52155 1	00006 1	40001 1	16747 1
7040	00006 1	50116 1	30002 0	20156 1	50116 1	60000 1	60154 1	54154 0
7050	16030 0	16752 0	50002 0	30000 1	24002 0	54116 0	50116 1	30001 0
7060	54156 1	35021 1	56155 0	54135 1	00006 1	70156 1	56156 0	00006 1
7070	70154 0	20156 1	50116 1	30000 1	56135 0	00006 1	70135 1	20156 1
7100	56154 1	00006 1	70135 1	20155 1	00002 0	35021 1	54163 1	56156 0
7110	60000 1	54001 1	00002 0	60155 0	54155 1	00002 0	60154 1	54154 0
7120	00002 0	54121 1	00002 0	35016 0	54136 1	00006 1	22137 1	07056 0
7130	52160 1	52155 1	52131 0	30156 0	54132 0	30136 0	26116 0	07056 0
7140	52156 1	20132 0	60154 1	60130 0	54130 1	17147 0	54121 1	52162 0
7150	52155 1	30136 0	26116 0	07056 0	52132 0	20156 1	60154 1	60130 0
7160	54154 0	00137 1	06766 0	00137 1	00006 1	22141 0	54117 1	22140 1
7170	17201 1	50002 0	30000 1	54140 0	60000 1	60002 0	54117 1	65022 1
7200	54141 1	36242 0	54116 0	00006 1	50117 0	30004 0	52155 1	52123 0
7210	17214 0	54140 0	45016 1	26117 1	07056 0	00006 1	50117 0	30002 0
7220	20155 1	10140 0	17211 0	00141 0	35021 1	54156 1	22002 0	06672 1
7230	17234 1	17254 1	44777 0	17235 0	34777 1	54002 1	00006 1	24000 1
7240	60156 0	54156 1	35021 1	60002 0	60155 0	54155 1	35021 1	60002 0
7250	60154 1	54154 0	54155 1	00001 0	54156 1	17251 1	54135 1	00006 1
7260	70156 1	54156 1	35021 1	56155 0	17075 0	54135 1	00006 1	70155 1
7270	52155 1	00006 1	70135 1	30001 0	26154 0	00006 1	30155 0	00002 0
7300	07123 0	35021 1	16027 0	35016 0	54140 0	17311 1	44377 1	54140 0
7310	36211 0	54136 1	07501 1	07125 0	00006 1	30123 1	52155 1	52134 0
7320	00006 1	30125 1	52160 1	00006 1	30127 0	52162 0	30140 1	26116 0
7330	07125 0	52123 0	52155 1	52125 0	52160 1	52127 1	52162 0	30140 1
7340	26116 0	07125 0	52134 0	52155 1	52162 0	52125 0	52160 1	16030 0
7350	10163 1	17377 1	17377 1	07056 0	07107 0	52160 1	52155 1	52160 1
7360	07056 0	07107 0	52162 0	52155 1	52162 0	07056 0	07107 0	52155 1
7370	52162 0	52160 1	52155 1	16030 0	07123 0	45015 1	26116 0	00006 1

OCTAL LISTING FOR PARAGRAPH # 017. WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD. "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

7400	30155 0	52160 1	07056 0	07107 0	35016 0	26116 0	00006 1	30160 0
7410	52155 1	52162 0	07056 0	07107 0	35016 0	26116 0	52160 1	52155 1
7420	52160 1	07056 0	07107 0	52155 1	52162 0	52155 1	16470 0	00006 1
7430	30162 1	52155 1	52123 0	07056 0	00006 1	40160 1	52155 1	52125 0
7440	07056 0	35016 0	26116 0	00006 1	40162 0	52155 1	52162 0	07056 0
7450	00006 1	30123 1	52155 1	52127 1	07056 0	35016 0	26116 0	00006 1
7460	40123 0	52155 1	20162 0	00006 1	17466 0	06760 0	07056 0	52125 0
7470	52160 1	52155 1	20160 1	00006 1	17476 1	06763 0	07056 0	52127 1
7500	16747 1	00006 1	30155 0	52123 0	00006 1	30160 0	52125 0	00006 1
7510	30162 1	52127 1	00002 0	10000 0	17520 0	00002 0	17530 1	00002 0
7520	56001 0	65002 0	65002 0	54000 0	17526 0	24001 0	56001 0	00002 0
7530	56001 0	65001 0	67716 0	54000 0	17536 1	24001 0	56001 0	40000 0
7540	00002 0	07056 0	16030 0	07056 0	07106 1	16030 0	00006 1	50116 1
7550	30001 0	17556 1	00006 1	50116 1	30001 0	52155 1	52131 0	35021 1
7560	54004 1	12353 1	30116 1	54166 1	16032 1	35021 1	54004 1	12172 0
7570	36043 0	54004 1	12214 0	10163 1	17605 1	17605 1	00006 1	50116 1
7600	30001 0	52131 0	35021 1	54004 1	12654 0	00006 1	50116 1	30003 1
7610	52160 1	00006 1	50116 1	30005 1	52162 0	45017 0	54163 1	00006 1
7620	50116 1	30001 0	52155 1	17601 0	50116 1	10000 0	16030 0	17631 0
7630	17637 0	50116 1	10001 1	16030 0	16030 0	17637 0	16030 0	00006 1
7640	40155 1	52155 1	10163 1	17654 0	17654 0	00006 1	40160 1	52160 1
7650	00006 1	40162 0	52162 0	16030 0	40156 1	54156 1	16030 0	C: 22000 1
7660	C: 23000 0	C: 24000 1	C: 25000 0	C: 26000 0	C: 27000 1	C: 31000 0	C: 31103 1	C: 32000 0
7670	C: 33000 1	C: 34000 0	C: 35000 1	C: 36000 1	C: 37000 0	C: 37401 0	C: 37766 1	C: 37774 1
7700	C: 37776 0	C: 40014 0	C: 40015 1	C: 40040 1	C: 40200 1	C: 57777 1	C: 65552 0	C: 70000 0
7710	C: 73777 1	C: 74000 1	C: 74056 1	C: 77700 0	C: 77774 0	C: 77775 1	C: 77776 1	05267 1
7720	C: 00764 1	05306 1	54001 1	75023 1	56001 0	75731 0	00004 0	54061 1
7730	50001 0	40074 0	70061 1	50001 0	26074 0	00003 1	24002 0	00002 0
7740	54001 1	75023 1	56001 0	75731 0	40000 0	00004 0	50001 0	70074 0
7750	50001 0	54074 0	00003 1	24002 0	00002 0	00004 0	30002 0	55363 1
7760	04662 1	C: 40000 0	51363 0	30000 1	05655 1	C: 40400 1	00004 0	35016 0
7770	60005 1	54017 0	50017 1	04701 0	C: 12651 0	C: 07775 0	C: 07776 0	CKSM 72635 1

OCTAL LISTING FOR PARAGRAPH # 020, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

00,2000	13207 0	13527 0	13516 1	13607 1	13611 0	13174 1	12116 1	17637 0
00,2010	13232 0	13023 1	13176 0	13245 0	16323 1	13274 1	13247 1	36211 0
00,2020	70020 1	54021 0	10020 1	12101 1	C: 00024 1	50021 1	35002 0	54135 1
00,2030	10020 1	02050 0	16027 0	30135 0	00006 1	70156 1	54156 1	30135 0
00,2040	00006 1	70154 0	52155 1	30135 0	00006 1	70001 1	20156 1	16030 0
00,2050	30156 0	00006 1	70135 1	56155 0	00006 1	70135 1	56155 0	60001 0
00,2060	60000 1	54156 1	12064 0	26155 1	35021 1	54156 1	56154 1	00006 1
00,2070	70135 1	20155 1	00002 0	30135 0	00006 1	70155 1	54155 1	56001 0
00,2100	12060 1	30021 1	54135 1	00006 1	30156 0	20156 1	60154 1	60154 1
00,2110	54154 0	12113 1	54121 1	10135 1	12102 1	10020 1	07105 1	16030 0
00,2120	16030 0	35023 0	70020 1	54135 1	10020 1	12145 1	C: 00176 1	50135 0
00,2130	35002 0	54135 1	02073 1	52155 1	52160 1	52155 1	02073 1	52155 1
00,2140	52162 0	52155 1	02073 1	17367 0	54135 1	00006 1	30155 0	20155 1
00,2150	00006 1	12153 0	06766 0	00006 1	30160 0	20160 1	00006 1	12161 1
00,2160	06763 0	00006 1	30162 1	20162 0	00006 1	12167 1	06760 0	10135 1
00,2170	12144 0	16030 0	54135 1	06672 1	12176 1	12212 0	07226 0	30154 1
00,2200	12207 1	24135 0	00006 1	30156 0	20156 1	60154 1	26154 0	60000 1
00,2210	54000 0	12201 1	40135 1	16572 0	70116 0	10000 0	12224 0	35006 1
00,2220	70116 0	10000 0	07105 1	16030 0	54135 1	35010 0	00006 1	70116 0
00,2230	76214 1	50000 1	12233 0	12332 0	12342 1	12336 1	10163 1	12277 0
00,2240	12277 0	30135 0	63730 0	00006 1	62127 1	67716 0	54135 1	35021 1
00,2250	54001 1	56154 1	56155 0	02272 1	20155 1	56157 1	56160 0	02272 1
00,2260	20160 1	56161 1	56162 1	02272 1	20162 0	10135 1	54135 1	12242 0
00,2270	C: 04604 1	16030 0	60000 1	54156 1	35021 1	56001 0	00002 0	30135 0
00,2300	63730 0	00006 1	62322 0	67716 0	54135 1	35021 1	56154 1	56155 0
00,2310	54156 1	10135 1	54135 1	02300 0	C: 22650 1	35006 1	70116 0	10000 0
00,2320	07105 1	16030 0	50135 0	35002 0	54135 1	35006 1	70116 0	10000 0
00,2330	12031 0	12033 1	40135 1	62126 0	54135 1	12236 0	42126 1	60135 0
00,2340	40000 0	54135 1	10163 1	12346 0	12346 0	12145 1	40116 0	00006 1
00,2350	75012 0	54020 1	12103 0	45017 0	54136 1	54137 0	54140 0	10130 1
00,2360	12516 0	12363 1	12531 0	54156 1	07226 0	10154 0	12414 0	12371 1
00,2370	12413 1	56131 1	56130 0	56155 0	56154 1	10130 1	12422 0	12401 1

OCTAL LISTING FOR PARAGRAPH # 021. WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD. "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

00,2400	12416 1	40154 0	00006 1	62405 1	24136 0	34777 1	54154 0	02630 0
00,2410	35017 1	54121 1	06030 1	24136 0	40131 0	12402 1	00006 1	40131 0
00,2420	52131 0	24136 0	10154 0	12437 1	12426 1	12433 0	10155 1	12437 1
00,2430	16030 0	12433 0	16030 0	00006 1	40155 1	52155 1	24136 0	40154 0
00,2440	67716 0	60130 0	10000 0	12505 1	C: 60001 0	12446 1	35002 0	60000 1
00,2450	60155 0	54155 1	35021 1	64777 1	26154 0	35002 0	60000 1	60131 1
00,2460	54131 0	35021 1	64777 1	26130 1	40154 0	60130 0	10000 0	12505 1
00,2470	C: 00133 0	12405 0	54140 0	40155 1	60131 1	00006 1	62405 1	12505 1
00,2500	00006 1	24137 1	00006 1	30131 1	20131 0	30130 0	60000 1	54000 0
00,2510	12500 1	52155 1	50137 1	02565 0	54156 1	16030 0	10000 0	12422 0
00,2520	40131 0	00006 1	62422 1	35002 0	60000 1	26131 0	35021 1	54130 1
00,2530	12363 1	10000 0	12416 1	30131 1	00006 1	62416 0	45002 1	12524 1
00,2540	22021 1	00006 1	75002 1	56001 0	60021 1	56001 0	12571 1	20001 1
00,2550	20001 1	20001 1	20001 1	20001 1	20001 1	20001 1	20001 1	20001 1
00,2560	20001 1	20001 1	20001 1	20001 1	52155 1	10140 0	C: 06552 0	12642 1
00,2570	52155 1	00006 1	10130 1	52155 1	40154 0	00006 1	70131 0	60155 0
00,2600	54000 0	12606 1	00006 1	60130 0	24154 1	12610 0	00006 1	62620 1
00,2610	00006 1	60130 0	00006 1	12616 0	00006 1	62624 0	24154 1	12625 0
00,2620	00006 1	12630 1	00006 1	26154 0	60130 0	22007 0	00006 1	10130 1
00,2630	54155 1	10136 1	00002 0	00002 0	00002 0	00006 1	40155 1	52155 1
00,2640	35021 1	00002 0	40154 0	60130 0	00006 1	12647 1	12570 0	34777 1
00,2650	54154 0	40131 0	60155 0	12624 1	45017 0	54137 0	54127 1	03010 0
00,2660	52131 0	07513 1	52131 0	10130 1	12721 0	12667 0	12715 1	56131 1
00,2670	56130 0	56155 0	56154 1	00006 1	12676 0	12405 0	56160 0	56157 1
00,2700	00006 1	12703 0	12405 0	56162 1	56161 1	00006 1	12710 1	12405 0
00,2710	10130 1	12721 0	12405 0	12715 1	12405 0	00006 1	40131 0	52131 0
00,2720	24127 0	00006 1	30131 1	52134 0	12732 1	00006 1	24137 1	00006 1
00,2730	30131 1	20131 0	30130 0	60000 1	54000 0	12725 1	02750 1	52160 1
00,2740	52155 1	52160 1	02750 1	52162 0	52155 1	52162 0	02750 1	17367 0
00,2750	30127 0	54136 1	10154 0	12767 1	12756 0	12763 0	10155 1	12767 1
00,2760	00002 0	12763 0	00002 0	00006 1	40155 1	52155 1	24136 0	45017 0
00,2770	54140 0	40154 0	60133 0	10000 0	13004 1	12777 0	12405 0	54140 0

OCTAL LISTING FOR PARAGRAPH # 022, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

00,3000	40155 1	60134 1	00006 1	62405 1	52155 1	50137 1	12565 1	C: 32506 0
00,3010	56002 0	52155 1	07513 1	52155 1	52160 1	07513 1	52160 1	52162 0
00,3020	07513 1	52162 0	00000 1	03010 0	07501 1	35021 1	56121 0	54141 1
00,3030	03317 1	30141 0	56121 0	00006 1	13036 0	12405 0	00006 1	30155 0
00,3040	50120 1	52043 1	03343 0	10154 0	13051 1	54001 1	50120 1	52045 1
00,3050	12405 0	44333 1	60135 0	10000 0	40000 0	13133 1	13065 0	45025 1
00,3060	54135 1	30154 1	54001 1	35021 1	13112 1	10135 1	13074 0	42024 1
00,3070	54135 1	00006 1	30155 0	13112 1	40000 0	54135 1	40000 0	50000 1
00,3100	35002 0	54130 1	00006 1	70155 1	56130 0	00006 1	70154 0	56001 0
00,3110	60130 0	56001 0	50120 1	52045 1	45017 0	54140 0	52123 0	52155 1
00,3120	52131 0	03151 1	52125 0	52155 1	52160 1	03151 1	52127 1	52155 1
00,3130	52162 0	03151 1	17367 0	54135 1	35021 1	56123 1	56122 0	56125 1
00,3140	56124 0	56127 0	56126 1	40135 1	50000 1	35002 0	00006 1	70154 0
00,3150	13062 1	10154 0	13170 0	13155 1	13162 0	10155 1	13170 0	00002 0
00,3160	13162 0	00002 0	45021 0	54136 1	00006 1	40155 1	50135 0	12564 0
00,3170	54136 1	52155 1	50135 0	12564 0	03300 1	16030 0	10163 1	13226 0
00,3200	13226 0	03317 1	22163 0	00006 1	30155 0	50120 1	52043 1	03343 0
00,3210	10135 1	13213 0	16030 0	63730 0	00006 1	63221 0	22007 0	22116 1
00,3220	12303 1	50135 0	35001 0	54135 1	35021 1	12036 1	06672 1	16030 0
00,3230	16030 0	17637 0	45015 1	26166 1	00006 1	50000 1	30003 1	52160 1
00,3240	00006 1	50166 0	30001 0	52162 0	16470 0	03317 1	17301 0	00006 1
00,3250	30155 0	50166 0	52001 1	50163 0	36213 1	26166 1	10163 1	13272 1
00,3260	16030 0	00006 1	30160 0	50166 0	51775 0	00006 1	30162 1	50166 0
00,3270	51777 1	16030 0	30156 0	16523 1	50120 1	30052 0	54117 1	16621 0
00,3300	30155 0	00006 1	70000 0	54156 1	35021 1	56155 0	00006 1	70154 0
00,3310	20001 1	20156 1	56154 1	00006 1	70000 0	20155 1	00002 0	00006 1
00,3320	22137 1	03300 1	52160 1	52155 1	52131 0	30156 0	54132 0	03300 1
00,3330	52156 1	20132 0	60154 1	60130 0	54130 1	13337 1	54121 1	52162 0
00,3340	52155 1	03300 1	17154 1	35021 1	54135 1	10154 0	13404 0	13351 1
00,3350	13373 1	56156 0	56155 0	54154 0	35023 0	54135 1	10154 0	13404 0
00,3360	13362 1	13376 1	56155 0	54154 0	35023 0	26135 1	10154 0	13404 0
00,3370	00002 0	13376 1	13452 0	10000 0	13402 0	10155 1	35021 1	13452 0

OCTAL LISTING FOR PARAGRAPH # 023, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

00,3400	13402 0	13452 0	05721 0	C: 01302 1	62444 1	00006 1	63455 0	52155 1
00,3410	22021 1	00006 1	75002 1	52155 1	56021 1	26155 1	32314 0	00006 1
00,3420	70154 0	62566 0	54130 1	30154 1	22007 0	00006 1	10130 1	00006 1
00,3430	75002 1	26130 1	00006 1	75002 1	52155 1	00006 1	10130 1	54131 0
00,3440	35021 1	56001 0	00006 1	10130 1	54001 1	30131 1	20155 1	00006 1
00,3450	13454 0	34777 1	54154 0	54155 1	00002 0	65003 1	00006 1	63501 0
00,3460	52155 1	22021 1	00006 1	75002 1	52155 1	56021 1	26155 1	33007 0
00,3470	00006 1	70154 0	62270 0	13422 1	00006 1	30156 0	20156 1	60154 1
00,3500	26154 0	24135 0	00006 1	30156 0	20156 1	60154 1	26154 0	60000 1
00,3510	54022 0	10022 0	10022 0	13474 1	13416 0	13467 0	06672 1	13522 0
00,3520	13525 1	13525 1	00006 1	40155 1	52155 1	35003 1	26154 0	52155 1
00,3530	20001 1	54000 0	13535 0	00006 1	40001 1	52155 1	30154 1	60000 1
00,3540	54001 1	13552 1	50000 1	35001 0	60000 1	00006 1	60154 1	54154 0
00,3550	40155 1	54155 1	00006 1	30155 0	52134 0	03300 1	07171 1	C: 00003 1
00,3560	C: 14441 0	C: 37325 1	C: 53250 0	C: 60764 1	C: 12146 1	C: 21276 1	C: 75466 1	C: 71471 0
00,3570	C: 00236 0	C: 32757 0	32470 0	07055 0	00006 1	30156 0	20156 1	60154 1
00,3600	26154 0	00006 1	30156 0	20156 1	60154 1	26154 0	16030 0	33630 1
00,3610	13612 0	33712 0	54136 1	06672 1	13624 0	13726 0	00006 1	40155 1
00,3620	52155 1	33731 1	56136 0	54137 0	45002 1	60154 1	10000 0	13720 0
00,3630	13706 1	13641 0	10155 1	35021 1	13636 0	13641 0	54155 1	54154 0
00,3640	00136 0	00006 1	40155 1	65002 0	52155 1	52134 0	03343 0	10135 1
00,3650	13713 0	52155 1	52134 0	52155 1	07171 1	C: 00006 1	C: 13240 0	C: 23630 0
00,3660	C: 74721 0	C: 47775 1	C: 02440 0	C: 20237 0	C: 75067 1	C: 70742 1	C: 03436 0	C: 26756 1
00,3670	C: 74037 0	C: 57640 1	C: 03046 0	C: 07143 0	C: 76654 1	C: 42244 0	32470 0	07055 0
00,3700	00136 0	00006 1	40155 1	65002 0	52155 1	00137 1	00006 1	40155 1
00,3710	65003 1	52155 1	16030 0	50000 1	35002 0	54135 1	02073 1	13651 1
00,3720	00006 1	13636 0	05650 1	C: 01301 1	35021 1	13636 0	35003 1	13637 1
00,3730	C: 77763 0	13701 0	00004 0	54002 1	36214 0	54070 1	50000 1	31141 1
00,3740	00006 1	13746 0	10070 1	13735 1	07755 1	C: 01104 0	33766 0	54061 1
00,3750	30004 0	60070 0	54001 1	33767 1	15255 1	04711 1	50070 0	55141 0
00,3760	05175 1	35021 1	50006 1	57141 1	05201 1	05324 1	C: 03753 0	C: 03761 1
00,3770	C: 03770 1	C: 03771 0	CKSM 50114 0	@	@	@	@	@

OCTAL LISTING FOR PARAGRAPH # 024. WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD. "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

01,2000	00063 1	00010 0	00063 1	00024 1	00063 1	00043 0	00063 1	00107 1
01,2010	00242 0	00260 0	00336 1	00346 0	C: 00170 1	C: 74570 0	C: 45711 1	C: 10000 0
01,2020	C: 02405 1	C: 34066 0	C: 10000 0	C: 02074 0	C: 56066 1	C: 10000 0	C: 02345 1	C: 76066 0
01,2030	C: 02654 1	C: 75150 1	C: 26063 0	C: 05000 1	C: 02636 0	C: 26063 0	C: 10000 0	C: 02630 0
01,2040	C: 70067 1	C: 14000 1	C: 02576 1	C: 62065 0	C: 10000 0	C: 02377 0	C: 56067 0	C: 20000 0
01,2050	C: 02427 1	C: 34067 1	C: 00000 1	C: 00000 1	C: 00000 1	C: 22000 1	C: 02117 1	C: 70063 0
01,2060	C: 22000 1	C: 02253 1	C: 70063 0	C: 22000 1	C: 02026 1	C: 70063 0	C: 76347 0	C: 75011 0
01,2070	C: 27710 1	C: 77777 0	C: 75207 0	C: 27710 1	C: 30000 1	C: 02534 1	C: 50067 0	C: 77777 0
01,2100	C: 75207 0	C: 27710 1	C: 05664 0	C: 75443 0	C: 27711 0	C: 77777 0	C: 75207 0	C: 27710 1
01,2110	C: 04700 1	C: 75203 1	C: 27710 1	C: 00050 1	C: 75115 0	C: 27711 0	C: 00240 1	C: 75064 1
01,2120	C: 27711 0	C: 00764 1	C: 75165 1	C: 27711 0	C: 00372 1	C: 74235 0	C: 27711 0	C: 00310 0
01,2130	C: 74270 1	C: 27710 1	C: 16000 0	C: 02000 0	C: 66065 1	C: 16000 0	C: 03742 0	C: 66065 1
01,2140	C: 01672 0	C: 75340 1	C: 50067 0	C: 12000 1	C: 02204 0	C: 50067 0	C: 24000 1	C: 02000 0
01,2150	C: 32060 0	C: 00372 1	C: 74775 1	C: 27711 0	C: 13000 0	C: 02533 0	C: 30065 1	C: 04064 1
01,2160	C: 75403 1	C: 23711 1	C: 12000 1	C: 02246 0	C: 50066 1	C: 00764 1	C: 75222 1	C: 27710 1
01,2170	C: 17000 1	C: 02512 0	C: 54066 0	C: 76003 0	C: 75212 1	C: 23711 1	C: 13000 0	C: 02603 0
01,2200	C: 54066 0	C: 17000 1	C: 03014 1	C: 52066 0	C: 77777 0	C: 75457 0	C: 07711 1	C: 77777 0
01,2210	C: 74254 1	C: 27710 1	C: 13000 0	C: 02457 0	C: 54067 1	C: 76105 1	C: 75277 1	C: 27710 1
01,2220	C: 77777 0	C: 75152 0	C: 27711 0	C: 77777 0	C: 75003 0	C: 27711 0	C: 00012 1	C: 75203 1
01,2230	C: 27710 1	C: 77777 0	C: 74336 1	C: 27711 0	C: 00372 1	C: 74321 1	C: 27711 0	C: 77777 0
01,2240	C: 74304 0	C: 27711 0	C: 77777 0	C: 74242 0	C: 27711 0	C: 77777 0	C: 75165 1	C: 27711 0
01,2250	C: 32000 0	C: 03236 0	C: 76067 1	C: 00310 0	C: 74472 0	C: 01711 1	C: 20000 0	C: 03104 1
01,2260	C: 76067 1	C: 00310 0	C: 74472 0	C: 01711 1	C: 00310 0	C: 74472 0	C: 01711 1	C: 77777 0
01,2270	C: 75026 1	C: 01711 1	C: 20000 0	C: 02456 1	C: 66065 1	C: 77777 0	C: 75175 0	C: 11712 0
01,2300	C: 20000 0	C: 02527 0	C: 66065 1	C: 20000 0	C: 03324 1	C: 66065 1	C: 20000 0	C: 05217 0
01,2310	C: 04065 0	C: 22000 1	C: 02636 0	C: 66065 1	C: 77777 0	C: 75152 0	C: 11712 0	C: 20000 0
01,2320	C: 03335 1	C: 66065 1	C: 20000 0	C: 03303 1	C: 66065 1	C: 00000 1	C: 00000 1	C: 00000 1
01,2330	C: 20000 0	C: 03360 1	C: 66065 1	C: 00000 1	C: 00000 1	C: 00000 1	C: 77777 0	C: 74744 0
01,2340	C: 01711 1	C: 77777 0	C: 75076 1	C: 01710 0	C: 77777 0	C: 75536 0	C: 37711 1	C: 00144 0
01,2350	C: 74517 1	C: 27710 1	C: 00144 0	C: 74517 1	C: 27710 1	C: 30000 1	C: 03573 0	C: 56063 1
01,2360	C: 00000 1	C: 00000 1	C: 00000 1	C: 76052 1	C: 75343 1	C: 45711 1	C: 00000 1	C: 00000 1
01,2370	C: 00000 1	02466 1	30117 0	50130 0	54046 1	16030 0	02466 1	40117 1

OCTAL LISTING FOR PARAGRAPH # 025, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD. "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

01,2400	02373 1	02454 0	50117 0	30000 1	12373 0	02454 0	50117 0	40000 0
01,2410	12373 0	02454 0	50130 0	30046 0	50117 0	54000 0	16030 0	02454 0
01,2420	50117 0	30000 1	50130 0	56046 0	12414 0	02454 0	50117 0	30000 1
01,2430	50130 0	26046 1	16030 0	02466 1	30117 0	12430 0	02454 0	50117 0
01,2440	40000 0	12430 0	02466 1	50130 0	40050 0	50130 0	60046 0	00006 1
01,2450	66030 1	50130 0	56046 0	16615 1	40117 1	65034 0	10000 0	30120 1
01,2460	12465 0	35051 0	56117 0	54003 0	74373 0	26117 1	30120 1	54130 1
01,2470	10020 1	24130 0	00002 0	00002 0	10020 1	30117 0	04665 0	10154 0
01,2500	16030 0	16615 1	16030 0	16615 1	10121 1	12507 0	16030 0	54121 1
01,2510	10020 1	12475 1	C: 00360 1	16615 1	10020 1	06672 1	16030 0	16615 1
01,2520	16030 0	10020 1	12530 1	C: 12000 1	06672 1	16030 0	16030 0	16615 1
01,2530	06672 1	16615 1	16615 1	16030 0	10020 1	16607 1	05747 0	02454 0
01,2540	50120 1	30052 0	12414 0	35026 0	70117 1	50000 1	35001 0	54131 0
01,2550	35011 1	00006 1	70117 1	54130 1	00004 0	50000 1	30074 1	54002 1
01,2560	35005 1	00006 1	70117 1	72623 0	50000 1	12566 1	30131 1	00006 1
01,2570	04002 1	12600 1	30131 1	00006 1	06002 0	12600 1	40131 0	70002 1
01,2600	50130 0	54074 0	00003 1	35003 1	00006 1	70117 1	72623 0	50000 1
01,2610	12611 1	40002 1	70131 0	10000 0	12624 1	16664 1	12624 1	05747 0
01,2620	05747 0	30002 0	12612 1	C: 00014 1	24164 1	16030 0	54061 1	10400 1
01,2630	12643 0	10454 0	12643 0	10530 0	12643 0	10604 1	12643 0	10660 0
01,2640	12643 0	07755 1	C: 01201 0	65016 0	22007 0	50000 1	21777 0	26063 0
01,2650	35021 1	54064 1	32657 1	54062 1	50064 0	10167 0	12717 0	C: 00006 1
01,2660	12717 0	30063 1	50064 0	54167 0	75046 1	50064 0	54166 1	10064 1
01,2670	12704 1	54121 1	30166 0	54120 0	10067 1	12704 1	05747 0	05747 0
01,2700	54067 1	52066 0	52165 1	15222 1	52066 0	50064 0	52165 1	50067 0
01,2710	40167 0	60063 1	00006 1	65222 0	30064 0	54067 1	15222 1	33054 0
01,2720	26064 1	10062 1	12653 1	07755 1	C: 01202 0	22164 1	30165 0	00004 0
01,2730	00006 1	04007 1	56001 0	50067 0	52165 1	52165 1	30165 0	00006 1
01,2740	01007 1	52155 1	50067 0	52155 1	52155 1	52157 0	50067 0	52157 0
01,2750	52157 0	52161 0	50067 0	52161 0	52161 0	52163 1	50067 0	52163 1
01,2760	52163 1	35021 1	56121 0	00006 1	12767 1	40166 1	54166 1	52167 0
01,2770	50067 0	52167 0	52167 0	35046 0	70167 0	54120 0	10166 1	35021 1

OCTAL LISTING FOR PARAGRAPH # 026, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

01,3000	13005 0	40166 1	54166 1	35017 1	56121 0	54067 1	00003 1	52165 1
01,3010	00006 1	63013 0	52006 0	40000 0	65017 1	54164 0	16017 0	00004 0
01,3020	40167 0	54167 0	36043 0	70006 0	00006 1	04007 1	54165 1	45021 0
01,3030	54131 0	13141 1	00004 0	10067 1	13037 1	00003 1	13233 1	35016 0
01,3040	00006 1	05011 1	52165 1	12733 0	54061 1	35021 1	54064 1	32657 1
01,3050	54062 1	50064 0	10167 0	13056 0	C: 00014 1	13065 0	33054 0	26064 1
01,3060	10062 1	13050 0	45017 0	54064 1	15222 1	40065 0	50064 0	60164 1
01,3070	00006 1	13073 1	13056 0	50064 0	40167 0	54063 0	50064 0	54167 0
01,3100	44364 0	70065 0	65005 1	56065 1	74364 0	50064 0	60165 0	54066 0
01,3110	10064 1	12704 1	12674 1	54164 0	35021 1	54130 1	35046 0	70167 0
01,3120	60063 1	54167 0	40000 0	13030 0	00004 0	45021 0	54131 0	56167 1
01,3130	75046 1	54001 1	45226 0	60001 0	00006 1	63141 0	10001 1	50000 1
01,3140	54000 0	10203 1	03206 0	05747 0	13145 0	10217 1	03206 0	05747 0
01,3150	13151 0	10233 1	03206 0	C: 67610 1	13155 1	10247 1	03206 0	05747 0
01,3160	13161 0	10263 1	03206 0	05747 0	13165 1	10277 1	03206 0	05747 0
01,3170	13171 1	10131 0	05747 0	05747 0	13176 0	13223 0	10130 1	13201 0
01,3200	13005 0	50000 1	27777 0	63153 0	54067 1	12725 1	54132 0	60131 1
01,3210	10000 0	40132 0	13216 0	13214 1	50002 0	00002 0	54131 0	00006 1
01,3220	22130 0	50130 0	00002 0	45021 0	54067 1	00003 1	45016 1	00006 1
01,3230	03011 1	10067 1	13032 1	35016 0	13242 1	31361 1	54001 1	33241 0
01,3240	15230 1	C: 66102 1	00006 1	05011 1	52165 1	15227 1	54062 1	40026 1
01,3250	65010 0	10000 0	66056 1	40000 0	63402 1	60002 0	10000 0	61400 1
01,3260	13322 0	13262 0	40002 1	65002 0	65002 0	56026 0	65001 0	60002 0
01,3270	00006 1	22007 0	57400 1	57401 0	57402 0	57403 1	57404 0	57405 1
01,3300	57406 1	57407 0	30063 1	50002 0	13305 0	53411 0	53413 1	53415 1
01,3310	53417 0	53421 0	53423 1	53425 1	53427 0	53431 1	65304 0	00006 1
01,3320	15263 1	13375 1	10000 0	61401 0	13330 0	65017 1	03403 0	C: 00001 0
01,3330	10000 0	61402 0	13336 0	65017 1	03403 0	C: 00002 0	10000 0	61403 1
01,3340	13344 0	65017 1	03403 0	C: 00003 1	10000 0	61404 0	13352 1	65017 1
01,3350	03403 0	C: 00004 0	10000 0	61405 1	13360 0	65017 1	03403 0	C: 00005 1
01,3360	10000 0	61406 1	13366 0	65017 1	03403 0	C: 00006 1	10000 0	61407 0
01,3370	13374 0	65017 1	03403 0	C: 00007 0	10000 0	07755 1	C: 01203 1	65017 1

OCTAL LISTING FOR PARAGRAPH # 027. WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD. "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

01,3400	03403 0	C: 00010 0	C: 40201 0	54064 1	50002 0	30000 1	54002 1	35017 1
01,3410	60064 0	50002 0	27377 1	40064 1	50002 0	13272 1	00006 1	04007 1
01,3420	54016 1	00006 1	22012 1	35000 1	57407 0	57406 1	57405 1	57404 0
01,3430	57403 1	57402 0	57401 0	57400 1	64777 1	26026 1	54734 0	45021 0
01,3440	54734 0	00006 1	45305 0	53431 1	53427 0	53425 1	53423 1	53421 0
01,3450	53417 0	53415 1	53413 1	53411 0	56001 0	00006 1	01007 1	56001 0
01,3460	52006 0	23435 1	35016 0	26002 1	55434 1	00006 1	43477 1	21140 1
01,3470	11140 1	13510 1	13473 0	13474 1	11137 1	13510 1	C: 00000 1	C: 20000 0
01,3500	35002 0	27140 1	05245 1	C: 03515 0	C: 02063 0	33517 1	53435 0	52006 0
01,3510	35002 0	05245 1	C: 03465 0	C: 02063 0	13505 0	53134 1	52006 0	C: 05324 1
01,3520	30161 1	60000 1	54155 1	33762 1	54157 0	33557 0	54707 0	30154 1
01,3530	75051 1	10000 0	13543 1	10154 0	10000 0	13643 1	35066 1	05147 0
01,3540	C: 03261 1	C: 20063 0	03557 0	75051 1	10000 0	13614 0	00006 1	50155 0
01,3550	31437 0	52706 1	30154 1	75023 1	67715 0	10000 0	13726 0	04675 1
01,3560	13562 1	13627 0	33766 0	54704 0	50155 0	31054 1	10000 0	24000 1
01,3570	13573 1	15500 0	13612 0	40000 0	54001 1	50155 0	41053 1	00006 1
01,3600	60025 0	10000 0	40000 0	67700 1	65017 1	60001 0	10000 0	35021 1
01,3610	13612 0	13612 0	65017 1	00704 1	33557 0	54157 0	33763 0	54707 0
01,3620	30154 1	76043 1	54154 0	00006 1	50155 0	31437 0	52706 1	50155 0
01,3630	31054 1	54704 0	00006 1	63637 0	33765 0	56704 1	00704 1	33767 1
01,3640	56704 1	40000 0	00704 1	54020 1	10020 1	13646 1	13744 1	33557 0
01,3650	54707 0	30154 1	54021 0	60021 1	50155 0	62001 1	54156 1	00006 1
01,3660	50156 0	32002 1	22706 0	10000 0	24000 1	13740 0	24000 1	54705 1
01,3670	33766 0	54704 0	30706 0	75006 0	10000 0	13733 1	50156 0	32000 0
01,3700	15507 1	53140 1	00006 1	40025 1	21140 1	00006 1	31136 1	21140 1
01,3710	11137 1	13721 1	13714 1	13607 1	11140 1	13721 1	13717 1	13607 1
01,3720	13612 0	33764 1	54704 0	00006 1	31140 0	00704 1	33766 0	54704 0
01,3730	50155 0	41054 0	15507 1	40706 1	54706 1	50156 0	32000 0	13566 0
01,3740	56705 0	50156 0	32000 0	13631 1	30157 1	54707 0	50155 0	32000 0
01,3750	60154 1	60154 1	60154 1	54156 1	13657 1	36214 0	26156 1	33557 0
01,3760	54707 0	13657 1	C: 03755 0	C: 03533 1	C: 05342 1	C: 05147 0	C: 05245 1	C: 05134 1
01,3770	C: 03770 1	C: 03771 0	CKSM 50017 1	@	@	@	@	@

OCTAL LISTING FOR PARAGRAPH # 040, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

04,2000	02330 0	05540 0	32010 1	04662 1	C: 20720 0	12002 0	12002 0	12002 0
04,2010	C: 11343 0	54775 0	34371 0	54366 0	31320 1	75012 0	10000 0	12071 1
04,2020	35003 1	00006 1	02011 0	10000 0	12031 0	40102 0	74105 0	00006 1
04,2030	62062 1	00004 0	35057 0	54003 0	31474 1	55652 0	04740 0	C: 51017 0
04,2040	04740 0	C: 13366 0	32415 0	04740 0	C: 42025 0	04740 0	C: 51071 0	35021 1
04,2050	54775 0	00003 1	35022 1	04662 1	C: 01732 0	35021 1	00006 1	01005 0
04,2060	00006 1	01006 0	30775 1	00006 1	12113 1	40076 1	75017 0	10000 0
04,2070	12076 0	05650 1	C: 01520 1	04473 0	04701 0	C: 21272 0	32520 1	54155 1
04,2100	50155 0	32457 0	76043 1	40000 0	60775 1	10000 0	10155 1	12077 1
04,2110	12272 0	30155 0	54774 1	40103 1	75012 0	10000 0	12124 0	00004 0
04,2120	45017 0	70075 1	54075 1	15217 1	32412 1	54374 0	05412 0	C: 00014 1
04,2130	06006 1	I: 77624 1	C: 27442 0	I: 77776 1	45051 1	00006 1	03011 1	32403 1
04,2140	00006 1	03012 1	42404 1	00006 1	03013 0	02330 0	05536 1	05560 1
04,2150	C: 00020 0	04662 1	C: 57757 0	05560 1	C: 00215 1	05560 1	C: 00037 0	10775 0
04,2160	12260 0	04473 0	35061 0	55056 1	00004 0	45017 0	70076 1	54076 1
04,2170	35022 1	54001 1	40000 0	52755 1	42407 1	70074 0	54074 0	35021 1
04,2200	54332 1	42410 1	55071 1	70075 1	54075 1	04740 0	C: 12513 0	10775 0
04,2210	12217 0	04740 0	C: 12505 1	30775 1	55011 1	04701 0	C: 12651 0	40775 0
04,2220	64112 1	00006 1	12224 0	12234 1	40775 0	61011 0	00006 1	12240 1
04,2230	30074 1	75011 0	10000 0	12251 1	35011 1	70074 0	10000 0	12246 1
04,2240	00006 1	35021 1	52753 1	00006 1	35021 1	52755 1	32411 1	54374 0
04,2250	12215 1	40075 1	75037 1	26075 1	00006 1	35021 1	52761 0	12213 1
04,2260	35011 1	70074 0	10000 0	12266 0	05560 1	C: 00007 0	50774 0	32521 0
04,2270	00004 0	12200 0	04400 1	12073 0	00004 0	50774 0	32457 0	55060 1
04,2300	54020 1	30020 0	77674 1	55062 0	54063 0	31060 0	00006 1	75010 1
04,2310	75023 1	54001 1	50774 0	32416 0	55061 0	74364 0	26001 1	31061 1
04,2320	75054 1	65005 1	05160 0	31060 0	76043 1	05357 0	04473 0	05217 0
04,2330	00006 1	22155 0	35057 0	54003 0	00004 0	04526 1	30105 0	75004 1
04,2340	10000 0	12345 0	04662 1	C: 50304 0	12347 1	04662 1	C: 50320 0	35024 1
04,2350	54154 0	50154 1	42367 0	50154 1	70074 0	50154 1	54074 0	10154 0
04,2360	12350 1	00003 1	05546 0	C: 00044 1	37716 0	55303 1	00155 0	C: 00000 1
04,2370	C: 00040 0	C: 06000 1	C: 00000 1	C: 00000 1	C: 04140 0	C: 10000 0	C: 16000 0	C: 00000 1

OCTAL LISTING FOR PARAGRAPH # 041. WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

04,2400	C: 42000 1	C: 00000 1	C: 00000 1	C: 44571 1	C: 00600 1	C: 03153 0	C: 12066 1	C: 00300 1
04,2410	C: 01120 0	C: 10277 1	C: 10133 1	C: 02122 1	C: 42066 1	C: 37312 0	C: 11172 0	C: 10744 1
04,2420	C: 73153 1	C: 26071 0	C: 72163 0	C: 72002 0	C: 11441 0	C: 11305 1	C: 54320 1	C: 54217 1
04,2430	C: 32000 0	C: 31067 1	C: 32000 0	C: 31067 1	C: 50463 0	C: 56614 1	C: 50073 0	C: 11166 0
04,2440	C: 10742 1	C: 74466 0	C: 72157 1	C: 72000 1	C: 11437 1	C: 11303 1	C: 73337 1	C: 73323 1
04,2450	C: 62403 1	C: 60000 1	C: 76001 1	C: 76261 0	C: 73151 0	C: 55660 1	C: 66001 0	C: 27117 0
04,2460	C: 27116 1	C: 27115 1	C: 27714 0	C: 27113 1	C: 27112 0	C: 27111 0	C: 27110 1	C: 27476 1
04,2470	C: 27475 1	C: 27266 0	C: 27265 0	C: 27264 1	C: 27263 0	C: 27657 0	C: 27451 1	C: 27450 0
04,2500	C: 27047 1	C: 27046 0	C: 27645 0	C: 27043 0	C: 27042 1	C: 27041 1	C: 27040 0	C: 27637 0
04,2510	C: 27636 1	C: 27227 0	C: 27226 1	C: 27025 0	C: 27424 0	C: 27021 1	C: 27006 1	C: 41201 1
04,2520	C: 00040 0	C: 00002 0	C: 00002 0	C: 00002 0	C: 00002 0	C: 00002 0	C: 00002 0	C: 00002 0
04,2530	C: 00002 0	C: 00001 0	C: 00003 1	C: 00000 1	C: 00000 1	C: 00000 1	C: 00000 1	C: 00003 1
04,2540	C: 00003 1	C: 00003 1	C: 00002 0	C: 00002 0	C: 00002 0	C: 00002 0	C: 00002 0	C: 00002 0
04,2550	C: 00002 0	C: 00002 0	C: 00002 0	C: 00002 0	C: 00004 0	C: 00002 0	C: 00002 0	C: 00002 0
04,2560	C: 00000 1	C: 00000 1	C: 00465 0	C: 32324 0	C: 00333 1	C: 01733 1	56002 0	54154 0
04,2570	00004 0	34371 0	05134 1	C: 03441 0	C: 60101 1	00003 1	00154 1	54001 1
04,2600	04234 0	04240 0	04410 0	30001 0	55043 0	05175 1	05201 1	45005 0
04,2610	50064 0	26164 0	00072 1	I: 62545 1	C: 02403 1	C: 15047 0	C: 02401 0	I: 77434 1
04,2620	C: 45546 1	56154 1	55045 0	04662 1	C: 20703 1	32644 0	04662 1	C: 20720 0
04,2630	02632 1	02633 0	02625 1	06006 1	I: 47135 0	C: 01046 1	C: 45513 1	C: 02401 0
04,2640	I: 60535 1	C: 01047 0	C: 02403 1	I: 77616 0	C: 01451 0	C: 20000 0	C: 00000 1	I: 43014 0
04,2650	C: 01312 0	C: 10667 1	C: 02747 1	C: 10672 0	I: 53575 0	I: 72441 0	C: 01744 1	I: 51136 1
04,2660	C: 10664 1	I: 43215 0	C: 10646 1	C: 10646 1	C: 03626 0	I: 43414 1	C: 02675 1	I: 77614 1
04,2670	C: 02747 1	C: 10654 1	I: 53575 0	C: 03570 0	I: 77676 0	C: 00023 0	I: 53435 0	C: 03576 0
04,2700	C: 00015 0	I: 53435 0	C: 00023 0	C: 24007 0	C: 00001 0	I: 76521 0	C: 00007 0	C: 03405 0
04,2710	I: 43414 1	C: 02475 0	I: 77160 0	C: 00002 0	C: 00000 1	I: 77614 1	C: 04343 1	C: 10723 0
04,2720	I: 77160 0	C: 00012 1	C: 00002 0	I: 66143 1	C: 11744 0	C: 03745 1	C: 23752 0	C: 11736 0
04,2730	I: 54214 1	C: 04343 1	C: 10734 0	C: 20607 1	C: 03750 0	I: 43134 0	C: 03746 1	C: 01271 1
04,2740	I: 77650 1	C: 73002 1	04627 0	02745 0	04642 0	04647 0	33274 0	03263 0
04,2750	33275 1	04662 1	C: 21057 0	14106 0	12761 1	12750 0	36214 0	05526 0
04,2760	15217 1	35022 1	55131 1	35017 1	55132 1	33276 1	04662 1	C: 21057 0
04,2770	14106 0	12776 1	12765 0	35015 0	05526 0	15217 1	06006 1	I: 77731 1

OCTAL LISTING FOR PARAGRAPH # 042. WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD. "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

04,3000	C: 03766 0	C: 00002 0	I: 70535 0	C: 01133 1	I: 71230 0	C: 11013 0	C: 03656 1	C: 02611 0
04,3010	I: 77614 1	C: 01230 1	C: 11042 1	I: 43014 0	C: 01070 1	C: 00670 0	I: 77624 1	C: 11216 1
04,3020	I: 43214 1	C: 00470 1	C: 03413 1	C: 03656 1	C: 01046 1	I: 77776 1	33277 0	04662 1
04,3030	C: 21057 0	14106 0	13037 1	13026 1	36211 0	05526 0	15217 1	33300 1
04,3040	03263 0	06006 1	I: 45014 0	C: 04266 1	C: 10712 1	I: 77624 1	C: 11216 1	I: 71214 0
04,3050	C: 01350 0	C: 11071 1	C: 03656 1	C: 34041 0	C: 11247 0	I: 53575 0	C: 00001 0	I: 47315 0
04,3060	C: 00007 0	I: 60246 1	C: 00047 1	I: 56325 0	C: 02611 0	I: 77657 0	C: 20172 1	C: 36613 0
04,3070	C: 11075 0	I: 43345 1	C: 02611 0	C: 00037 0	C: 03656 1	I: 45345 1	C: 03656 1	C: 02613 1
04,3100	C: 02615 1	C: 34041 0	C: 11247 0	I: 77745 1	C: 03413 1	C: 03503 1	I: 77331 0	C: 02371 0
04,3110	C: 11114 0	C: 00001 0	I: 77624 1	C: 72546 0	I: 43014 0	C: 04346 1	C: 11125 1	C: 01311 0
04,3120	C: 11123 1	I: 77614 1	C: 00470 1	I: 77776 1	03152 1	I: 51575 1	C: 03646 0	C: 26635 0
04,3130	C: 03640 0	I: 51451 0	C: 03620 0	C: 26637 1	C: 03540 0	I: 45115 0	C: 03612 1	C: 45153 1
04,3140	I: 77624 1	C: 45263 1	C: 02641 0	I: 43014 0	C: 01311 0	C: 11147 0	C: 00470 1	I: 77776 1
04,3150	33301 0	03263 0	33302 0	03263 0	06006 1	I: 77214 0	C: 01267 0	C: 03646 0
04,3160	C: 37646 1	C: 73002 1	I: 52014 0	C: 04306 0	C: 11203 0	C: 11045 0	04627 0	00006 1
04,3170	31422 1	03175 1	04642 0	00006 1	31424 1	53764 1	04647 0	06006 1
04,3200	I: 45014 0	C: 04066 0	C: 10712 1	I: 43234 0	C: 45510 1	C: 02364 1	C: 03413 1	C: 34041 0
04,3210	C: 45215 0	I: 77624 1	C: 74000 1	I: 52145 0	C: 02615 1	C: 11101 1	I: 71220 1	C: 02367 1
04,3220	C: 03413 1	C: 34041 0	C: 45215 0	I: 53775 1	C: 03554 0	C: 57176 0	C: 16657 1	C: 03754 1
04,3230	I: 71406 0	C: 16734 0	I: 43156 1	C: 03466 0	C: 26732 0	C: 03562 0	I: 77657 0	C: 57176 0
04,3240	C: 36746 1	C: 24744 0	I: 77624 1	C: 74000 1	I: 52145 0	C: 00037 0	C: 02367 1	I: 43020 1
04,3250	C: 02367 1	C: 01352 1	C: 11257 1	I: 77624 1	C: 27071 1	I: 77650 1	C: 02367 1	I: 77624 1
04,3260	C: 27105 0	I: 77650 1	C: 02367 1	00006 1	23767 0	55765 0	31765 1	04662 1
04,3270	C: 20720 0	14106 0	01767 0	13266 1	C: 01441 1	C: 01467 0	C: 01006 0	C: 01471 1
04,3300	C: 01442 1	C: 01472 1	C: 01521 0	04627 0	03306 1	04642 0	06006 1	I: 77745 1
04,3310	C: 11566 1	C: 03754 1	I: 77776 1	03331 0	I: 77734 1	C: 03664 0	I: 77740 1	C: 03664 0
04,3320	I: 77533 1	C: 15653 0	30154 1	05764 1	35050 1	04662 1	C: 20720 0	04106 1
04,3330	03324 1	04647 0	06006 1	I: 77745 1	C: 11566 1	C: 03766 0	I: 77776 1	34656 0
04,3340	04575 1	34615 1	04662 1	C: 20720 0	04106 1	03347 1	03341 1	34614 0
04,3350	04575 1	06006 1	I: 77745 1	C: 02637 1	C: 37413 0	C: 10712 1	I: 77624 1	C: 76645 1
04,3360	I: 77201 1	C: 00001 0	C: 03512 1	I: 65315 0	C: 03756 0	C: 02637 1	I: 65325 0	C: 03663 1
04,3370	C: 11630 1	I: 41512 1	I: 77624 1	C: 72705 0	I: 77624 1	C: 45247 1	I: 77624 1	C: 15704 0

OCTAL LISTING FOR PARAGRAPH # 043, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD. "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

04,3400	I: 43014 0	C: 01311 0	C: 11404 1	C: 00470 1	I: 52145 0	C: 02547 0	C: 30002 0	C: 03656 1
04,3410	I: 51025 1	C: 15652 1	C: 11407 1	I: 77776 1	34660 0	04575 1	06006 1	I: 45175 0
04,3420	C: 02445 0	C: 73457 0	C: 26445 0	C: 02453 1	C: 26541 0	C: 03667 0	I: 45170 0	C: 01522 0
04,3430	C: 76625 1	I: 77745 1	C: 03663 1	C: 36641 1	C: 73002 1	I: 77650 1	C: 11356 1	04627 0
04,3440	03442 0	04642 0	04647 0	34657 1	04575 1	06006 1	I: 77745 1	C: 02641 0
04,3450	C: 17663 1	C: 02635 0	C: 37413 0	C: 10712 1	I: 77624 1	C: 76645 1	I: 77624 1	C: 13230 1
04,3460	I: 77201 1	C: 00001 0	C: 03546 0	I: 45115 0	C: 02453 1	C: 63671 1	I: 77624 1	C: 45237 0
04,3470	I: 77201 1	C: 00001 0	C: 02617 0	I: 45115 0	C: 02625 1	C: 63671 1	I: 77624 1	C: 45247 1
04,3500	I: 43145 0	C: 11566 1	C: 03461 1	C: 36364 0	C: 72216 1	I: 77454 1	C: 24000 1	05650 1
04,3510	C: 00611 1	35050 1	04662 1	C: 20720 0	04106 1	03517 1	03442 0	06006 1
04,3520	I: 77745 1	C: 11566 1	C: 36364 0	C: 24000 1	I: 51025 1	C: 15652 1	C: 11524 1	I: 77615 0
04,3530	C: 15652 1	C: 16547 0	C: 03663 1	I: 41425 1	C: 02641 0	I: 45246 0	C: 15652 1	I: 43244 1
04,3540	C: 11535 1	C: 15652 1	I: 45565 0	C: 74121 0	I: 77776 1	34660 0	04575 1	06006 1
04,3550	I: 45175 0	C: 03667 0	C: 73457 0	C: 37667 1	C: 73002 1	I: 77650 1	C: 11454 1	C: 00000 1
04,3560	C: 00000 1	C: 00000 1	C: 00000 1	C: 20000 0	C: 00000 1	C: 00000 1	C: 00000 1	C: 00000 1
04,3570	C: 00000 1	C: 00000 1	C: 00000 1	C: 77777 0	C: 77771 0	C: 77763 0	C: 37777 1	C: 37777 1
04,3600	C: 37777 1	C: 37777 1	C: 00000 1	C: 04000 0	C: 00000 1	C: 00200 0	C: 00000 1	C: 00400 0
04,3610	C: 00000 1	C: 10000 0	C: 00000 1	C: 02000 0	C: 00000 1	C: 01000 0	C: 00000 1	C: 00020 0
04,3620	C: 00000 1	C: 00100 0	C: 00000 1	C: 34631 1	C: 23146 0	C: 77467 1	C: 77777 0	C: 03110 1
04,3630	C: 17665 1	C: 00000 1	C: 00001 0	C: 37767 0	C: 37737 0	C: 40010 1	C: 40040 1	I: 43020 1
04,3640	C: 02755 1	C: 03665 1	I: 77614 1	C: 04273 0	I: 45131 0	C: 02675 1	C: 27777 0	C: 11702 1
04,3650	C: 14045 0	I: 56261 1	C: 20606 0	C: 00045 0	C: 33775 1	C: 11740 1	C: 14017 1	C: 02722 1
04,3660	I: 60316 0	C: 00047 1	I: 41275 1	C: 00017 1	C: 00041 1	I: 77657 0	C: 21576 0	I: 44206 0
04,3670	C: 11616 0	C: 16744 1	I: 60205 0	C: 00045 0	C: 00047 1	I: 53605 1	C: 00045 0	C: 20575 1
04,3700	C: 36742 0	C: 02755 1	I: 77656 1	C: 16714 1	C: 00045 0	C: 26722 1	I: 77656 1	C: 02724 1
04,3710	I: 72441 0	C: 02714 1	I: 77725 1	C: 00045 0	C: 24041 1	C: 02724 1	I: 76435 1	C: 02714 1
04,3720	I: 75214 1	C: 03705 0	C: 11734 1	C: 02675 1	I: 40056 0	C: 11732 1	C: 16676 1	C: 00045 0
04,3730	I: 43565 0	C: 02675 1	I: 52162 0	C: 11726 1	I: 75246 0	C: 02675 1	I: 77616 0	C: 22437 1
04,3740	C: 16067 1	C: 15625 1	C: 21042 1	C: 30276 1	C: 04773 0	C: 25004 1	C: 06702 1	C: 16471 1
04,3750	C: 01352 1	C: 21412 0	C: 20500 0	C: 25477 1	C: 03367 0	C: 27533 1	C: 07571 0	C: 03757 1
04,3760	C: 03760 0	CKSM 53747 0	@	@	@	@	@	@
04,3770	@	@	@	@	@	@	@	@

OCTAL LISTING FOR PARAGRAPH # 044, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

05,2000	C: 77340 0	C: 32043 1	C: 24340 0	C: 32052 1	C: 14340 0	C: 32057 1	C: 03412 0	C: 03422 0
05,2010	C: 13414 1	C: 03427 0	C: 01245 0	C: 11162 1	C: 03023 0	C: 03223 1	C: 03702 1	C: 12444 0
05,2020	C: 25735 1	C: 32061 1	C: 00024 1	C: 32063 0	C: 24340 0	C: 32052 1	C: 14340 0	C: 32057 1
05,2030	C: 32072 0	C: 03743 1	C: 03753 0	C: 02610 1	C: 00106 0	C: 01336 0	C: 03223 1	C: 01331 1
05,2040	C: 32075 1	C: 13720 0	C: 64111 1	C: 76605 0	C: 01174 1	C: 01176 0	C: 01200 1	C: 01202 0
05,2050	C: 01204 0	C: 76607 1	C: 77743 1	C: 03133 0	C: 03135 0	C: 03137 1	C: 77745 1	C: 07076 1
05,2060	C: 70605 0	C: 20074 0	C: 52754 0	C: 76054 1	C: 01725 0	C: 01727 1	C: 01731 0	C: 01733 1
05,2070	C: 01642 0	C: 76056 0	C: 01432 0	C: 10372 0	C: 73741 1	C: 03073 0	C: 03066 1	C: 07167 0
05,2100	C: 13125 0	C: 05154 1	C: 01320 1	C: 34011 0	C: 34013 1	C: 34030 0	C: 43745 0	C: 32043 1
05,2110	C: 24340 0	C: 32052 1	C: 14340 0	C: 32057 1	C: 03412 0	C: 00302 0	C: 17674 1	C: 17502 0
05,2120	C: 06351 0	C: 03023 0	C: 13720 0	C: 25735 1	C: 32061 1	C: 00024 1	C: 32063 0	C: 24340 0
05,2130	C: 32052 1	C: 14340 0	C: 32057 1	C: 32072 0	C: 12757 1	C: 00106 0	C: 01336 0	C: 02633 0
05,2140	C: 01331 1	C: 32075 1	C: 52754 0	C: 32043 1	C: 24340 0	C: 32052 1	C: 14340 0	C: 32057 1
05,2150	C: 03412 0	C: 03422 0	C: 13414 1	C: 01151 0	C: 17674 1	C: 01125 0	C: 03662 0	C: 03424 0
05,2160	C: 02636 0	C: 06634 0	C: 03655 1	C: 13404 0	C: 06320 0	C: 32061 1	C: 00024 1	C: 32063 0
05,2170	C: 24340 0	C: 32052 1	C: 14340 0	C: 32057 1	C: 32072 0	C: 02632 1	C: 03753 0	C: 02610 1
05,2200	C: 13645 1	C: 01331 1	C: 32075 1	C: 02324 0	C: 07400 1	C: 07766 1	C: 77671 1	C: 32043 1
05,2210	C: 24340 0	C: 32052 1	C: 14340 0	C: 32057 1	C: 07300 0	C: 03635 1	C: 24304 0	C: 14320 0
05,2220	C: 04300 0	C: 03313 0	C: 13675 1	C: 07400 1	C: 03265 0	C: 32061 1	C: 00024 1	C: 32257 0
05,2230	C: 24340 0	C: 32052 1	C: 14340 0	C: 07076 1	C: 13167 0	C: 07300 0	C: 24304 0	C: 14320 0
05,2240	C: 03073 0	C: 03066 1	C: 03314 1	C: 01331 1	C: 13125 0	C: 05154 1	C: 01320 1	C: 34011 0
05,2250	C: 34013 1	C: 34030 0	C: 34032 1	C: 01432 0	C: 10372 0	C: 00106 0	C: 74007 0	C: 76615 1
05,2260	C: 01164 0	C: 01166 1	C: 03726 1	C: 03724 0	C: 03766 0	C: 76532 1	C: 32043 1	C: 24340 0
05,2270	C: 32052 1	C: 14340 0	C: 32057 1	C: 27537 0	C: 27553 1	C: 27567 0	C: 02751 0	C: 00007 0
05,2300	C: 00007 0	C: 00007 0	C: 32061 1	C: 00024 1	C: 32332 1	C: 04340 1	C: 00007 0	C: 00007 0
05,2310	C: 00007 0	C: 00007 0	C: 32052 1	C: 14340 0	C: 32057 1	C: 32072 0	C: 02747 1	C: 00106 0
05,2320	C: 12025 0	C: 00007 0	C: 01331 1	C: 32075 1	C: 00007 0	C: 00007 0	C: 00007 0	C: 00007 0
05,2330	C: 00007 0	C: 77770 1	C: 76672 0	C: 01107 0	C: 76674 0	C: 02107 0	C: 02207 0	C: 02143 0
05,2340	C: 02001 1	C: 02266 1	00004 0	02776 0	12351 0	35002 0	05147 0	C: 77777 0
05,2350	C: 77777 0	31036 0	75033 0	65001 0	55036 1	35021 1	55365 1	54375 1
05,2360	54376 1	54377 0	55154 1	44710 1	55302 0	35021 1	55360 1	55362 0
05,2370	55501 0	00006 1	01005 0	00006 1	01006 0	00006 1	01011 0	00006 1

OCTAL LISTING FOR PARAGRAPH # 045. WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "ə" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

05,2400	01012 0	00006 1	01013 1	00006 1	01014 0	55316 0	54332 1	54371 0
05,2410	55071 1	55130 0	55126 1	55125 1	55044 1	41036 1	75033 0	10000 0
05,2420	02424 1	35033 1	00006 1	05012 1	02501 1	45021 0	55011 1	34371 0
05,2430	54366 0	33177 0	55320 0	37716 0	55303 1	33202 1	55331 0	35070 0
05,2440	55321 1	00006 1	33156 0	53313 0	33204 1	54074 0	30075 0	75004 1
05,2450	63205 0	54075 1	33206 0	54076 1	30077 1	75003 0	63207 1	54077 0
05,2460	00006 1	33211 0	52101 0	00006 1	33213 1	52103 1	30104 1	72525 0
05,2470	63214 0	54104 0	33215 1	54105 1	00006 1	33217 0	52107 0	04701 0
05,2500	C: 03225 1	00004 0	00006 1	35021 1	52755 1	00006 1	35021 1	52761 0
05,2510	00006 1	35021 1	52753 1	00006 1	35021 1	52757 0	00006 1	35021 1
05,2520	52763 1	00006 1	35021 1	52765 1	00002 0	C: 06200 0	25154 0	22002 0
05,2530	00006 1	04007 1	53433 0	04662 1	C: 40000 0	35001 0	00006 1	03033 1
05,2540	00006 1	12547 1	35002 0	00006 1	02033 0	00006 1	12774 0	02753 1
05,2550	34364 1	71360 1	00006 1	12555 1	12774 0	41360 1	00006 1	12574 1
05,2560	61377 0	00006 1	12564 0	12774 0	31374 0	54003 0	00006 1	31376 1
05,2570	51377 0	52001 1	35021 1	55360 1	02776 0	30102 1	00006 1	75015 1
05,2600	76211 1	00006 1	50000 1	33156 0	53313 0	45002 1	70106 1	54106 1
05,2610	31331 1	73203 1	65011 1	55331 0	35012 1	71321 1	65070 0	55321 1
05,2620	33201 1	71036 1	65001 0	57036 0	75014 0	00006 1	12635 1	04740 0
05,2630	C: 17027 1	36211 0	05245 1	C: 03023 0	C: 16063 0	33165 0	71320 0	63200 0
05,2640	55320 0	40101 0	75011 0	10000 0	12667 0	35003 1	00006 1	05011 1
05,2650	12667 0	00004 0	02753 1	03006 1	43172 1	70106 1	54106 1	40102 0
05,2660	74105 0	00006 1	62667 1	35036 1	05245 1	C: 02720 0	C: 34066 0	35022 1
05,2670	54161 0	60000 1	00006 1	50000 1	30753 0	00006 1	06001 0	10000 0
05,2700	12746 1	12746 1	12746 1	10161 0	12670 0	54162 0	05360 1	00004 0
05,2710	30102 1	74105 0	00006 1	62721 1	35057 0	54003 0	04526 1	35051 0
05,2720	54003 0	35022 1	54161 0	60000 1	50000 1	10753 1	12730 0	12735 0
05,2730	54154 0	24154 1	24162 1	32752 0	04666 0	10161 0	12722 0	10162 0
05,2740	12477 0	35001 0	71011 1	00006 1	14106 0	12477 0	05650 1	C: 01107 0
05,2750	12365 1	C: 07777 1	C: 03520 0	35011 1	00006 1	02016 1	00006 1	12773 1
05,2760	34362 1	00006 1	02016 1	63176 1	00006 1	12774 0	00006 1	00015 0
05,2770	63176 1	00006 1	12774 0	00002 0	02776 0	12365 1	33166 0	54335 0

OCTAL LISTING FOR PARAGRAPH # 046. WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD. "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

05,3000	34777 1	54026 1	67715 0	54027 0	67716 0	54030 0	33173 1	00006 1
05,3010	03011 1	33174 0	00006 1	03013 0	47662 0	70076 1	65006 1	54076 1
05,3020	33175 1	54003 0	35000 1	55407 1	55406 0	55405 0	55404 1	55403 0
05,3030	55402 1	55401 1	55400 0	45304 1	55410 1	55412 0	55414 0	55416 1
05,3040	55420 1	55422 0	55424 0	55426 1	55430 0	45305 0	55411 0	55413 1
05,3050	55415 1	55417 0	55421 0	55423 1	55425 1	55427 0	55431 1	45021 0
05,3060	54167 0	54203 1	54217 1	54233 1	54247 1	54263 1	54277 1	55302 0
05,3070	54067 1	33170 1	54400 1	63171 0	54454 0	63171 0	54530 0	63171 0
05,3100	54604 1	63171 0	54660 0	34377 0	54154 0	45004 1	50154 1	55023 0
05,3110	10154 0	13104 0	55141 0	55142 0	55143 1	55144 0	55073 0	54045 1
05,3120	54776 0	55042 1	55013 0	55015 0	55012 1	55020 0	55021 1	55001 0
05,3130	55002 0	55043 0	55330 1	55322 1	55323 0	55324 1	55325 0	55304 0
05,3140	54100 1	35024 1	55016 0	35002 0	71044 1	55044 1	33167 1	55361 0
05,3150	44374 1	54777 1	00002 0	30001 0	15336 0	C: 03153 0	C: 12066 1	C: 02105 1
05,3160	C: 42066 1	C: 03140 1	C: 34066 0	C: 02765 1	C: 46066 0	C: 00435 0	C: 03530 1	C: 03340 0
05,3170	C: 00400 0	C: 00054 0	C: 20100 1	C: 77603 1	C: 74777 0	C: 01400 1	C: 77755 0	C: 37411 1
05,3200	C: 37000 0	C: 00450 0	C: 00130 0	C: 00430 0	C: 00000 1	C: 00000 1	C: 00000 1	C: 00000 1
05,3210	C: 00000 1	C: 00200 0	C: 00000 1	C: 00000 1	C: 00000 1	C: 00000 1	C: 00000 1	C: 00000 1
05,3220	I: 41406 0	I: 74241 0	C: 02611 0	C: 02611 0	I: 51352 1	I: 63256 0	I: 74246 1	I: 43572 0
05,3230	I: 77220 1	C: 02370 1	C: 02453 1	I: 53406 0	C: 27546 0	C: 02625 1	I: 50256 0	C: 03546 0
05,3240	I: 72406 0	C: 16734 0	I: 65316 0	C: 23756 1	I: 45302 1	I: 72566 1	I: 57515 1	I: 77635 1
05,3250	C: 02625 1	I: 65241 0	C: 02611 0	I: 45565 0	C: 51045 1	C: 02625 1	I: 45115 0	C: 02617 0
05,3260	C: 45253 1	C: 26746 0	I: 77614 1	C: 03666 1	C: 36657 0	C: 24744 0	I: 53754 1	C: 03746 1
05,3270	C: 57576 1	C: 00023 0	I: 76441 1	C: 03546 0	I: 51515 1	I: 63257 1	C: 57576 1	C: 02453 1
05,3300	I: 65246 1	I: 77625 0	C: 00003 1	C: 16633 0	C: 02744 1	I: 65301 0	C: 00047 1	C: 00041 1
05,3310	I: 77624 1	C: 45263 1	I: 56362 0	I: 41457 1	C: 20174 1	I: 65225 1	C: 02633 0	I: 56302 0
05,3320	C: 00005 1	I: 75406 1	I: 41275 1	C: 00007 0	C: 00001 0	I: 65272 0	C: 00003 1	I: 65301 0
05,3330	C: 00047 1	C: 03750 0	I: 56342 1	I: 65257 1	C: 20174 1	C: 00005 1	I: 65301 0	C: 00050 1
05,3340	C: 03750 0	I: 56342 1	I: 44257 1	C: 57604 1	I: 63525 0	C: 00011 1	I: 75421 1	I: 47315 0
05,3350	C: 02611 0	C: 03546 0	I: 74256 0	C: 00013 0	I: 74315 0	C: 03546 0	C: 00011 1	I: 76455 1
05,3360	I: 77626 0	C: 74231 1	I: 77651 0	C: 02533 0	C: 37667 1	C: 02370 1	34334 1	55506 1
05,3370	31466 1	75003 0	00006 1	13377 0	51506 0	33463 0	13407 0	31473 0

OCTAL LISTING FOR PARAGRAPH # 047, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

05,3400	60000 1	00006 1	51506 0	73505 0	20001 1	51506 0	63473 1	51506 0
05,3410	55511 1	11506 1	13367 1	11466 0	13422 1	13422 1	53522 1	21513 0
05,3420	33520 0	27520 0	35016 0	55506 1	55507 0	31474 1	63517 1	60000 1
05,3430	55510 0	00006 1	63435 0	37715 0	55506 1	51506 0	31516 1	00006 1
05,3440	71510 0	60000 1	51507 1	61511 0	51507 1	55470 1	11507 0	13457 0
05,3450	31466 1	75002 1	10000 0	31473 0	61474 1	55475 1	00002 0	55507 0
05,3460	00006 1	27506 1	13435 1	C: 00616 0	C: 02526 1	C: 02352 1	C: 01471 1	C: 00634 0
05,3470	C: 00612 1	C: 03706 0	C: 04425 0	C: 00644 1	C: 03710 1	C: 04246 0	C: 02011 0	C: 77501 0
05,3500	C: 00612 1	C: 04656 0	C: 10372 0	C: 77126 1	C: 76261 0	C: 00767 1	C: 15624 0	C: 03054 0
05,3510	C: 04532 1	C: 10433 1	C: 00000 1	C: 22070 0	C: 03204 1	C: 77266 0	C: 02476 0	C: 70364 1
05,3520	C: 75420 0	54016 1	00006 1	22012 1	35011 1	00006 1	05013 0	00335 1
05,3530	37716 0	54337 1	54336 0	33653 1	54335 0	13551 1	10336 0	03666 1
05,3540	C: 77753 0	13542 0	10337 1	13701 0	C: 74001 0	30334 0	00006 1	63551 0
05,3550	13556 0	50332 0	32335 0	54334 1	40332 1	13771 1	50334 0	30000 1
05,3560	10000 0	24334 0	13566 0	56334 0	40000 0	56334 0	24000 1	54336 0
05,3570	63540 0	10000 0	13576 1	C: 47777 0	13576 1	03620 0	30336 1	63573 0
05,3600	00006 1	63666 1	67710 0	00006 1	63624 1	00006 1	50336 1	44000 1
05,3610	54001 1	00006 1	50336 1	43777 1	54336 0	37716 0	56336 1	13714 1
05,3620	45011 0	00006 1	03013 0	00002 0	50336 1	00000 1	10000 0	30336 1
05,3630	13700 1	56336 1	54337 1	35021 1	56336 1	54003 0	74373 0	00006 1
05,3640	50000 1	31402 0	50336 1	52341 0	24336 1	24336 1	24337 0	50337 0
05,3650	00000 1	10000 0	13635 0	C: 03536 1	54337 1	37716 0	54336 0	56337 0
05,3660	54003 0	74373 0	00006 1	50000 1	31402 0	13714 1	30336 1	54003 0
05,3670	74373 0	54001 1	33544 1	26336 0	00006 1	50001 0	31401 0	13714 1
05,3700	54337 1	50337 0	00000 1	10000 0	24337 0	13711 1	54337 1	37716 0
05,3710	56337 0	24000 1	54336 0	13577 0	00006 1	01034 1	30001 0	00006 1
05,3720	01035 0	15333 0	35021 1	54336 0	03766 0	33734 1	54335 0	30025 0
05,3730	56001 0	30336 1	13714 1	C: 03735 0	C: 03750 0	35016 0	26336 0	74373 0
05,3740	10000 0	13752 0	30336 1	70333 0	77671 1	10000 0	13530 0	13724 1
05,3750	33733 0	54335 0	30336 1	54003 0	74373 0	54002 1	35020 0	54001 1
05,3760	50002 0	71401 1	56001 0	50002 0	71400 0	13714 1	00006 1	22335 1
05,3770	35054 0	54001 1	03620 0	32000 0	56001 0	13714 1	C: 03776 1	CKSM 74460 0

OCTAL LISTING FOR PARAGRAPH # 050. WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD. "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

06,2000	54016 1	00006 1	22012 1	11302 0	12010 0	12007 0	12136 0	35023 0
06,2010	54070 1	55302 0	11036 1	02063 0	02063 0	57036 0	74372 1	55036 1
06,2020	64105 1	00006 1	01010 1	02071 0	55016 0	45021 0	54073 1	56776 1
06,2030	65020 0	54776 0	50776 1	11023 0	10776 0	12030 1	12047 1	C: 00012 1
06,2040	10073 1	C: 37764 0	55016 0	00002 0	54073 1	32037 1	12031 0	65017 1
06,2050	50776 1	55023 0	74372 1	54073 1	34364 1	50776 1	74072 1	60073 0
06,2060	00006 1	01010 1	16706 1	10101 0	35021 1	12132 1	11016 0	02024 0
06,2070	12132 1	42173 1	27302 0	37700 1	54027 0	31321 0	00006 1	06032 0
06,2100	75002 1	00006 1	12116 1	23321 0	00006 1	06001 0	55321 1	75002 1
06,2110	10000 0	12116 1	34371 0	05134 1	C: 03357 0	C: 60101 1	50070 0	12120 1
06,2120	12130 0	12765 0	12174 0	15333 0	12130 0	12765 0	12174 0	15333 0
06,2130	04740 0	C: 20000 0	00006 1	01010 1	32041 0	12074 1	35002 0	71302 0
06,2140	00006 1	12167 1	11016 0	02024 0	12154 1	45002 1	27302 0	37700 1
06,2150	54027 0	35007 0	27302 0	05333 1	00006 1	01010 1	37700 1	26027 0
06,2160	35007 0	27302 0	11302 0	05333 1	C: 37737 0	02156 1	05333 1	00006 1
06,2170	01010 1	35002 0	12146 1	C: 22400 0	31320 1	00006 1	06030 1	72743 1
06,2200	00006 1	12231 1	54070 1	23320 1	00006 1	06001 0	55320 0	45017 0
06,2210	56070 0	00006 1	62507 1	12215 1	65017 1	24070 0	60000 1	54000 0
06,2220	12215 1	56071 1	50070 0	35002 0	71320 0	50070 0	02737 0	10071 0
06,2230	12214 0	41320 0	75011 0	10000 0	12367 0	35010 0	71320 0	10000 0
06,2240	12244 0	35010 0	27320 0	12367 0	42757 1	71320 0	55320 0	75002 1
06,2250	10000 0	12342 1	41320 0	75007 1	10000 0	12260 0	05650 1	C: 00213 1
06,2260	02717 1	32764 0	05245 1	C: 02270 0	C: 14063 1	12367 0	32764 0	05272 0
06,2270	45016 1	71320 0	57320 1	75016 1	00006 1	12310 0	35002 0	71320 0
06,2300	00006 1	12266 0	40074 0	75010 1	10000 0	15324 0	04701 0	C: 17522 1
06,2310	35001 0	00006 1	05012 1	04740 0	C: 17151 1	05521 1	45027 0	00006 1
06,2320	03012 1	35005 1	05272 0	42754 1	71320 0	55320 0	45012 0	71321 1
06,2330	55321 1	02665 0	45001 1	00006 1	03012 1	35045 0	05245 1	C: 03137 1
06,2340	C: 16063 0	15324 0	35014 1	00006 1	02012 0	10000 0	12367 0	35010 0
06,2350	70074 0	10000 0	12367 0	02730 1	04740 0	C: 17151 1	35013 0	00006 1
06,2360	05012 1	05521 1	35012 1	05245 1	C: 02315 1	C: 14062 0	12367 0	31321 0
06,2370	75070 1	54001 1	35070 0	00006 1	03033 1	00006 1	06001 0	00006 1

OCTAL LISTING FOR PARAGRAPH # 051, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD. "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

06,2400	12427 0	54070 1	23321 0	00006 1	06001 0	55321 1	35021 1	56070 0
06,2410	60000 1	12414 0	65017 1	24070 0	60000 1	54000 0	12413 1	56071 1
06,2420	50070 0	35003 1	71321 1	50070 0	02745 0	10071 0	12412 0	10034 1
06,2430	12434 1	12460 0	12434 1	12460 0	62505 0	00006 1	62457 0	62506 0
06,2440	00006 1	62455 1	35014 1	00006 1	02012 0	10000 0	12455 0	04740 0
06,2450	C: 17027 1	36211 0	05245 1	C: 03023 0	C: 16063 0	35012 1	12460 0	35021 1
06,2460	61036 0	75012 0	00006 1	15333 0	71036 1	10000 0	12502 0	35012 1
06,2470	71320 0	10000 0	15333 0	41036 1	75012 0	65001 0	57036 0	72164 1
06,2500	27036 1	15333 0	02750 1	15333 0	12473 1	C: 63434 1	C: 75252 0	74777 0
06,2510	54071 0	11320 0	12520 0	12520 0	35014 1	00006 1	05011 1	12227 0
06,2520	02750 1	12227 0	45014 0	00006 1	03011 1	12227 0	35016 0	71320 0
06,2530	10000 0	12227 0	35002 0	71320 0	00006 1	12551 0	35001 0	00006 1
06,2540	02012 0	00006 1	12544 1	12227 0	35016 0	27320 0	05650 1	C: 00207 1
06,2550	12227 0	41320 0	75011 0	27320 0	12227 0	10000 0	12354 0	42762 1
06,2560	00006 1	03014 1	42756 0	00006 1	03012 1	45003 0	00006 1	03011 1
06,2570	02725 0	04740 0	C: 17060 1	45021 0	54050 0	54051 1	54052 1	54047 0
06,2600	42761 1	00006 1	03014 1	12227 0	00006 1	12625 0	41321 1	75012 0
06,2610	27321 1	04740 0	C: 17060 1	42757 1	70074 0	56074 1	40000 0	75010 1
06,2620	10000 0	12227 0	05650 1	C: 00214 0	12227 0	35016 0	71320 0	10000 0
06,2630	12227 0	12551 0	10000 0	35006 1	57320 1	72763 0	27320 0	02665 0
06,2640	41320 0	75017 0	10000 0	12425 1	31320 1	72760 0	10000 0	12425 1
06,2650	05650 1	C: 00212 0	12425 1	10000 0	12425 1	05650 1	C: 01105 1	12425 1
06,2660	10000 0	12425 1	05650 1	C: 01106 1	12425 1	35025 0	71320 0	00006 1
06,2670	75006 0	31320 1	00006 1	04001 1	40000 0	75067 1	10000 0	12710 1
06,2700	35017 1	71321 1	10000 0	00002 0	45017 0	00006 1	03011 1	00002 0
06,2710	00006 1	22066 1	05764 1	35017 1	00006 1	05011 1	00066 1	47703 0
06,2720	00006 1	03012 1	35027 1	00006 1	05012 1	41036 1	72753 0	27036 1
06,2730	41320 0	72755 0	27320 0	41321 1	75012 0	27321 1	00002 0	12526 0
06,2740	12665 1	12665 1	12555 1	C: 76400 1	12604 0	12632 0	12653 1	12660 1
06,2750	41321 1	75017 0	13065 0	C: 40010 1	C: 00054 0	C: 00075 0	C: 00272 0	C: 00300 1
06,2760	C: 01720 0	C: 00740 1	C: 77000 1	C: 76777 1	C: 21450 0	31331 1	00006 1	06030 1
06,2770	75011 0	54070 1	10000 0	03224 0	11303 1	13001 1	13001 1	13001 1

OCTAL LISTING FOR PARAGRAPH # 052, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

06,3000	15333 0	31331 1	00006 1	06033 1	75027 0	26070 1	23331 1	00006 1
06,3010	06001 0	55331 0	40000 0	75027 0	00006 1	13022 0	75013 1	10000 0
06,3020	03022 1	37716 0	55314 1	11315 0	03125 1	03077 1	03027 1	11314 1
06,3030	03047 1	03037 0	03057 0	03154 1	11317 1	03153 0	03157 1	03057 0
06,3040	03154 1	05650 1	C: 00116 1	35024 1	55316 0	03070 0	03154 1	03057 0
06,3050	03115 1	05650 1	C: 00116 1	03070 0	03112 0	35007 0	13064 1	35017 1
06,3060	71331 0	10000 0	05333 1	35015 0	71331 0	10000 0	24002 0	00002 0
06,3070	46211 1	71331 0	55331 0	45017 0	00006 1	03012 1	00002 0	11314 1
06,3100	03112 0	03107 1	11316 0	03105 0	03151 1	03216 1	03154 1	11316 0
06,3110	55316 0	03154 1	35021 1	55316 0	55317 1	03055 1	03154 1	35017 1
06,3120	55303 1	35016 0	00006 1	05012 1	03154 1	11314 1	03154 1	03133 0
06,3130	35012 1	55317 1	03216 1	11303 1	03140 1	03140 1	03137 1	03154 1
06,3140	37716 0	55303 1	45016 1	00006 1	03012 1	41331 0	75007 1	27331 0
06,3150	03154 1	03216 1	35012 1	55317 1	31314 0	55315 0	05333 1	35017 1
06,3160	00006 1	05012 1	34112 1	05245 1	C: 03172 0	C: 14062 0	41331 0	75017 0
06,3170	27331 0	03154 1	03210 1	45017 0	00006 1	03012 1	34112 1	05272 0
06,3200	41331 0	75006 0	27331 0	45023 1	71331 0	55331 0	03224 0	05324 1
06,3210	35021 1	54036 0	55307 0	43261 0	54035 0	00002 0	35021 1	55316 0
06,3220	41331 0	76211 1	27331 0	00002 0	35011 1	00006 1	02030 0	10000 0
06,3230	13252 0	35016 0	71331 0	10000 0	00002 0	35010 0	61036 0	75010 1
06,3240	00006 1	16711 1	54001 1	31036 0	00006 1	06001 0	74777 0	65001 0
06,3250	55036 1	00002 0	35017 1	71321 1	10000 0	00002 0	35010 0	71036 1
06,3260	13240 0	C: 16037 1	33516 0	56003 1	54163 1	11477 0	13271 1	13271 1
06,3270	13407 0	00004 0	35015 0	54132 0	50132 1	31453 1	00006 1	50132 1
06,3300	71162 1	54002 1	30001 0	00006 1	75012 0	50132 1	55163 0	30002 0
06,3310	00006 1	75012 0	50132 1	21163 0	50132 1	41452 1	00006 1	71074 1
06,3320	00006 1	75017 0	50132 1	21163 0	10132 0	67716 0	13273 0	13330 0
06,3330	00003 1	55477 0	54130 1	00006 1	41163 0	52155 1	31463 1	03412 0
06,3340	00006 1	41165 0	52155 1	41466 0	03412 0	41460 0	03441 0	00006 1
06,3350	41165 0	52155 1	31464 0	03412 0	00006 1	41167 1	52155 1	41467 1
06,3360	03412 0	41461 1	03441 0	00006 1	41165 0	52155 1	31470 0	03412 0
06,3370	00006 1	41167 1	52155 1	31465 1	03412 0	31462 0	03441 0	11477 0

OCTAL LISTING FOR PARAGRAPH # 053. WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD. "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

06,3400	13402 0	13407 0	35073 0	05134 1	C: 03474 0	C: 14063 1	00003 1	30163 0
06,3410	54003 0	14675 0	56154 1	00006 1	70154 0	52123 0	30155 0	00006 1
06,3420	70154 0	54001 1	35021 1	20123 0	30122 0	00006 1	75004 1	50130 0
06,3430	21472 0	30123 1	00006 1	75004 1	54001 1	35021 1	50130 0	21472 0
06,3440	00002 0	00006 1	22131 1	00006 1	71074 1	22155 0	00006 1	75014 0
06,3450	50130 0	21472 0	30155 0	00006 1	75014 0	54001 1	35021 1	50130 0
06,3460	21472 0	35016 0	60130 0	56130 0	50000 1	11471 0	13470 0	00131 1
06,3470	77716 1	10000 0	55477 0	00131 1	35015 0	54130 1	50130 0	31472 1
06,3500	00006 1	75010 1	50130 0	55472 0	35021 1	50130 0	57471 1	00006 1
06,3510	75010 1	50130 0	21472 0	10130 1	67716 0	13475 0	C: 01471 1	33516 0
06,3520	04662 1	C: 17206 0	04662 1	C: 17577 1	15217 1	35015 0	54130 1	50130 0
06,3530	31472 1	00006 1	75010 1	50130 0	23472 1	10130 1	67716 0	13526 1
06,3540	C: 01436 1	15217 1	11477 0	13546 1	13546 1	15217 1	00004 0	10076 1
06,3550	15217 1	15217 1	13553 0	30025 0	57074 0	00003 1	40000 0	61074 0
06,3560	10000 0	65017 1	13567 1	13565 0	15217 1	40000 0	64777 1	00006 1
06,3570	75006 0	52123 0	00006 1	30123 1	52155 1	35021 1	55477 0	54130 1
06,3600	41460 0	03617 1	00006 1	40123 0	52155 1	31461 0	03617 1	00006 1
06,3610	40123 0	52155 1	41462 1	03617 1	11477 0	13474 1	15217 1	56002 0
06,3620	54131 0	30002 0	00006 1	70154 0	50130 0	21472 0	30002 0	00006 1
06,3630	70155 1	54001 1	35021 1	50130 0	21472 0	13461 0	04662 1	C: 17156 0
06,3640	11477 0	13644 0	13644 0	15217 1	37665 0	57074 0	40000 0	61246 0
06,3650	13560 0	C: 00025 0	C: 37100 1	C: 00600 1	C: 00601 0	C: 00602 0	C: 00603 1	C: 00604 0
06,3660	C: 00605 1	C: 00606 1	C: 00000 1	C: 00020 0	C: 00003 1	C: 34661 1	C: 00606 1	C: 04467 0
06,3670	C: 00601 0	C: 33216 1	C: 10000 0	C: 00000 1	C: 00000 1	C: 00001 0	C: 00000 1	C: 01177 1
06,3700	C: 77754 1	C: 57611 0	C: 00116 1	C: 00730 0	I: 43014 0	C: 05660 1	C: 05461 1	I: 43014 0
06,3710	C: 05662 0	C: 05463 0	I: 77745 1	C: 11566 1	C: 03764 1	C: 03665 1	I: 77201 1	C: 00001 0
06,3720	C: 02541 0	I: 41446 1	I: 70501 1	C: 00050 1	I: 51515 1	C: 03554 0	I: 55301 0	C: 00047 1
06,3730	I: 53664 0	C: 00046 0	C: 57175 0	I: 41215 1	C: 15673 1	I: 65301 0	C: 00047 1	C: 03750 0
06,3740	I: 56342 1	I: 75457 0	C: 20172 1	I: 53515 0	C: 02541 0	I: 47315 0	C: 02611 0	I: 77656 1
06,3750	I: 72441 0	C: 03504 0	I: 45421 1	C: 60315 0	C: 15665 0	C: 03464 1	I: 43345 1	C: 03764 1
06,3760	C: 15675 1	C: 03764 1	I: 77025 0	C: 15663 0	C: 00006 1	I: 52044 0	C: 63642 1	C: 24013 0
06,3770	C: 03770 1	C: 03771 0	CKSM 63024 1	@	@	@	@	@

OCTAL LISTING FOR PARAGRAPH # 054, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD. "∅" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

07,2000	C: 03674 1	C: 03725 1	00004 0	54070 1	36211 0	71044 1	10000 0	02013 1
07,2010	35016 0	27044 1	02015 1	07755 1	C: 01211 1	10400 1	02031 1	10454 0
07,2020	02031 1	10530 0	02031 1	10604 1	02031 1	10660 0	02031 1	07755 1
07,2030	C: 01207 0	65016 0	55330 1	50000 1	54052 1	35021 1	51330 0	53777 0
07,2040	05364 0	C: 00065 1	12044 1	14675 0	05364 0	C: 00066 1	12050 1	14675 0
07,2050	35004 0	00006 1	70070 1	56001 0	27330 1	37667 1	05134 1	C: 02347 0
07,2060	C: 16062 1	00003 1	14675 0	35021 1	57330 0	75046 1	10000 0	50000 1
07,2070	54000 0	00004 0	45007 1	71331 0	55331 0	37716 0	55303 1	45016 1
07,2100	00006 1	03012 1	00003 1	04675 1	54016 1	30035 1	54362 1	30036 1
07,2110	54360 0	30033 1	54357 1	30034 0	54361 1	30032 0	54363 0	00006 1
07,2120	30025 0	52356 0	00006 1	30356 1	52014 0	56002 0	54012 0	35012 1
07,2130	00006 1	02016 1	10000 0	02430 1	35011 1	00006 1	02016 1	10000 0
07,2140	02301 1	34362 1	00006 1	02016 1	00006 1	12150 0	04701 0	C: 17702 1
07,2150	05650 1	C: 00113 1	05333 1	35002 0	70076 1	00006 1	12170 1	36211 0
07,2160	05606 1	C: 01725 0	C: 01734 0	36211 0	05606 1	C: 00355 1	C: 01725 0	15324 0
07,2170	11330 1	02225 0	35016 0	71044 1	00006 1	12217 0	35004 0	70101 0
07,2200	00006 1	12217 0	35061 0	05134 1	C: 02426 0	C: 76067 1	36211 0	05606 1
07,2210	C: 00355 1	C: 01674 0	36211 0	05606 1	C: 00355 1	C: 01725 0	15324 0	05650 1
07,2220	C: 00122 0	15324 0	05650 1	C: 00114 0	15324 0	67711 1	00006 1	62222 1
07,2230	55330 1	40000 0	75006 0	27330 1	75046 1	54061 1	50000 1	56052 0
07,2240	54062 1	65023 0	50061 0	54052 1	00006 1	30356 1	50062 0	52001 1
07,2250	30357 0	50062 0	54002 1	30360 1	50062 0	54003 0	30361 0	50062 0
07,2260	54004 1	30362 0	50062 0	54005 0	30363 1	50062 0	54006 0	37671 0
07,2270	71330 1	00006 1	12274 0	15324 0	37667 1	05134 1	C: 02422 1	C: 16062 1
07,2300	15324 0	35002 0	70076 1	00006 1	12310 0	37716 0	55725 1	05333 1
07,2310	11330 1	02315 1	05650 1	C: 00112 0	05333 1	45006 0	71330 1	57330 0
07,2320	75006 0	10000 0	02326 1	05650 1	C: 00110 1	05333 1	35046 0	71330 1
07,2330	54061 1	45023 1	50061 0	26052 1	35004 0	61330 0	57330 0	77671 1
07,2340	10000 0	05333 1	37667 1	05134 1	C: 02347 0	C: 16062 1	05333 1	04662 1
07,2350	C: 20560 0	32427 1	04662 1	C: 20572 0	12357 0	12370 0	12416 1	05536 1
07,2360	05364 0	C: 00003 1	12364 0	02366 0	04701 0	C: 30205 0	05546 0	C: 00032 0
07,2370	35046 0	71330 1	55330 1	40000 0	51330 0	60052 0	00006 1	62403 1

OCTAL LISTING FOR PARAGRAPH # 055. WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

07,2400	00006 1	75004 1	65017 1	51330 0	54052 1	00004 0	35022 1	05245 1
07,2410	C: 02413 0	C: 16062 1	05534 0	35017 1	04740 0	C: 17550 1	37671 0	71330 1
07,2420	10000 0	12347 1	34333 0	55045 0	32426 0	12352 0	C: 14431 1	C: 14600 1
07,2430	11341 1	12434 1	12434 1	35021 1	65017 1	05245 1	C: 02203 1	C: 20067 1
07,2440	15333 0	I: 40220 0	C: 02370 1	C: 00001 0	I: 73150 1	C: 03745 1	C: 03746 1	I: 53775 1
07,2450	C: 03640 0	C: 57176 0	C: 22746 1	C: 11742 0	I: 53715 1	C: 03632 0	C: 57176 0	I: 64646 1
07,2460	C: 11740 1	I: 47515 0	C: 02746 0	I: 57301 1	C: 00047 1	I: 53605 1	C: 00003 1	C: 21576 0
07,2470	I: 77621 1	C: 11616 0	I: 65301 0	C: 00047 1	I: 56362 0	I: 41457 1	C: 20174 1	I: 75542 0
07,2500	I: 77605 1	I: 65301 0	C: 00047 1	I: 56342 1	I: 53605 1	C: 03752 1	C: 20201 0	I: 60325 0
07,2510	C: 11630 1	C: 00047 1	I: 56325 0	I: 77657 0	C: 20176 0	C: 37754 0	C: 02370 1	I: 74345 0
07,2520	I: 76455 1	C: 00023 0	I: 50206 0	C: 03540 0	I: 41552 0	I: 72316 0	C: 00155 0	I: 50315 0
07,2530	C: 03540 0	C: 03540 0	I: 57551 1	C: 00155 0	I: 50315 0	C: 03554 0	C: 03554 0	I: 76371 0
07,2540	I: 71244 0	C: 16557 1	C: 03764 1	I: 77025 0	C: 15675 1	C: 00001 0	I: 77654 0	C: 11314 1
07,2550	I: 70545 1	C: 03464 1	C: 03464 1	I: 77621 1	C: 03470 1	C: 37462 0	C: 15756 1	I: 41566 1
07,2560	I: 45276 0	C: 00007 0	C: 14013 0	I: 45425 0	C: 77762 1	I: 77646 0	C: 14017 1	C: 00013 0
07,2570	I: 45246 0	C: 00017 1	I: 71240 1	C: 50002 0	C: 00015 0	C: 34013 1	C: 50002 0	00004 0
07,2600	41036 1	75033 0	10000 0	12607 0	05650 1	C: 00206 0	13542 0	03536 1
07,2610	41321 1	75035 0	27321 1	41320 0	75771 1	27320 0	45033 0	00006 1
07,2620	03012 1	03151 1	35013 0	00006 1	05012 1	05521 1	35012 1	05245 1
07,2630	C: 02642 0	C: 16063 0	41320 0	75007 1	10000 0	12640 0	05650 1	C: 00210 1
07,2640	00003 1	14675 0	03524 1	05521 1	45013 1	00006 1	03012 1	35005 1
07,2650	05272 0	03524 1	45771 1	71320 0	55320 0	45035 0	71321 1	55321 1
07,2660	04740 0	C: 14665 1	13514 0	00004 0	03536 1	03027 1	36211 0	05245 1
07,2670	C: 02673 1	C: 16063 0	12640 0	03524 1	35012 1	00006 1	05012 1	35016 0
07,2700	55474 0	51474 1	31155 1	00006 1	51474 1	20032 1	00006 1	75003 0
07,2710	56001 0	60000 1	54061 1	12715 1	26001 1	51474 1	23471 1	11474 0
07,2720	02700 1	35016 0	05272 0	03524 1	54061 1	35016 0	55474 0	51474 1
07,2730	11471 0	02735 1	02744 1	03002 0	02744 1	63624 1	00006 1	63012 1
07,2740	51474 1	55471 0	43625 1	24061 0	65020 0	51474 1	54050 0	11474 0
07,2750	02726 0	10061 1	13016 1	05267 1	C: 00226 1	35016 0	54061 1	50000 1
07,2760	30032 0	00006 1	50061 0	21155 0	10000 0	12773 1	12770 1	12773 1
07,2770	10061 1	12756 0	13514 0	63001 0	00006 1	62770 0	05650 1	C: 00211 0

OCTAL LISTING FOR PARAGRAPH # 056. WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

07,3000	13522 0	C: 77511 1	63624 1	00006 1	63012 1	40000 0	51474 1	55471 0
07,3010	33625 0	02743 0	35021 1	51474 1	57471 1	02743 0	37707 0	00006 1
07,3020	05014 1	33626 0	12722 0	35012 1	00006 1	05012 1	05324 1	35014 1
07,3030	00006 1	02012 0	10000 0	00002 0	45012 0	00006 1	03012 1	45006 0
07,3040	00006 1	03014 1	45021 0	54047 0	35014 1	00006 1	05012 1	41036 1
07,3050	73072 0	27036 1	41321 1	75012 0	27321 1	41320 0	75014 0	27320 0
07,3060	45013 1	70075 1	54075 1	45001 1	70076 1	54076 1	45003 0	70077 0
07,3070	54077 0	00002 0	C: 40010 1	00004 0	03536 1	45027 0	00006 1	03012 1
07,3100	45012 0	71321 1	55321 1	03151 1	35006 1	05245 1	C: 03117 0	C: 16063 0
07,3110	35042 1	05245 1	C: 03115 1	C: 16063 0	12640 0	03524 1	13514 0	03531 0
07,3120	15324 0	35014 1	00006 1	02012 0	10000 0	15324 0	41320 0	75003 0
07,3130	27320 0	45014 0	71320 0	55320 0	04740 0	C: 14665 1	15324 0	03531 0
07,3140	15324 0	41320 0	75006 0	27320 0	41321 1	75003 0	27321 1	45013 1
07,3150	13132 0	43072 0	71036 1	65001 0	55036 1	00002 0	45021 0	54037 1
07,3160	54040 1	54041 0	03531 0	14675 0	00004 0	45017 0	71320 0	55320 0
07,3170	04740 0	C: 14665 1	12640 0	00004 0	41320 0	75017 0	27320 0	75006 0
07,3200	10000 0	12640 0	05650 1	C: 00212 0	00004 0	13170 0	54161 0	03536 1
07,3210	11304 0	03252 1	54156 1	35012 1	00006 1	05014 1	35015 0	05245 1
07,3220	C: 03270 1	C: 16063 0	30161 1	56003 1	56161 1	55304 0	74373 0	54061 1
07,3230	35016 0	54157 0	60000 1	60061 0	54160 1	00006 1	50000 1	31401 0
07,3240	52155 1	07226 0	52155 1	50160 0	53401 1	10157 0	13231 0	30161 1
07,3250	54003 0	12640 0	00006 1	30134 1	52155 1	33267 1	15175 0	11304 0
07,3260	13255 1	54156 1	00006 1	30155 0	52134 0	35017 1	13217 1	C: 17257 1
07,3270	43511 0	00006 1	03014 1	03524 1	31304 1	00006 1	75014 0	50000 1
07,3300	13301 1	03316 0	C: 00202 1	03316 0	C: 00302 0	03314 1	C: 00100 0	35021 1
07,3310	55304 0	33267 1	05201 1	13115 0	45015 1	27304 0	50002 0	30000 1
07,3320	54064 1	75023 1	65003 1	27304 0	54003 0	74373 0	54061 1	45023 1
07,3330	70064 1	54064 1	00006 1	50061 0	31401 0	52071 0	10070 1	13352 1
07,3340	13342 0	13472 1	10071 0	13347 0	13274 1	13467 0	13274 1	63403 0
07,3350	00006 1	63274 0	00006 1	33513 0	20071 0	30064 0	00006 1	05014 1
07,3360	36043 0	70071 0	56071 1	00006 1	75010 1	54062 1	30070 0	00006 1
07,3370	75007 1	54070 1	30001 0	00006 1	75002 1	26062 1	00006 1	30071 1

OCTAL LISTING FOR PARAGRAPH # 057. WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD. "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

07,3400	67716 0	10000 0	13426 0	C: 77601 0	13410 0	35002 0	26062 1	35021 1
07,3410	50061 0	53401 1	30062 0	54047 0	00006 1	75006 0	66214 0	05245 1
07,3420	C: 03270 1	C: 16063 0	35006 1	00006 1	05014 1	15324 0	50061 0	53401 1
07,3430	35002 0	60062 0	54047 0	00006 1	75006 0	67714 1	05245 1	C: 03442 0
07,3440	C: 16063 0	13422 1	03524 1	35014 1	00006 1	02012 0	10000 0	13522 0
07,3450	31304 1	54003 0	74373 0	54061 1	50061 0	11400 0	13462 0	35002 0
07,3460	26047 0	13414 1	50061 0	55400 0	35002 0	26047 0	13433 1	63403 0
07,3470	00006 1	63274 0	00006 1	43513 1	20071 0	30064 0	65007 0	00006 1
07,3500	05014 1	40070 1	54070 1	40071 0	76043 1	40000 0	56071 1	40000 0
07,3510	13363 0	C: 01700 1	C: 00000 1	C: 00034 0	00006 1	00011 1	75017 0	10000 0
07,3520	13522 0	13550 0	35021 1	13545 1	35012 1	71320 0	10000 0	13522 0
07,3530	00002 0	41320 0	75012 0	10000 0	24002 0	00002 0	41320 0	75012 0
07,3540	10000 0	00002 0	45021 0	55322 1	12640 0	54071 0	45021 0	13552 1
07,3550	54071 0	45017 0	54072 0	50071 1	11322 1	13557 1	13567 1	35021 1
07,3560	50071 1	57322 0	05201 1	40072 0	50064 0	26164 0	15324 0	30072 1
07,3570	50071 1	55322 1	15324 0	35017 1	03600 1	35016 0	13600 0	35021 1
07,3600	00004 0	54071 0	50000 1	11322 1	13622 0	13616 1	13612 0	50071 1
07,3610	55322 1	12640 0	10000 0	13622 0	24133 0	13607 1	04711 1	50071 1
07,3620	55322 1	15175 0	05721 0	C: 01210 0	C: 77500 1	C: 77477 0	C: 00074 1	31325 1
07,3630	00006 1	13634 1	05721 0	C: 01210 0	00006 1	30134 1	53326 0	30006 1
07,3640	75023 1	27326 0	30167 1	77674 1	55327 1	33651 0	54003 0	04701 0
07,3650	C: 44000 1	C: 03261 1	C: 00063 1	35003 1	70077 0	10000 0	03667 0	31320 1
07,3660	75007 1	00006 1	13664 1	45014 0	63672 1	05764 1	04106 1	05546 0
07,3670	C: 00007 0	14675 0	C: 00220 1	54016 1	56002 0	54012 0	04414 1	34362 1
07,3700	00006 1	02015 1	54073 1	40101 0	75001 1	26101 0	34371 0	05134 1
07,3710	C: 02000 0	C: 60101 1	30073 0	50064 0	54154 0	05333 1	54016 1	56002 0
07,3720	54012 0	04414 1	35021 1	56045 0	54073 1	35015 0	00006 1	05011 1
07,3730	34362 1	70073 1	56073 0	00006 1	75006 0	54734 0	74362 0	63773 1
07,3740	03770 1	35006 1	00006 1	70734 0	74362 0	40000 0	03770 1	43776 0
07,3750	60073 0	00006 1	13760 1	35014 1	70103 1	10000 0	05333 1	03706 0
07,3760	45014 0	70103 1	54103 1	03706 0	40103 1	75014 0	26103 1	05333 1
07,3770	60073 0	10000 0	03764 1	C: 77740 1	03764 1	00002 0	C: 00022 1	CKSM 73341 0

OCTAL LISTING FOR PARAGRAPH # 060, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD. "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

10,2000	30036 1	54001 1	10000 0	67707 0	12006 1	12003 1	00006 1	62016 1
10,2010	31307 1	00006 1	12014 1	12020 0	56001 0	12017 1	35021 1	55307 0
10,2020	11303 1	02025 1	02025 1	05333 1	05333 1	31314 0	00006 1	65333 1
10,2030	35006 1	71331 0	10000 0	02036 0	05650 1	C: 00120 1	35016 0	00006 1
10,2040	02012 0	00006 1	12175 1	35017 1	55303 1	00006 1	12132 1	51303 0
10,2050	31160 1	00006 1	51303 0	20035 0	00006 1	75003 0	56001 0	60000 1
10,2060	54061 1	12063 1	26001 1	51303 0	23305 0	11303 1	12044 1	54061 1
10,2070	10036 0	65000 1	12074 1	12071 1	00006 1	62122 1	31307 1	00006 1
10,2100	12122 0	75001 1	54001 1	31306 0	75001 1	00006 1	06001 0	10000 0
10,2110	12122 0	11161 1	65000 1	12115 1	12112 0	00006 1	62120 0	12122 0
10,2120	41306 1	55306 1	35017 1	55303 1	50000 1	11305 1	02144 1	02151 0
10,2130	02161 0	02151 0	40035 0	61160 1	54002 1	02047 0	10000 0	34777 1
10,2140	02142 1	44777 0	54001 1	02063 0	62202 0	00006 1	62166 1	42201 1
10,2150	24061 0	65020 0	51303 0	54053 0	11303 1	02123 0	10061 1	12171 0
10,2160	05333 1	62202 0	00006 1	62166 1	32201 0	12150 0	51303 0	57305 0
10,2170	12150 0	35062 0	00006 1	05014 1	05333 1	35016 0	00006 1	05012 1
10,2200	05333 1	C: 77532 0	C: 77533 1	31341 0	00006 1	62216 0	45017 0	54354 1
10,2210	30363 1	02220 0	30357 0	02220 0	30361 0	02220 0	04740 0	C: 16153 1
10,2220	24354 0	00006 1	50354 0	20032 1	10000 0	12231 1	00002 0	12231 1
10,2230	00002 0	67715 0	00006 1	62230 1	05650 1	C: 00121 0	15324 0	I: 43414 1
10,2240	C: 04756 1	C: 20242 1	I: 53775 1	C: 01521 0	C: 57605 0	I: 53655 1	C: 01535 0	C: 57576 1
10,2250	C: 25171 1	C: 01527 0	I: 53257 1	C: 57602 1	C: 01543 1	I: 77657 0	C: 57576 1	C: 15177 1
10,2260	C: 01517 0	C: 01205 1	I: 77616 0	I: 53775 1	C: 01521 0	C: 57605 0	I: 53655 1	C: 01535 0
10,2270	C: 57576 1	C: 25722 1	C: 01527 0	I: 53257 1	C: 57602 1	C: 01543 1	I: 77657 0	C: 57576 1
10,2300	C: 01730 1	I: 77616 0	I: 43025 1	C: 03464 1	C: 05661 0	C: 37462 0	C: 15756 1	I: 43014 0
10,2310	C: 05702 1	C: 20333 0	C: 05703 0	C: 20333 0	I: 75345 1	C: 15701 0	C: 00005 1	I: 77765 0
10,2320	C: 03466 0	C: 03464 1	I: 43276 0	C: 03462 1	C: 17462 1	C: 00001 0	I: 43014 0	C: 05463 0
10,2330	C: 05462 1	C: 37466 1	C: 24013 0	I: 60345 0	C: 00005 1	C: 00050 1	I: 54065 0	C: 00001 0
10,2340	C: 00047 1	I: 77657 0	C: 20601 1	C: 17464 1	C: 00001 0	C: 03466 0	I: 51545 1	C: 03464 1
10,2350	I: 45206 1	C: 15677 0	I: 71240 1	C: 20370 1	I: 50025 0	C: 15703 1	C: 20363 0	I: 75345 1
10,2360	C: 15703 1	C: 03464 1	C: 03464 1	I: 45345 1	C: 03462 1	C: 03464 1	C: 37462 0	C: 15756 1
10,2370	I: 77145 1	C: 03460 0	C: 00002 0	I: 52150 1	C: 03745 1	C: 63610 0	I: 67201 0	C: 00001 0

OCTAL LISTING FOR PARAGRAPH # 061, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

10,2400	C: 03012 1	I: 41542 1	I: 65346 0	I: 65356 1	C: 03316 0	I: 74346 0	C: 03550 1	I: 73525 1
10,2410	C: 03316 0	I: 53361 0	C: 03556 1	I: 77772 0	C: 02722 1	I: 76435 1	C: 03542 1	I: 65361 0
10,2420	I: 53361 0	C: 03542 1	I: 77772 0	C: 02714 1	I: 76435 1	C: 02722 1	C: 26730 1	C: 01736 1
10,2430	C: 26672 0	C: 01744 1	C: 26700 1	C: 01752 0	C: 02706 1	I: 52014 0	C: 00260 0	C: 47311 1
10,2440	00004 0	52071 0	34371 0	05134 1	C: 03441 0	C: 60102 1	52071 0	00003 1
10,2450	52006 0	22073 0	30065 1	75023 1	60000 1	54061 1	30065 1	75072 0
10,2460	00006 1	75004 1	54062 1	30065 1	74105 0	56065 1	75066 0	10000 0
10,2470	15426 0	30062 0	50061 0	54751 0	10066 0	12511 1	12477 0	40072 0
10,2500	22072 1	50071 1	52751 0	10066 0	12505 1	12511 1	40025 1	50071 1
10,2510	55051 0	10065 0	12525 0	12530 1	40025 1	50061 0	55051 0	30065 1
10,2520	62523 1	10000 0	12523 0	C: 17777 0	12530 1	00006 1	30025 0	53136 0
10,2530	40062 1	50061 0	54750 1	30002 0	22073 0	00003 1	52006 0	22073 0
10,2540	30062 0	50061 0	54751 0	30070 0	50061 0	55052 0	00006 1	30064 0
10,2550	50061 0	53435 0	12474 0	05536 1	13643 1	54155 1	35001 0	12722 0
10,2560	35021 1	54155 1	33253 0	12722 0	54155 1	33742 0	12722 0	54155 1
10,2570	33727 0	12722 0	54155 1	33730 0	12722 0	54155 1	35001 0	12700 0
10,2600	54155 1	33253 0	13061 1	54155 1	33742 0	13061 1	54155 1	33727 0
10,2610	13061 1	35017 1	03157 1	30100 0	73743 0	10000 0	12654 0	30100 0
10,2620	75007 1	00006 1	12624 1	15217 1	00004 0	45022 0	70100 1	65017 1
10,2630	54100 1	00003 1	41070 0	75013 1	10000 0	12640 0	40370 1	54370 1
10,2640	35017 1	13040 1	30165 0	54156 1	50164 1	33753 0	54162 0	50164 1
10,2650	31067 1	54160 1	54003 0	00002 0	30100 0	73476 0	10000 0	13676 1
10,2660	40100 1	75015 1	00004 0	26100 1	12756 0	30370 0	74160 0	13342 0
10,2670	54155 1	35021 1	12722 0	54155 1	35012 1	12722 0	54155 1	35021 1
10,2700	54160 1	35021 1	13063 0	35021 1	54155 1	33726 1	12722 0	54155 1
10,2710	35002 0	12722 0	54155 1	35002 0	12700 0	54155 1	33765 0	12722 0
10,2720	54155 1	35014 1	54160 1	03144 0	00003 1	12770 1	54155 1	33745 1
10,2730	13061 1	54155 1	33745 1	12722 0	35021 1	54164 0	03616 0	12744 0
10,2740	30100 0	73764 0	10000 0	13017 0	30100 0	77765 0	00006 1	12752 1
10,2750	35021 1	13216 0	30100 0	73762 0	00006 1	12760 0	35017 1	13216 0
10,2760	03156 0	03427 0	05201 1	03444 0	30025 0	55147 0	35021 1	13040 1
10,2770	30167 1	77674 1	54163 1	37670 1	05210 1	30160 0	73744 1	10000 0

OCTAL LISTING FOR PARAGRAPH # 062. WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD. "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

10,3000	12734 1	13003 0	12611 1	35016 0	54164 0	03616 0	13021 0	41071 1
10,3010	75014 0	10000 0	13021 0	30100 0	73735 1	00006 1	13021 0	05721 0
10,3020	C: 01502 1	03160 0	30163 0	00006 1	04007 1	54366 0	30100 0	73736 1
10,3030	10000 0	13176 0	13034 1	13176 0	03427 0	05201 1	03444 0	35016 0
10,3040	54164 0	13312 0	54155 1	37703 1	12722 0	55045 0	33720 1	54155 1
10,3050	33717 0	12722 0	54155 1	33723 1	12722 0	03137 1	12722 0	54155 1
10,3060	35014 1	54160 1	36214 0	00004 0	54072 0	30167 1	77674 1	54063 0
10,3070	30160 0	75014 0	10000 0	13101 0	30063 1	05134 1	C: 02770 0	C: 20067 1
10,3100	13107 0	30006 1	00006 1	04007 1	54001 1	33761 1	05160 0	03144 0
10,3110	00006 1	30156 0	50064 0	52156 1	00006 1	30160 0	50064 0	52160 1
10,3120	30064 0	54161 0	03151 1	00003 1	14704 1	55045 0	33720 1	54155 1
10,3130	33717 0	13061 1	54155 1	33723 1	13061 1	03137 1	13061 1	55131 1
10,3140	33724 0	54155 1	33725 1	00002 0	00004 0	43734 0	70160 1	60003 1
10,3150	54160 1	22002 0	04711 1	54157 0	60072 1	00001 0	35021 1	54164 0
10,3160	00004 0	30160 0	50164 1	55067 0	73752 0	00006 1	13172 1	30157 1
10,3170	50164 1	54372 0	30155 0	50164 1	54367 1	13453 1	50164 1	33753 0
10,3200	73202 0	07722 1	C: 03004 0	45017 0	60164 1	54154 0	50154 1	33732 1
10,3210	00004 0	05201 1	03444 0	50154 1	33732 1	15175 0	54154 0	03427 0
10,3220	05201 1	30154 1	50064 0	54154 0	33237 1	03445 1	50154 1	33754 1
10,3230	73756 1	07740 0	C: 74004 0	50154 1	35013 0	65015 0	07722 1	C: 03206 0
10,3240	30100 0	75015 1	10000 0	02624 0	12760 0	35021 1	54160 1	50160 0
10,3250	33746 1	65015 0	07740 0	C: 40010 1	50160 0	33732 1	00004 0	05201 1
10,3260	13557 1	31071 0	54003 0	30366 1	04773 0	77674 1	05210 1	46214 1
10,3270	60374 1	14704 1	00003 1	31072 0	54156 1	30100 0	77707 1	10000 0
10,3300	13303 0	13713 0	12624 1	05546 0	C: 00105 0	35002 0	70100 1	10000 0
10,3310	12766 0	13037 1	02644 0	30160 0	75023 1	54001 1	45003 0	50164 1
10,3320	71067 0	50164 1	55067 0	75010 1	54141 1	30156 0	54165 1	55072 1
10,3330	50164 1	10367 1	13341 0	13455 1	40370 1	54370 1	76043 1	63737 1
10,3340	60141 0	65017 1	04171 1	13467 0	04447 1	02642 0	05560 1	C: 00102 1
10,3350	05560 1	C: 00103 0	05560 1	C: 00104 1	30160 0	04271 1	13312 0	35013 0
10,3360	70160 1	10000 0	13405 1	35014 1	70160 1	10000 0	13502 1	40160 1
10,3370	75012 0	10000 0	13377 0	50164 1	30372 1	54157 0	13575 1	50164 1

OCTAL LISTING FOR PARAGRAPH # 063, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "a" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

10,3400	30367 0	76043 1	00006 1	13502 1	15217 1	30160 0	75003 0	10000 0
10,3410	13363 0	35003 1	50164 1	27067 0	22007 0	00006 1	62665 0	75004 1
10,3420	00006 1	13425 0	41145 1	63763 0	13342 0	33722 0	13342 0	45013 1
10,3430	00006 1	03011 1	30100 0	73740 0	10000 0	35017 1	54001 1	35021 1
10,3440	50001 0	57042 0	00004 0	00002 0	34233 1	56064 0	00006 1	63453 0
10,3450	56064 0	50064 0	54164 0	00003 1	00002 0	37667 1	05147 0	C: 04245 0
10,3460	C: 04060 0	13503 0	30100 0	73510 1	00006 1	13017 0	15217 1	11042 1
10,3470	15217 1	13473 0	15217 1	30162 1	73741 1	07722 1	C: 24100 0	50164 1
10,3500	33731 1	04456 1	04443 0	30164 1	54157 0	30162 1	73232 0	07722 1
10,3510	C: 40040 1	31073 1	50164 1	75015 1	10000 0	13602 1	11042 1	13462 0
10,3520	13522 0	13462 0	04223 0	13614 0	13633 0	43750 1	60154 1	00006 1
10,3530	26000 0	00006 1	13703 1	35016 0	54161 0	30100 0	74105 0	10000 0
10,3540	13543 1	13651 1	13635 0	40025 1	61147 1	10000 0	40000 0	67700 1
10,3550	65017 1	63774 0	00006 1	62766 1	13651 1	35017 1	13246 0	10161 0
10,3560	65017 1	13563 0	15217 1	50157 1	60372 1	54157 0	30162 1	73571 0
10,3570	07740 0	C: 74044 1	46214 1	04170 0	13575 1	30163 0	77674 1	05210 1
10,3600	30157 1	14704 1	50164 1	45015 1	71073 0	55073 0	35021 1	04773 0
10,3610	36214 0	50164 1	60372 1	14704 1	35021 1	13534 1	40160 1	75002 1
10,3620	10000 0	16706 1	40157 0	50164 1	60372 1	00006 1	13630 0	00002 0
10,3630	11012 1	05217 0	00002 0	35017 1	13534 1	46211 1	70100 1	00004 0
10,3640	54100 1	00003 1	13557 1	37716 0	54161 0	30100 0	74371 1	10000 0
10,3650	13303 0	30100 0	73746 0	10000 0	13245 0	30100 0	73747 1	10000 0
10,3660	13555 0	31071 0	75033 0	10000 0	13557 1	30371 1	00006 1	13557 1
10,3670	35067 0	00004 0	05134 1	C: 03037 0	C: 20060 0	13557 1	30100 0	73746 0
10,3700	10000 0	15217 1	13176 0	50157 1	30367 0	76043 1	40000 0	60155 0
10,3710	00006 1	13533 0	13272 1	46214 1	04170 0	15217 1	15217 1	C: 00036 1
10,3720	C: 00231 1	C: 01407 0	C: 14400 0	C: 00030 1	C: 01006 0	C: 00014 1	C: 20010 1	C: 40230 1
10,3730	C: 40036 0	C: 20764 0	C: 20624 0	C: 21037 0	C: 03400 0	C: 11210 1	C: 66521 1	C: 01177 1
10,3740	C: 00700 0	C: 00704 1	C: 40030 0	C: 34300 0	C: 40100 1	C: 00110 1	C: 02020 1	C: 01010 1
10,3750	C: 00026 0	C: 77730 0	C: 00050 1	C: 20144 1	C: 42424 0	C: 11254 1	C: 74704 1	C: 67777 1
10,3760	C: 40420 0	C: 02770 0	C: 10200 1	C: 30200 0	C: 20100 1	C: 24030 1	00004 0	54001 1
10,3770	30133 0	55363 1	30134 1	05657 0	C: 77467 1	35050 1	12726 1	CKSM 72264 1

OCTAL LISTING FOR PARAGRAPH # 064, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

11,2000	I: 77614 1	C: 00475 1	I: 44175 1	C: 03415 1	C: 01340 1	C: 03604 0	I: 46135 1	C: 03747 0
11,2010	C: 22022 1	I: 72575 0	C: 03570 0	C: 27570 0	C: 03576 0	I: 77752 1	C: 27576 0	C: 03604 0
11,2020	I: 77752 1	C: 03604 0	I: 71331 0	C: 03505 1	C: 77776 1	I: 70546 1	C: 17630 1	I: 67154 0
11,2030	C: 00154 1	C: 02703 1	I: 77775 1	C: 03570 0	C: 26657 1	C: 03604 0	C: 16665 0	C: 03423 1
11,2040	C: 02673 1	I: 77201 1	C: 00001 0	C: 03570 0	I: 41456 0	I: 53435 0	C: 03576 0	C: 26676 1
11,2050	C: 03604 0	I: 50256 0	I: 43015 1	C: 03630 1	C: 03665 1	C: 03630 1	I: 43044 0	C: 22101 1
11,2060	C: 03465 0	I: 41575 0	C: 02665 0	I: 63246 1	I: 46206 1	C: 02676 1	I: 51352 1	I: 74256 0
11,2070	I: 77772 0	C: 02665 0	I: 67351 1	C: 11566 1	C: 03505 1	I: 77244 0	C: 22101 1	C: 02665 0
11,2100	C: 03604 0	I: 63345 0	C: 27735 0	C: 02665 0	I: 63256 0	C: 02657 1	I: 41456 0	I: 57435 1
11,2110	C: 00003 1	I: 77606 1	I: 71350 1	C: 03745 1	C: 00023 0	I: 62040 1	C: 22120 1	C: 77767 1
11,2120	I: 67310 1	C: 00012 1	C: 00047 1	I: 77230 0	C: 22126 1	I: 41476 1	I: 77775 1	I: 50235 0
11,2130	I: 71244 0	C: 22133 0	I: 41476 1	I: 67154 0	C: 00000 1	C: 02674 0	I: 45150 1	C: 03745 1
11,2140	C: 25224 1	I: 77214 0	C: 00675 0	C: 02746 0	C: 17612 1	C: 02704 0	I: 45030 0	C: 22224 0
11,2150	C: 27442 0	I: 43135 1	C: 03747 0	C: 00263 0	I: 43030 0	C: 22157 1	C: 00063 1	I: 77775 1
11,2160	C: 03570 0	C: 02657 1	C: 25535 0	C: 03612 1	C: 15543 1	C: 03503 1	C: 01517 0	I: 43015 1
11,2170	C: 03423 1	C: 01673 1	C: 34041 0	C: 27135 0	I: 77775 1	C: 00025 0	C: 02705 1	I: 63154 1
11,2200	C: 03504 0	C: 00001 0	I: 55134 1	C: 03504 0	C: 02703 1	I: 46135 1	C: 00050 1	C: 22221 0
11,2210	I: 52375 1	C: 03604 0	C: 00017 1	I: 77655 1	C: 02665 0	C: 16665 0	C: 03630 1	I: 77650 1
11,2220	C: 22056 1	I: 77775 1	C: 02665 0	C: 03604 0	I: 52375 1	C: 03612 1	C: 03576 0	C: 27646 0
11,2230	C: 02705 1	C: 03620 0	I: 46135 1	C: 03747 0	C: 22251 1	I: 70575 1	C: 03620 0	C: 27620 0
11,2240	C: 03612 1	I: 77742 0	C: 27612 1	C: 03604 0	I: 77742 0	C: 27604 0	C: 03646 0	I: 77742 0
11,2250	C: 03646 0	I: 77201 1	C: 00001 0	C: 03604 0	C: 37415 0	C: 01340 1	I: 77624 1	C: 63662 0
11,2260	C: 26625 1	C: 00007 0	C: 36617 1	C: 13230 1	I: 40375 1	C: 02453 1	C: 00001 0	I: 45115 0
11,2270	C: 03546 0	C: 45153 1	I: 77624 1	C: 45263 1	C: 27472 0	C: 03546 0	I: 63201 1	C: 00001 0
11,2300	C: 02453 1	I: 65325 0	C: 02635 0	C: 03663 1	I: 62525 1	C: 11630 1	I: 45006 0	C: 72705 0
11,2310	I: 77624 1	C: 45237 0	I: 77745 1	C: 03744 0	I: 73401 0	C: 00007 0	I: 53515 0	C: 03540 0
11,2320	C: 00001 0	I: 47315 0	C: 02611 0	I: 77656 1	I: 71525 0	C: 03744 0	I: 45561 1	C: 43754 0
11,2330	C: 16517 0	I: 77620 0	C: 00300 1	I: 77624 1	C: 47477 0	I: 77624 1	C: 34612 0	I: 66370 0
11,2340	C: 00022 1	C: 00051 0	C: 00006 1	I: 61373 1	C: 02736 1	C: 01736 1	I: 77656 1	C: 06736 0
11,2350	I: 77700 0	C: 22343 0	I: 75160 1	C: 00306 1	C: 02671 0	I: 77624 1	C: 31053 0	I: 77624 1
11,2360	C: 47311 1	I: 77650 1	C: 00300 1	I: 77745 1	C: 00041 1	C: 01101 0	I: 52014 0	C: 01753 1
11,2370	C: 27305 1	C: 27271 0	I: 40354 1	C: 02150 1	C: 00001 0	I: 75543 1	C: 50042 1	I: 53515 0

OCTAL LISTING FOR PARAGRAPH # 065. WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD. "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

11,2400	C: 01535 0	I: 60325 0	C: 00045 0	C: 00047 1	I: 77715 1	I: 65241 0	C: 01543 1	C: 02312 0
11,2410	I: 60225 1	C: 01551 1	C: 00051 0	I: 77742 0	I: 65271 0	C: 00003 1	I: 41405 0	C: 00005 1
11,2420	I: 65316 0	C: 00005 1	I: 64716 0	C: 50042 1	I: 40442 1	I: 47515 0	C: 01543 1	I: 44205 0
11,2430	C: 00045 0	I: 41271 0	C: 00003 1	I: 53605 1	C: 23774 1	C: 20176 0	I: 43260 1	C: 00050 1
11,2440	I: 45257 0	C: 20211 1	I: 41205 0	C: 00001 0	C: 00005 1	I: 53657 0	C: 20211 1	C: 20201 0
11,2450	I: 65215 1	C: 01553 0	I: 53605 1	C: 00001 0	C: 20202 0	I: 43204 0	C: 57352 1	I: 77626 0
11,2460	C: 75471 1	I: 74020 0	C: 02270 0	C: 00012 1	I: 74014 1	C: 00303 1	C: 24042 1	C: 00002 0
11,2470	I: 77650 1	C: 24042 1	I: 66350 1	C: 01500 0	C: 00051 0	C: 77762 1	I: 54345 1	C: 02314 0
11,2500	C: 20612 0	I: 61500 0	C: 22503 1	I: 43206 1	C: 01551 1	C: 16312 0	I: 77615 0	C: 01517 0
11,2510	C: 35517 1	C: 22372 1	I: 73150 1	C: 02150 1	C: 02150 1	I: 77775 1	C: 11566 1	C: 26202 0
11,2520	C: 02152 0	I: 53257 1	C: 57605 0	C: 01535 0	C: 02160 1	I: 65014 1	C: 01756 1	C: 22534 0
11,2530	C: 01500 0	C: 12217 0	I: 77724 0	C: 01500 0	I: 53575 0	C: 02152 0	C: 16152 0	C: 00045 0
11,2540	C: 02310 1	I: 77624 1	C: 22636 1	I: 66175 1	C: 02160 1	C: 00051 0	C: 16152 0	C: 02210 0
11,2550	C: 02310 1	I: 71214 0	C: 00342 1	C: 23010 1	C: 01517 0	I: 77624 1	C: 54110 0	I: 72174 0
11,2560	C: 00002 0	C: 00051 0	I: 77614 1	C: 00343 0	C: 22567 0	I: 77076 0	C: 00000 1	C: 02160 1
11,2570	C: 26263 1	C: 00003 1	C: 02300 0	I: 77214 0	C: 01756 1	C: 22610 0	C: 02152 0	I: 53761 1
11,2600	C: 02310 1	C: 57175 0	I: 65051 0	C: 02160 1	C: 01500 0	C: 12225 1	I: 77724 0	C: 01500 0
11,2610	I: 62175 0	C: 02263 1	C: 00004 0	I: 43014 0	C: 04260 1	C: 00343 0	C: 22623 0	I: 53261 1
11,2620	C: 20612 0	C: 02300 0	C: 02300 0	I: 77624 1	C: 22636 1	I: 62174 1	C: 00004 0	C: 00004 0
11,2630	I: 77775 1	C: 02300 0	C: 36160 0	C: 22636 1	I: 77650 1	C: 23010 1	I: 74575 0	C: 02160 1
11,2640	I: 40236 1	C: 00001 0	I: 61501 1	C: 00040 0	I: 60325 0	C: 02310 1	C: 00041 1	I: 63342 1
11,2650	C: 02160 1	I: 77656 1	C: 16160 1	C: 00045 0	C: 02210 0	I: 55301 0	C: 00042 1	I: 41562 0
11,2660	I: 77743 1	C: 27727 0	C: 00051 0	I: 57124 1	C: 00050 1	C: 00040 0	I: 71264 1	C: 00041 1
11,2670	C: 00003 1	I: 65057 0	C: 57177 1	C: 00050 1	I: 74406 0	I: 50315 0	C: 02152 0	C: 02160 1
11,2700	I: 44372 1	I: 57206 1	C: 00005 1	I: 77752 1	I: 43206 1	C: 23756 1	I: 75406 1	I: 41475 1
11,2710	C: 00013 0	I: 43352 1	C: 23756 1	I: 43325 1	C: 00013 0	C: 11564 0	I: 72475 1	C: 00011 1
11,2720	I: 56215 1	C: 23750 1	C: 00017 1	I: 74275 1	C: 00007 0	C: 02160 1	I: 64515 1	C: 02152 0
11,2730	I: 41455 0	I: 41345 0	C: 00001 0	C: 00015 0	I: 61501 1	C: 00037 0	I: 40665 0	C: 00003 1
11,2740	C: 50042 1	I: 74276 1	I: 57124 1	C: 00050 1	C: 00051 0	I: 55064 0	C: 00036 1	C: 00037 0
11,2750	I: 77600 1	C: 22752 1	I: 65057 0	C: 57177 1	C: 00050 1	I: 77655 1	C: 02202 0	C: 02202 0
11,2760	I: 43400 1	C: 22762 1	I: 51575 1	C: 01521 0	I: 77654 0	C: 23005 0	I: 54345 1	C: 02212 1
11,2770	C: 20612 0	I: 44206 0	C: 01551 1	C: 16312 0	C: 01517 0	I: 45425 0	C: 42260 0	C: 22372 1

OCTAL LISTING FOR PARAGRAPH # 066, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD. "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

11,3000	I: 77624 1	C: 23421 1	I: 77614 1	C: 04020 1	C: 27305 1	I: 77776 1	05721 0	C: 00430 0
11,3010	I: 71354 0	C: 02150 1	C: 02310 1	I: 44601 0	C: 00001 0	C: 50010 0	I: 43044 0	C: 23220 0
11,3020	C: 00343 0	C: 23227 1	I: 65375 0	C: 02152 0	C: 01517 0	I: 45125 0	C: 23746 0	C: 55371 1
11,3030	C: 00017 1	I: 47375 0	C: 02012 0	C: 11560 1	I: 61255 1	C: 11560 1	C: 00025 0	I: 77656 1
11,3040	C: 00025 0	I: 57345 1	C: 00023 0	C: 23760 1	I: 63525 0	C: 00023 0	I: 45275 0	C: 23762 0
11,3050	C: 23754 0	I: 57206 1	C: 00023 0	I: 76405 1	C: 23766 1	I: 57325 1	C: 00001 0	C: 23774 1
11,3060	I: 41421 0	I: 57275 0	C: 00023 0	C: 23770 0	I: 57325 1	C: 00003 1	C: 23772 1	I: 77621 1
11,3070	I: 77603 1	C: 50036 1	I: 43271 1	C: 02310 1	C: 00005 1	I: 56273 1	C: 50032 0	C: 02310 1
11,3100	I: 74215 1	C: 00003 1	C: 02152 0	C: 14033 1	I: 70403 1	C: 50036 1	I: 43271 1	C: 02310 1
11,3110	I: 50473 1	C: 50032 0	I: 43271 1	C: 02310 1	I: 76561 1	C: 00025 0	I: 77645 0	C: 00033 1
11,3120	C: 14033 1	C: 02310 1	I: 63501 0	C: 00047 1	I: 60316 0	C: 00051 0	I: 54606 0	C: 50026 0
11,3130	I: 40161 0	C: 00033 1	C: 23133 1	I: 56070 0	C: 00046 0	C: 00046 0	I: 53670 0	C: 00050 1
11,3140	C: 20153 1	I: 40055 0	C: 02202 0	C: 22762 1	C: 36202 1	C: 27770 1	I: 77716 1	I: 41206 0
11,3150	C: 27755 0	I: 60525 0	I: 44215 1	C: 00011 1	C: 11616 0	I: 41205 0	C: 00017 1	C: 27755 0
11,3160	I: 56561 0	C: 00017 1	I: 77725 1	I: 43225 0	C: 11616 0	C: 00011 1	C: 14011 1	C: 00017 1
11,3170	I: 41205 0	C: 00023 0	C: 27755 0	I: 43352 1	I: 60325 0	C: 02310 1	C: 00050 1	I: 67206 1
11,3200	C: 02000 0	I: 74271 0	I: 53257 1	C: 57601 1	I: 70257 0	C: 20146 0	I: 65325 0	C: 01517 0
11,3210	C: 27755 0	I: 45154 0	C: 02150 1	C: 55344 1	I: 40055 0	C: 02202 0	C: 22762 1	C: 02202 0
11,3220	I: 72135 0	C: 01501 1	C: 00154 1	I: 73205 1	C: 27757 1	C: 00155 0	C: 23235 1	I: 77745 1
11,3230	C: 02156 1	C: 24023 0	C: 11560 1	I: 77650 1	C: 23040 1	C: 23446 0	C: 23452 0	C: 23463 1
11,3240	I: 45014 0	C: 00342 1	C: 23246 0	C: 23320 1	I: 77640 0	C: 23355 0	I: 51575 1	C: 01521 0
11,3250	I: 77600 1	C: 23274 1	I: 51025 1	C: 23764 0	C: 23274 1	I: 53615 0	C: 23764 0	C: 57605 0
11,3260	I: 45271 1	C: 00013 0	C: 27761 1	I: 77244 0	C: 23274 1	C: 01527 0	I: 45246 0	C: 23764 0
11,3270	I: 77600 1	C: 23274 1	I: 77640 0	C: 23276 0	I: 77624 1	C: 23421 1	I: 77775 1	C: 01527 0
11,3300	C: 25120 0	C: 01521 0	C: 01112 1	I: 77614 1	C: 00261 1	I: 66375 0	C: 01112 1	C: 01501 1
11,3310	C: 00000 1	C: 16152 0	C: 11566 1	C: 02212 1	I: 52014 0	C: 00301 0	C: 23665 0	C: 22512 1
11,3320	I: 43020 1	C: 02270 0	C: 04340 1	C: 23333 0	I: 45145 0	C: 01517 0	C: 54115 0	I: 57414 1
11,3330	C: 00343 0	C: 23332 1	C: 02263 1	I: 77354 0	C: 02150 1	C: 01521 0	I: 53257 1	C: 57605 0
11,3340	C: 01535 0	I: 51414 1	C: 00343 0	C: 23350 0	I: 44302 0	C: 27763 0	I: 77650 1	C: 02270 0
11,3350	I: 51451 0	C: 02263 1	I: 52025 1	C: 27763 0	C: 02270 0	I: 77624 1	C: 23361 1	I: 77650 1
11,3360	C: 23276 0	I: 45020 1	C: 02270 0	C: 23421 1	I: 53775 1	C: 01535 0	C: 57576 1	I: 53651 0
11,3370	C: 02263 1	C: 57574 0	C: 01503 0	C: 15535 0	C: 01517 0	I: 77624 1	C: 54120 0	I: 57414 1

OCTAL LISTING FOR PARAGRAPH # 067, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

11,3400	C: 00343 0	C: 23402 0	I: 53715 1	C: 01543 1	C: 57576 1	I: 77651 0	I: 77657 0	C: 57574 0
11,3410	C: 01511 0	C: 01543 1	I: 67154 0	C: 02270 0	C: 00052 0	I: 52014 0	C: 00303 1	C: 26735 1
11,3420	C: 26742 1	I: 77354 0	C: 02150 1	C: 01521 0	I: 53257 1	C: 57605 0	C: 01535 0	C: 01503 0
11,3430	C: 25535 0	C: 01527 0	I: 53257 1	C: 57602 1	C: 01543 1	C: 01511 0	C: 25543 1	C: 11566 1
11,3440	C: 01521 0	C: 15527 0	C: 11566 1	C: 01551 1	C: 01553 0	I: 77616 0	I: 64575 1	C: 02202 0
11,3450	C: 36166 0	C: 23626 1	I: 74575 0	C: 02202 0	I: 53206 0	C: 02166 1	C: 26174 1	I: 53362 0
11,3460	C: 02166 1	C: 36166 0	C: 23626 1	I: 57345 1	C: 02212 1	C: 23774 1	I: 74206 0	C: 02166 1
11,3470	I: 53372 1	C: 01120 0	I: 53361 0	C: 02212 1	C: 01112 1	C: 25112 1	C: 02202 0	I: 53322 1
11,3500	C: 02174 1	I: 76561 1	I: 77655 1	C: 01120 0	C: 01120 0	I: 45014 0	C: 00341 1	C: 23557 1
11,3510	C: 56750 0	I: 77354 0	C: 01102 0	C: 01120 0	I: 77732 1	C: 12467 1	I: 77775 1	C: 01112 1
11,3520	I: 40132 0	C: 23651 1	C: 12401 1	I: 77624 1	C: 56750 0	I: 66354 0	C: 01102 0	C: 00052 0
11,3530	C: 00000 1	I: 67114 1	C: 00006 1	C: 01111 1	I: 45104 0	C: 23622 0	C: 56750 0	I: 67154 0
11,3540	C: 01111 1	C: 01102 0	I: 77624 1	C: 56750 0	I: 76754 0	C: 01102 0	C: 75376 1	I: 77722 0
11,3550	C: 01112 1	I: 76173 0	C: 75310 1	C: 00000 1	I: 77722 0	C: 35120 1	C: 23305 0	I: 77200 0
11,3560	C: 22762 1	C: 01120 0	C: 25527 0	C: 01112 1	C: 01521 0	I: 43014 0	C: 04715 0	C: 27633 1
11,3570	C: 01756 1	C: 27305 1	I: 77776 1	05412 0	C: 04022 0	05546 0	C: 00236 0	06006 1
11,3600	I: 77731 1	C: 00053 1	C: 23607 1	I: 52014 0	C: 01714 1	C: 26705 1	C: 26760 1	I: 66214 0
11,3610	C: 00061 0	C: 01103 1	C: 77741 0	I: 66214 0	C: 01755 1	C: 23542 0	C: 01103 1	C: 77717 0
11,3620	I: 77650 1	C: 23542 0	I: 77745 1	C: 01101 0	C: 34041 0	C: 27167 1	I: 43345 1	C: 02314 0
11,3630	C: 02212 1	I: 66110 1	C: 77763 0	C: 01500 0	C: 02212 1	I: 74561 0	C: 02202 0	I: 74255 0
11,3640	C: 01120 0	C: 02212 1	I: 77655 1	C: 01112 1	C: 02152 0	I: 52014 0	C: 00301 0	C: 23665 0
11,3650	C: 22472 0	I: 43014 0	C: 01676 1	C: 01671 0	I: 77614 1	C: 02676 1	I: 77414 0	C: 01472 1
11,3660	05650 1	C: 00421 0	06006 1	I: 77650 1	C: 27305 1	I: 70754 0	C: 02150 1	C: 50042 1
11,3670	C: 36210 1	C: 23713 0	C: 02202 0	I: 62014 0	C: 00342 1	C: 23220 0	C: 77771 0	I: 70744 1
11,3700	C: 02150 1	C: 50044 1	C: 36210 1	C: 23713 0	I: 50414 0	C: 00303 1	C: 23707 0	I: 77655 1
11,3710	C: 02202 0	C: 36202 1	C: 23220 0	I: 60575 0	C: 02152 0	I: 53513 0	C: 02217 1	I: 46315 1
11,3720	C: 02152 0	I: 52361 1	C: 23764 0	I: 60325 0	C: 00045 0	C: 00052 0	I: 63406 0	I: 77605 1
11,3730	I: 65301 0	C: 00043 0	C: 02210 0	I: 56342 1	I: 77761 1	I: 57154 0	C: 00051 0	C: 00051 0
11,3740	I: 57074 0	C: 00051 0	C: 00042 1	I: 43457 0	C: 57606 0	C: 04631 1	C: 23146 0	C: 14000 1
11,3750	C: 00000 1	C: 02314 0	C: 31463 1	C: 01400 1	C: 00000 1	C: 10000 0	C: 00000 1	C: 03000 1
11,3760	C: 00000 1	C: 36000 1	C: 00000 1	C: 30000 1	C: 00000 1	C: 22525 0	C: 12525 0	C: 22000 1
11,3770	C: 00000 1	C: 01200 1	C: 00000 1	C: 25252 0	C: 25253 1	C: 00027 1	C: 03776 1	CKSM 66002 0

OCTAL LISTING FOR PARAGRAPH # 070, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

12,2000	I: 43014 0	C: 01311 0	C: 24004 0	C: 00470 1	I: 43345 1	C: 02364 1	C: 03663 1	C: 03663 1
12,2010	I: 52025 1	C: 02635 0	C: 11524 1	I: 77601 0	C: 00001 0	I: 51545 1	C: 03462 1	I: 50025 0
12,2020	C: 15667 1	C: 45267 0	I: 43174 1	C: 00007 0	C: 05700 0	C: 63642 1	I: 43014 0	C: 05742 0
12,2030	C: 24033 1	C: 05703 0	C: 63642 1	I: 71214 0	C: 05460 0	C: 15671 0	I: 77765 0	C: 03462 1
12,2040	C: 37462 0	C: 45267 0	I: 40001 1	C: 00001 0	C: 24045 0	I: 77773 1	C: 11740 1	C: 24017 1
12,2050	C: 01503 0	I: 66256 0	C: 00027 1	C: 00024 1	C: 16647 0	C: 00045 0	C: 24041 1	C: 01503 0
12,2060	I: 76441 1	C: 01511 0	I: 76405 1	C: 00023 0	C: 24043 0	C: 01511 0	I: 57236 1	C: 00017 1
12,2070	I: 52405 1	C: 00041 1	I: 61425 0	C: 11610 0	C: 00045 0	I: 74421 0	C: 11610 0	I: 77671 1
12,2100	C: 00041 1	C: 00011 1	I: 71244 0	C: 24112 0	C: 11626 0	I: 40071 0	C: 00011 1	C: 24116 1
12,2110	I: 52166 1	C: 24116 1	I: 55366 1	C: 11630 1	I: 77600 1	C: 24116 1	C: 00013 0	I: 65205 0
12,2120	C: 00023 0	C: 00011 1	I: 65301 0	C: 00047 1	I: 56257 1	C: 20173 0	I: 50000 1	C: 24143 1
12,2130	C: 24143 1	I: 51525 1	C: 02312 0	I: 50025 0	C: 00001 0	C: 24143 1	I: 77765 0	C: 02312 0
12,2140	C: 16312 0	I: 77650 1	C: 24131 1	I: 71201 1	C: 00001 0	C: 02306 0	C: 00025 0	I: 53165 0
12,2150	C: 02312 0	C: 24320 0	I: 51440 0	C: 24320 0	I: 51025 1	C: 00013 0	C: 24320 0	I: 51145 0
12,2160	C: 02312 0	C: 24170 1	I: 57545 1	C: 00013 0	C: 14015 0	C: 11566 1	C: 34013 1	C: 24173 1
12,2170	I: 77745 1	C: 11566 1	C: 00015 0	I: 57345 1	C: 02312 0	C: 11621 1	I: 77646 0	C: 15350 0
12,2200	C: 01553 0	I: 77621 1	C: 00025 0	C: 02643 1	I: 63545 0	C: 00025 0	I: 41501 0	C: 00047 1
12,2210	I: 53605 1	C: 00011 1	C: 21573 0	C: 34031 1	C: 24433 0	I: 44200 0	C: 24326 0	C: 02312 0
12,2220	C: 02645 1	I: 44246 1	C: 01350 0	I: 71244 0	C: 24346 0	C: 00037 0	I: 60225 1	C: 01551 1
12,2230	C: 00047 1	I: 60325 0	C: 02643 1	C: 00050 1	I: 41260 0	C: 00047 1	C: 02645 1	I: 56257 1
12,2240	C: 21202 1	I: 41542 1	I: 71244 0	C: 24264 1	C: 00025 0	C: 00013 0	I: 45221 1	C: 00015 0
12,2250	I: 51000 0	C: 24256 0	C: 24256 0	I: 52145 0	C: 00001 0	C: 24276 1	I: 45345 1	C: 00015 0
12,2260	C: 00025 0	I: 52075 1	C: 11624 1	C: 24276 1	I: 77745 1	C: 00025 0	C: 00015 0	I: 45221 1
12,2270	C: 00013 0	I: 50000 1	C: 24312 1	C: 24312 1	I: 77745 1	C: 00001 0	C: 02643 1	I: 43254 0
12,2300	C: 24346 0	C: 00025 0	C: 14025 0	C: 00037 0	C: 01551 1	I: 46034 1	C: 24656 1	C: 24346 0
12,2310	I: 77650 1	C: 24204 1	I: 45345 1	C: 00013 0	C: 00025 0	I: 52075 1	C: 11624 1	C: 24276 1
12,2320	I: 70545 1	C: 00013 0	I: 77765 0	C: 02312 0	C: 34025 1	C: 24157 1	I: 50145 1	C: 00025 0
12,2330	C: 24344 1	C: 00013 0	I: 70545 1	C: 02643 1	C: 02643 1	I: 44254 1	C: 02270 0	C: 00025 0
12,2340	C: 14025 0	C: 01551 1	C: 34037 1	C: 24305 1	C: 34015 1	C: 24332 0	I: 44545 0	C: 00041 1
12,2350	I: 74225 1	C: 00035 1	C: 02647 0	I: 65372 1	C: 00025 0	I: 60316 0	C: 00047 1	I: 57275 0
12,2360	C: 00023 0	C: 00025 0	I: 53605 1	C: 00033 1	C: 21572 1	I: 77621 1	C: 00037 0	I: 74352 0
12,2370	C: 01511 0	I: 53372 1	I: 77712 0	C: 01535 0	I: 60246 1	C: 00050 1	C: 16655 0	C: 00031 0

OCTAL LISTING FOR PARAGRAPH # 071. WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD. "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

12,2400	I: 45275 0	C: 00033 1	C: 11606 1	I: 76405 1	C: 00021 1	I: 53605 1	C: 00025 0	C: 56601 0
12,2410	I: 74271 0	C: 02655 0	C: 02647 0	I: 65372 1	C: 00035 1	I: 56257 1	C: 56602 0	C: 02655 0
12,2420	I: 74221 0	C: 11622 1	C: 01511 0	I: 42455 0	I: 77626 0	C: 62234 0	C: 00037 0	C: 15551 1
12,2430	C: 00025 0	C: 35553 1	C: 02270 0	I: 77776 1	07171 1	C: 00010 0	C: 02525 1	C: 12526 0
12,2440	C: 67356 0	C: 75666 0	C: 15001 1	C: 23771 1	C: 64342 0	C: 43674 0	C: 06563 1	C: 04645 1
12,2450	C: 75173 0	C: 52672 0	C: 00656 1	C: 14331 0	C: 77633 1	C: 40512 0	C: 00023 0	C: 11210 1
12,2460	C: 77774 0	C: 67506 0	06006 1	C: 14033 1	C: 00031 0	I: 77776 1	07171 1	C: 00010 0
12,2470	C: 01000 0	C: 00000 1	C: 72525 0	C: 52506 0	C: 13301 1	C: 15337 1	C: 62776 0	C: 54733 1
12,2500	C: 11176 1	C: 13267 0	C: 73410 0	C: 51674 0	C: 01446 0	C: 33641 1	C: 77451 1	C: 65233 0
12,2510	C: 00055 1	C: 37266 1	C: 77767 1	C: 52336 0	06006 1	I: 53605 1	C: 00001 0	C: 21574 1
12,2520	C: 00035 1	I: 72405 0	C: 00043 0	I: 65234 1	C: 45565 0	I: 53605 1	C: 00033 1	C: 21574 1
12,2530	I: 72405 0	C: 00045 0	I: 65234 1	C: 45565 0	C: 00041 1	I: 76261 0	C: 20607 1	I: 41301 0
12,2540	C: 00047 1	C: 00025 0	I: 76257 0	C: 20576 1	I: 57232 0	C: 00023 0	C: 00037 0	I: 77616 0
12,2550	I: 71214 0	C: 00614 1	C: 24620 0	C: 00037 0	I: 60225 1	C: 02764 0	C: 00047 1	I: 60325 0
12,2560	C: 00015 0	C: 00050 1	I: 41260 0	C: 00047 1	C: 02762 0	I: 56257 1	C: 21202 1	I: 43142 1
12,2570	C: 04351 1	C: 24574 1	I: 75246 0	C: 02762 0	I: 51006 0	C: 24632 0	I: 43145 0	C: 03775 1
12,2600	C: 04311 0	C: 24603 1	C: 00017 1	I: 45221 1	C: 00011 1	I: 51000 0	C: 24612 1	C: 24612 1
12,2610	I: 77650 1	C: 24644 1	I: 45345 1	C: 00011 1	C: 03775 1	I: 52005 0	C: 11624 1	C: 24646 0
12,2620	I: 41345 0	C: 00011 1	C: 00051 0	I: 41325 0	C: 00017 1	C: 00051 0	I: 77625 0	I: 52165 1
12,2630	C: 02762 0	C: 24574 1	I: 43145 0	C: 03775 1	C: 04311 0	C: 24637 0	C: 00011 1	I: 45221 1
12,2640	C: 00017 1	I: 50000 1	C: 24650 1	C: 24650 1	I: 77745 1	C: 00001 0	C: 00015 0	I: 77616 0
12,2650	I: 45345 1	C: 00017 1	C: 03775 1	I: 52005 0	C: 11624 1	C: 24646 0	45017 0	50120 1
12,2660	60026 0	50120 1	54026 1	54154 0	06030 1	I: 44545 0	C: 00041 1	I: 74225 1
12,2670	C: 00035 1	C: 02724 1	I: 65372 1	C: 00025 0	I: 60316 0	C: 00047 1	I: 57275 0	C: 00023 0
12,2700	C: 00025 0	I: 53605 1	C: 00033 1	C: 21572 1	I: 77621 1	C: 00037 0	I: 74352 0	C: 02746 0
12,2710	I: 53372 1	I: 41512 1	I: 77646 0	I: 77701 1	C: 00047 1	C: 16722 1	C: 00031 0	I: 45205 1
12,2720	C: 00033 1	C: 11606 1	I: 76405 1	C: 00021 1	I: 53605 1	C: 00025 0	C: 21176 1	I: 74271 0
12,2730	C: 02722 1	C: 02724 1	I: 65372 1	C: 00035 1	I: 56257 1	C: 21175 1	C: 02722 1	I: 77621 1
12,2740	C: 11622 1	I: 53361 0	C: 02746 0	I: 43412 1	I: 40220 0	C: 02712 1	C: 00001 0	I: 77600 1
12,2750	C: 24751 1	I: 63375 0	C: 02657 1	C: 02746 0	I: 77624 1	C: 11637 0	I: 45000 0	C: 24776 1
12,2760	C: 25001 1	I: 43145 0	C: 00031 0	C: 04310 1	C: 25751 0	I: 45014 0	C: 04273 0	C: 24433 0
12,2770	I: 45014 0	C: 03706 0	C: 02712 1	C: 24665 1	I: 77650 1	C: 02712 1	I: 77614 1	C: 04033 0

OCTAL LISTING FOR PARAGRAPH # 072, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

12,3000	C: 25751 0	I: 66374 1	C: 00003 1	C: 00052 0	C: 00001 0	I: 77614 1	C: 04276 0	I: 65366 1
12,3010	C: 02734 0	I: 44342 1	C: 11612 1	I: 54325 1	C: 02732 0	C: 21607 0	I: 77671 1	I: 77600 1
12,3020	C: 25134 0	I: 41225 1	C: 03775 1	I: 40132 0	C: 25134 0	I: 63406 0	I: 65351 0	C: 00155 0
12,3030	C: 02744 1	I: 76202 0	I: 75440 0	C: 25217 1	I: 43306 0	I: 61000 0	C: 25132 0	C: 25025 1
12,3040	I: 40065 0	C: 11606 1	C: 25217 1	I: 41440 1	C: 25217 1	I: 77716 1	I: 41301 0	C: 00047 1
12,3050	C: 02744 1	I: 77457 1	C: 21567 0	07171 1	C: 00005 1	C: 20000 0	C: 00000 1	C: 72525 0
12,3060	C: 52471 1	C: 03146 1	C: 15003 0	C: 75556 0	C: 45210 0	C: 01615 1	C: 13553 0	C: 76371 0
12,3070	C: 63777 0	C: 01232 0	C: 27367 0	06006 1	I: 76405 1	I: 43006 0	C: 04316 1	C: 25204 0
12,3100	I: 60316 0	C: 00047 1	I: 53605 1	C: 02744 1	C: 21565 1	C: 14031 0	C: 00041 1	I: 75542 0
12,3110	I: 41306 1	I: 77632 0	C: 00025 0	I: 60316 0	C: 00047 1	I: 41325 0	C: 02742 1	C: 00041 1
12,3120	I: 75452 0	I: 56405 0	C: 03775 1	C: 14043 0	C: 02744 1	I: 43021 0	C: 11610 0	C: 04270 0
12,3130	C: 00045 0	I: 77616 0	I: 77774 0	C: 00003 1	I: 51001 1	C: 00001 0	C: 25141 1	I: 77614 1
12,3140	C: 04076 1	I: 75545 1	C: 02742 1	I: 41325 0	C: 02732 0	C: 03775 1	I: 65352 0	C: 02734 0
12,3150	I: 43202 0	C: 11616 0	I: 41225 1	I: 55301 0	C: 00047 1	C: 02732 0	I: 51457 0	C: 21174 0
12,3160	I: 63406 0	C: 14043 0	C: 11614 1	I: 63406 0	I: 65234 1	C: 45565 0	C: 02744 1	I: 40405 1
12,3170	C: 00043 0	I: 77771 0	I: 75440 0	C: 25217 1	I: 77615 0	I: 60304 0	C: 25163 1	C: 00047 1
12,3200	I: 77665 1	I: 52057 1	C: 21172 0	C: 25043 1	I: 50145 1	C: 02744 1	C: 25217 1	I: 60366 1
12,3210	C: 00047 1	I: 53665 1	C: 11630 1	C: 20176 0	I: 41425 1	I: 77650 1	C: 25100 1	I: 40001 1
12,3220	C: 00001 0	C: 25222 1	I: 43414 1	C: 04070 1	I: 40220 0	C: 02712 1	C: 00001 0	I: 77600 1
12,3230	C: 25231 0	I: 76731 0	C: 00027 1	C: 00024 1	C: 11740 1	C: 14017 1	C: 02673 1	I: 77675 0
12,3240	C: 11615 0	C: 03777 0	I: 77214 0	C: 00474 0	C: 02657 1	I: 45115 0	C: 02665 0	C: 11702 1
12,3250	C: 16732 0	C: 02722 1	I: 65301 0	C: 00047 1	C: 00041 1	I: 56342 1	I: 65257 1	C: 20173 0
12,3260	I: 77626 0	C: 75043 1	I: 44342 1	C: 11612 1	C: 02736 1	I: 53106 0	C: 25473 0	I: 65301 0
12,3270	C: 00047 1	C: 00001 0	I: 56342 1	I: 75457 0	C: 20176 0	I: 54325 1	C: 02732 0	C: 20607 1
12,3300	I: 43271 1	C: 02736 1	I: 77626 0	C: 77760 0	I: 50000 1	C: 25312 0	C: 25315 1	I: 50025 0
12,3310	C: 11634 0	C: 25315 1	I: 77745 1	C: 11634 0	C: 00017 1	I: 77745 1	C: 02734 0	I: 45261 0
12,3320	C: 20607 1	I: 77626 0	C: 61037 1	C: 02675 1	I: 71240 1	C: 25512 0	C: 02740 0	I: 56352 0
12,3330	C: 02732 0	I: 77600 1	C: 25512 0	C: 00011 1	I: 66214 0	C: 00715 1	C: 25477 1	C: 00051 0
12,3340	C: 00001 0	I: 77745 1	C: 03775 1	I: 77605 1	C: 02732 0	I: 45342 0	C: 02740 0	I: 65301 0
12,3350	C: 00047 1	C: 02736 1	I: 55257 1	C: 20170 0	I: 53040 0	C: 25431 0	C: 25431 0	C: 16742 1
12,3360	C: 03775 1	I: 43316 1	C: 11620 0	I: 41301 0	C: 00047 1	C: 02742 1	I: 44257 1	C: 20571 0
12,3370	C: 11616 0	C: 16744 1	C: 02742 1	I: 45000 0	C: 25434 0	C: 25001 1	I: 77745 1	C: 00037 0

OCTAL LISTING FOR PARAGRAPH # 073, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "a" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

12,3400	C: 16764 0	C: 00031 0	I: 45014 0	C: 04310 1	C: 25431 0	C: 24433 0	I: 44200 0	C: 25450 1
12,3410	C: 02673 1	C: 02762 0	I: 44246 1	C: 03777 0	I: 47044 1	C: 25515 1	C: 24656 1	I: 45030 0
12,3420	C: 25460 1	C: 24550 1	I: 53145 1	C: 00155 0	C: 25460 1	I: 77615 0	C: 03775 1	C: 37775 0
12,3430	C: 25343 1	I: 51145 0	C: 00015 0	C: 25453 1	I: 71201 1	C: 00001 0	C: 03775 1	C: 00011 1
12,3440	I: 70545 1	C: 00015 0	C: 00015 0	I: 44254 1	C: 25460 1	C: 03775 1	C: 37775 0	C: 25343 1
12,3450	I: 77745 1	C: 02764 0	C: 00037 0	I: 71201 1	C: 00001 0	C: 03775 1	C: 34017 0	C: 25440 0
12,3460	I: 51545 1	C: 02762 0	I: 41325 0	C: 02673 1	C: 11612 1	I: 45215 0	C: 11632 0	I: 43044 0
12,3470	C: 25515 1	C: 02434 0	C: 02712 1	I: 43001 1	C: 00001 0	C: 02434 0	C: 02712 1	I: 71331 0
12,3500	C: 00051 0	C: 10000 0	C: 00011 1	I: 65342 1	C: 00017 1	I: 43342 0	I: 77626 0	C: 74002 0
12,3510	C: 34015 1	C: 25343 1	I: 52145 0	C: 11636 1	C: 25333 0	I: 60345 0	C: 00041 1	C: 00047 1
12,3520	I: 70525 1	C: 02742 1	I: 77671 1	I: 75457 0	C: 20175 0	I: 72405 0	C: 00021 1	I: 41206 0
12,3530	C: 03775 1	I: 74261 1	C: 20206 1	C: 02724 1	I: 77725 1	I: 76561 1	C: 02676 1	I: 53235 0
12,3540	C: 02724 1	I: 43172 1	C: 02674 0	C: 02746 0	I: 53135 0	C: 02704 0	C: 25551 1	I: 77650 1
12,3550	C: 02712 1	I: 45145 0	C: 02722 1	C: 24713 1	C: 36705 0	C: 02712 1	I: 40220 0	C: 02712 1
12,3560	C: 00001 0	I: 77600 1	C: 25563 0	I: 63375 0	C: 02657 1	C: 02746 0	I: 77624 1	C: 11637 0
12,3570	I: 71200 0	C: 24776 1	C: 11616 0	I: 41225 1	C: 02744 1	C: 02742 1	I: 41366 1	C: 03775 1
12,3600	I: 74212 0	C: 02714 1	I: 45325 1	C: 11610 0	C: 02744 1	I: 52361 1	C: 02724 1	I: 53512 1
12,3610	I: 77600 1	C: 25667 1	I: 60325 0	C: 02760 1	C: 00047 1	I: 41325 0	C: 00041 1	C: 02742 1
12,3620	I: 56257 1	C: 20201 0	I: 56225 1	C: 11614 1	C: 00045 0	C: 00031 0	I: 63400 0	C: 25673 1
12,3630	I: 50021 1	C: 11612 1	C: 25673 1	I: 75366 0	C: 02757 0	I: 77614 1	C: 04272 1	I: 76561 1
12,3640	C: 02676 1	I: 63235 0	C: 00001 0	I: 53361 0	C: 00031 0	I: 41572 1	I: 56241 0	C: 02724 1
12,3650	C: 23756 1	I: 40142 I	C: 25653 0	C: 26734 0	C: 02724 1	I: 76435 1	I: 72441 0	C: 02676 1
12,3660	C: 16732 0	C: 02742 1	I: 77624 1	C: 25001 1	I: 77614 1	C: 02634 1	C: 24761 1	I: 43001 1
12,3670	C: 00001 0	C: 02434 0	C: 25751 0	I: 75345 1	C: 11564 0	C: 00031 0	C: 14031 0	C: 11566 1
12,3700	I: 77614 1	C: 04032 1	C: 25637 1	I: 40220 0	C: 02712 1	C: 00001 0	I: 77600 1	C: 25710 0
12,3710	I: 63375 0	C: 02657 1	C: 02746 0	I: 77624 1	C: 11637 0	I: 77600 1	C: 25717 1	I: 42405 0
12,3720	C: 02744 1	I: 75421 1	C: 11610 0	C: 02754 0	I: 65215 1	C: 11604 0	C: 00041 1	I: 72405 0
12,3730	C: 02742 1	I: 77671 1	I: 60325 0	C: 02744 1	C: 00047 1	I: 53725 1	C: 00041 1	C: 20174 1
12,3740	I: 45271 1	I: 50000 1	C: 25746 0	C: 25746 0	I: 77650 1	C: 02712 1	I: 52145 0	C: 11577 1
12,3750	C: 02712 1	I: 77776 1	05721 0	C: 00607 0	I: 63525 0	C: 00021 1	I: 77625 0	I: 74205 0
12,3760	C: 27755 0	C: 00017 1	I: 65332 0	C: 00017 1	I: 43342 0	C: 00003 1	C: 14003 1	C: 00021 1
12,3770	I: 44342 1	C: 00005 1	C: 00005 1	I: 74335 1	C: 01777 1	I: 43525 1	C: 00023 0	CKSM 35464 1

OCTAL LISTING FOR PARAGRAPH # 074. WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD. "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

13,2000	I: 43014 0	C: 01474 1	C: 01751 0	C: 26006 0	I: 77614 1	C: 01476 0	I: 45014 0	C: 01667 1
13,2010	C: 27162 1	I: 71214 0	C: 04307 1	C: 26031 1	C: 01571 0	C: 34041 0	C: 27442 0	I: 45014 0
13,2020	C: 01674 0	C: 26670 1	I: 43014 0	C: 02756 1	C: 26026 1	C: 01476 0	I: 45014 0	C: 01467 0
13,2030	C: 27162 1	I: 77614 1	C: 01236 1	C: 26656 0	I: 43414 1	C: 01474 1	52134 0	52365 0
13,2040	24364 0	30006 1	75054 1	26365 0	50364 0	27777 0	04666 0	02053 0
13,2050	02052 1	24364 0	24364 0	52365 0	52006 0	22164 1	50001 0	30001 0
13,2060	24001 0	24001 0	52365 0	06006 1	I: 77624 1	C: 00364 0	I: 77776 1	22365 1
13,2070	16010 1	05546 0	C: 00031 0	32220 0	04662 1	C: 20720 0	12212 0	02101 0
13,2100	02073 1	32221 1	04662 1	C: 20720 0	12212 0	02107 0	02101 0	06006 1
13,2110	I: 77745 1	C: 03413 1	C: 34041 0	C: 27105 0	I: 53575 0	C: 00001 0	I: 77676 0	C: 00031 0
13,2120	I: 53435 0	C: 00007 0	C: 00023 0	I: 53435 0	C: 00031 0	C: 24015 0	C: 03540 0	I: 76505 0
13,2130	C: 00015 0	I: 77655 1	C: 00007 0	C: 00007 0	I: 77624 1	C: 27442 0	I: 77624 1	C: 26222 1
13,2140	I: 53775 1	C: 00007 0	C: 57176 0	C: 25543 1	C: 00001 0	I: 77657 0	C: 57176 0	C: 15535 0
13,2150	C: 03413 1	C: 01517 0	I: 71214 0	C: 01673 1	C: 01571 0	C: 34041 0	C: 27135 0	I: 77624 1
13,2160	C: 27442 0	I: 77624 1	C: 26222 1	I: 77775 1	C: 00017 1	C: 01503 0	C: 15535 0	C: 00015 0
13,2170	C: 25517 0	C: 00025 0	I: 77624 1	C: 23435 1	I: 77776 1	05412 0	C: 04024 0	05546 0
13,2200	C: 00236 0	06006 1	I: 77624 1	C: 26760 1	I: 77531 0	C: 00053 1	C: 26211 1	04662 1
13,2210	C: 27477 0	I: 77776 1	35021 1	55126 1	55125 1	37716 0	55734 1	14106 0
13,2220	C: 01524 0	C: 01441 1	I: 67214 1	C: 00263 0	C: 00050 1	I: 43030 0	C: 26230 1	C: 00063 1
13,2230	I: 77616 0	I: 77201 1	C: 00007 0	C: 02611 0	I: 63276 1	C: 02541 0	I: 57456 1	I: 47206 0
13,2240	C: 02611 0	I: 77772 0	C: 00001 0	I: 77616 0	04711 1	55777 0	06006 1	I: 43234 0
13,2250	C: 45510 1	C: 26365 0	C: 02356 0	I: 43014 0	C: 00705 0	C: 26262 0	C: 00706 0	C: 26272 1
13,2260	I: 77650 1	C: 26313 1	I: 77745 1	C: 02356 0	C: 34041 0	C: 27126 1	I: 77775 1	C: 00001 0
13,2270	I: 77650 1	C: 26302 1	I: 71214 0	C: 04305 0	C: 54000 0	C: 02356 0	I: 77624 1	C: 26441 1
13,2300	I: 77775 1	C: 02152 0	C: 16766 1	C: 02356 0	C: 34041 0	C: 27114 0	I: 52375 1	C: 02766 1
13,2310	C: 00001 0	I: 52056 0	C: 26326 1	I: 72131 1	C: 00051 0	C: 00000 1	C: 00304 0	I: 77700 0
13,2320	C: 26324 0	I: 52175 0	C: 02617 0	C: 26326 1	I: 77775 1	C: 02611 0	I: 53521 1	C: 01736 1
13,2330	C: 02766 1	I: 45001 1	C: 00001 0	C: 47477 0	I: 77624 1	C: 46034 1	I: 77414 0	C: 01750 1
13,2340	C: 26342 0	02360 0	I: 45345 1	C: 02776 0	C: 26363 0	I: 71244 0	C: 26353 0	C: 02776 0
13,2350	I: 51025 1	C: 26367 1	C: 26355 0	I: 77776 1	02357 1	I: 77776 1	25777 1	25777 1
13,2360	31777 1	04666 0	C: 25252 0	C: 25254 0	C: 00000 1	C: 00202 1	C: 61740 0	C: 77777 0
13,2370	I: 40220 0	C: 02242 1	C: 00001 0	C: 24007 0	C: 02152 0	I: 51406 1	C: 16310 1	C: 11566 1

OCTAL LISTING FOR PARAGRAPH # 075, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

13,2400	I: 71414 0	C: 01743 0	C: 26403 1	I: 77624 1	C: 55371 1	I: 77656 1	C: 36152 1	C: 26571 0
13,2410	I: 77624 1	C: 26601 1	I: 63545 0	C: 02152 0	I: 63525 0	C: 02154 0	I: 75415 0	I: 76405 1
13,2420	C: 00011 1	C: 14021 1	C: 02156 1	C: 34023 1	C: 26531 1	C: 15104 0	C: 02152 0	C: 14021 1
13,2430	C: 02154 0	C: 34023 1	C: 26531 1	C: 15106 1	C: 02310 1	I: 77625 0	C: 02241 1	C: 35110 1
13,2440	C: 02242 1	I: 40220 0	C: 02242 1	C: 00001 0	C: 34007 1	C: 26571 0	I: 73545 1	C: 01104 0
13,2450	I: 65275 1	C: 00011 1	C: 01104 0	I: 65346 0	C: 01106 1	I: 57356 0	I: 71525 0	C: 01104 0
13,2460	I: 71525 0	C: 01106 1	I: 55475 1	I: 41456 0	C: 36152 1	C: 26601 1	I: 43145 0	C: 11566 1
13,2470	C: 01743 0	C: 26473 0	I: 77746 1	I: 77624 1	C: 55344 1	C: 16152 0	C: 02241 1	I: 74215 1
13,2500	C: 01110 0	C: 02152 0	I: 77772 0	C: 36152 1	C: 02242 1	I: 63545 0	C: 02156 1	I: 44352 0
13,2510	C: 11564 0	I: 44275 1	C: 26526 1	C: 11564 0	I: 75465 1	C: 26522 0	I: 77622 1	C: 02241 1
13,2520	I: 77616 0	C: 00446 1	C: 00305 1	C: 17711 0	C: 05254 1	C: 00155 0	C: 25250 1	C: 00302 0
13,2530	C: 17755 0	I: 77600 1	C: 26533 0	I: 63545 0	C: 00023 0	I: 63525 0	C: 00021 1	I: 77615 0
13,2540	I: 75454 0	C: 26557 1	I: 40065 0	C: 00023 0	C: 26564 1	I: 67542 0	C: 00025 0	I: 50125 1
13,2550	C: 00021 1	C: 26553 0	I: 43545 1	I: 57545 1	I: 43244 1	C: 26561 1	C: 11564 0	C: 00025 0
13,2560	I: 77616 0	I: 52025 1	C: 11564 0	C: 26557 1	I: 75345 1	C: 11612 1	C: 00023 0	C: 00025 0
13,2570	I: 77616 0	I: 43145 0	C: 26524 0	C: 01743 0	C: 26577 0	I: 77735 0	C: 11564 0	C: 00011 1
13,2600	I: 77616 0	I: 71220 1	C: 00051 0	C: 26626 1	I: 71214 0	C: 01703 1	C: 26616 1	C: 26530 0
13,2610	I: 45014 0	C: 00742 0	C: 26614 0	C: 26505 0	C: 36241 0	C: 00051 0	I: 77214 0	C: 00702 1
13,2620	C: 26614 0	C: 02026 1	I: 64445 0	I: 77650 1	C: 26614 0	C: 00065 1	C: 01265 1	05412 0
13,2630	C: 00052 0	35061 0	05147 0	C: 02636 0	C: 26063 0	05324 1	06006 1	I: 47014 1
13,2640	C: 04712 1	C: 26677 0	C: 45510 1	C: 00041 1	I: 45014 0	C: 04274 1	C: 27442 0	I: 45014 0
13,2650	C: 01076 1	C: 26670 1	I: 77650 1	C: 26000 0	C: 00003 1	C: 25140 0	I: 77414 0	C: 01672 0
13,2660	05412 0	C: 20032 1	00006 1	32655 0	05342 1	C: 02627 0	C: 26063 0	05217 0
13,2670	I: 43014 0	C: 01472 1	C: 01673 1	I: 43014 0	C: 01676 1	C: 01675 1	I: 77616 0	I: 77776 1
13,2700	05412 0	C: 00002 0	05560 1	C: 00221 0	05217 0	I: 47020 0	C: 00051 0	C: 26720 0
13,2710	I: 45014 0	C: 04063 0	C: 20237 0	I: 43014 0	C: 00303 1	C: 00051 0	C: 04223 0	C: 00051 0
13,2720	03064 0	55500 1	51500 0	31502 1	51500 0	55554 0	11500 1	12721 0
13,2730	06030 1	I: 43034 1	C: 26747 1	C: 04303 0	C: 26742 1	I: 66214 0	C: 00263 0	C: 02151 0
13,2740	C: 00000 1	I: 77616 0	I: 66214 0	C: 00063 1	C: 02151 0	C: 00002 0	I: 77616 0	03064 0
13,2750	55500 1	51500 0	31554 1	51500 0	55502 0	11500 1	12750 0	06030 1
13,2760	I: 47020 0	C: 00051 0	C: 26773 0	I: 45014 0	C: 04064 1	C: 20263 1	I: 43014 0	C: 00303 1
13,2770	C: 00051 0	C: 04224 1	C: 00051 0	03064 0	55500 1	51500 0	31502 1	51500 0

OCTAL LISTING FOR PARAGRAPH # 076, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

13,3000	55626 0	11500 1	12774 0	06030 1	I: 47014 1	C: 04307 1	C: 27025 0	C: 27014 1
13,3010	I: 52014 0	C: 04304 1	C: 26742 1	C: 26735 1	03064 0	55500 1	51500 0	31626 1
13,3020	51500 0	55502 0	11500 1	13015 1	06030 1	I: 77201 1	C: 00001 0	C: 02026 1
13,3030	I: 41525 0	C: 00041 1	C: 15517 0	C: 27755 0	I: 77624 1	C: 55344 1	C: 25535 0	C: 11560 1
13,3040	C: 14001 0	C: 01517 0	C: 14007 0	C: 27755 0	I: 45014 0	C: 00063 1	C: 55344 1	I: 74235 0
13,3050	C: 01535 0	C: 27063 1	C: 25543 1	C: 11566 1	C: 01521 0	I: 67174 1	C: 00002 0	C: 02150 1
13,3060	C: 35527 1	C: 27176 1	C: 07112 1	C: 06620 0	33070 0	54006 0	33507 0	00002 0
13,3070	C: 26063 0	I: 45020 1	C: 00046 0	C: 27442 0	I: 43130 1	C: 02214 1	C: 01474 1	I: 43014 0
13,3100	C: 01467 0	C: 01676 1	I: 77614 1	C: 01633 0	C: 27164 1	I: 45020 1	C: 00046 0	C: 27442 0
13,3110	I: 43130 1	C: 02214 1	C: 01634 1	C: 27077 1	I: 45020 1	C: 00046 0	C: 27442 0	I: 43130 1
13,3120	C: 02214 1	C: 01474 1	I: 43014 0	C: 01676 1	C: 01433 1	C: 27164 1	I: 45020 1	C: 00046 0
13,3130	C: 27442 0	I: 43130 1	C: 02214 1	C: 01634 1	C: 27122 0	I: 66214 0	C: 01467 0	C: 02151 0
13,3140	C: 00000 1	I: 66214 0	C: 00343 0	C: 27146 1	C: 02151 0	C: 00002 0	I: 77220 1	C: 02214 1
13,3150	C: 11566 1	C: 01521 0	C: 35527 1	C: 23421 1	I: 43014 0	C: 01676 1	C: 04062 1	I: 77614 1
13,3160	C: 04020 1	C: 22363 1	I: 77620 0	C: 02214 1	I: 43014 0	C: 04060 0	C: 04062 1	I: 77731 1
13,3170	C: 00053 1	C: 22363 1	I: 52014 0	C: 01714 1	C: 26731 0	C: 27004 0	I: 45014 0	C: 00342 1
13,3200	C: 27205 0	C: 23320 1	I: 45044 0	C: 27205 0	C: 23361 1	I: 77414 0	C: 01652 1	C: 27226 1
13,3210	05412 0	C: 04022 0	05546 0	C: 00236 0	06006 1	I: 77731 1	C: 00053 1	C: 27224 0
13,3220	I: 52014 0	C: 01714 1	C: 26705 1	C: 26760 1	I: 77624 1	C: 56750 0	I: 45001 1	C: 00001 0
13,3230	C: 23421 1	I: 53775 1	C: 01503 0	C: 57576 1	I: 53715 1	C: 01511 0	C: 57576 1	I: 63325 0
13,3240	C: 01517 0	C: 01503 0	I: 64715 0	C: 01511 0	C: 50042 1	I: 76006 0	C: 77765 0	I: 76014 0
13,3250	C: 00303 1	C: 27253 0	C: 77775 1	I: 40001 1	C: 00001 0	C: 27256 0	I: 77614 1	C: 04675 1
13,3260	I: 43014 0	C: 04676 1	C: 01667 1	I: 77535 1	C: 02215 0	30154 1	50120 1	54052 1
13,3270	03457 1	I: 45345 1	C: 01101 0	C: 01517 0	C: 36312 1	C: 23421 1	I: 77624 1	C: 22372 1
13,3300	I: 43345 1	C: 01551 1	C: 01517 0	C: 35517 1	C: 27226 1	I: 43014 0	C: 04752 0	C: 27312 1
13,3310	C: 01632 1	C: 27253 0	I: 73001 1	C: 00013 0	C: 02150 1	I: 51575 1	C: 01535 0	I: 43006 0
13,3320	C: 00262 1	I: 50023 0	C: 67212 1	C: 27326 0	I: 77614 1	C: 00062 0	I: 41345 0	C: 00013 0
13,3330	C: 00043 0	I: 55762 1	C: 50042 1	I: 41366 1	C: 23752 0	I: 40442 1	I: 54345 1	C: 00155 0
13,3340	C: 20220 0	I: 40006 0	C: 27367 0	I: 50021 1	C: 27441 0	C: 27367 0	I: 45345 1	C: 01101 0
13,3350	C: 01517 0	I: 54234 0	C: 45544 0	C: 20211 1	C: 02314 0	I: 51400 1	C: 27373 0	I: 50025 0
13,3360	C: 00015 0	C: 27377 1	I: 75345 1	C: 00015 0	C: 02314 0	C: 36314 1	C: 27377 1	I: 65345 0
13,3370	C: 27441 0	I: 77650 1	C: 27346 0	I: 77634 0	C: 45712 1	C: 36314 1	C: 27362 0	I: 51545 1

OCTAL LISTING FOR PARAGRAPH # 077. WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD. "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

13,3400	C: 02314 0	I: 50025 0	C: 27437 1	C: 27176 1	I: 46135 1	C: 01012 0	C: 27411 0	I: 77650 1
13,3410	C: 23240 0	I: 77614 1	C: 01707 0	C: 23240 0	I: 45345 1	C: 02314 0	C: 00015 0	I: 43040 1
13,3420	C: 27176 1	C: 04242 1	C: 23240 0	I: 45345 1	C: 01101 0	C: 01517 0	I: 77640 0	C: 27253 0
13,3430	I: 40525 1	C: 02314 0	I: 44322 1	I: 52040 1	C: 27253 0	C: 23240 0	C: 00000 1	C: 01400 1
13,3440	C: 14152 1	C: 00000 1	I: 77776 1	35021 1	54001 1	30106 0	50001 0	73540 1
13,3450	00006 1	13516 1	50001 0	33535 1	05175 1	I: 77776 1	13477 1	40106 1
13,3460	75011 0	10000 0	03477 0	50120 1	30052 0	55055 1	05412 0	C: 04022 0
13,3470	31055 0	50120 1	54052 1	35011 1	70106 1	00006 1	13521 0	35021 1
13,3500	54154 0	50154 1	33535 1	00004 0	05201 1	10064 1	13501 1	C: 00051 0
13,3510	50154 1	43540 1	70106 1	54106 1	00003 1	13521 0	50001 0	35002 0
13,3520	26106 1	06006 1	I: 77616 0	I: 77776 1	35017 1	13444 1	I: 77776 1	35016 0
13,3530	13444 1	35017 1	13500 0	35016 0	13500 0	C: 27443 1	C: 27524 1	C: 27527 1
13,3540	C: 20100 1	C: 10040 1	C: 04020 1	I: 45020 1	C: 01127 1	C: 27442 0	I: 43145 0	C: 27711 0
13,3550	C: 04674 0	C: 37732 0	C: 27567 0	I: 45020 1	C: 01127 1	C: 27442 0	I: 47014 1	C: 04474 1
13,3560	C: 45510 1	I: 44215 1	C: 27711 0	C: 00041 1	I: 45044 0	C: 27573 0	C: 27674 1	I: 43234 0
13,3570	C: 45510 1	C: 03732 1	C: 00041 1	I: 45014 0	C: 01676 1	C: 26034 1	I: 43014 0	C: 01573 1
13,3600	C: 04475 0	I: 77624 1	C: 27162 1	I: 66134 1	C: 03746 1	C: 03745 1	I: 67214 1	C: 00275 1
13,3610	C: 03747 0	I: 43054 1	C: 27614 1	C: 00075 0	I: 77775 1	C: 00001 0	C: 25232 0	C: 00007 0
13,3620	C: 15240 0	C: 00015 0	C: 01246 0	I: 77776 1	00004 0	00006 1	40025 1	20155 1
13,3630	07226 0	31127 1	04704 0	I: 47014 1	C: 04754 0	C: 27652 0	C: 45510 1	I: 44215 1
13,3640	C: 27711 0	C: 01101 0	I: 45044 0	C: 27305 1	C: 27674 1	I: 43234 0	C: 45510 1	C: 03732 1
13,3650	C: 35101 1	C: 27305 1	I: 45345 1	C: 01101 0	C: 01517 0	I: 45246 0	C: 27707 1	I: 77644 1
13,3660	C: 27645 0	I: 44234 1	C: 45510 1	C: 01517 0	I: 51025 1	C: 27713 1	C: 27176 1	I: 43345 1
13,3670	C: 03732 1	C: 27711 0	C: 37732 0	C: 27645 0	I: 77414 0	C: 04674 0	25127 1	05650 1
13,3700	C: 01703 1	06006 1	I: 77745 1	C: 27711 0	C: 03732 1	I: 77616 0	C: 00000 1	C: 00003 1
13,3710	C: 00000 1	C: 02342 0	C: 00000 1	C: 01060 0	C: 77764 1	C: 77775 1	C: 77766 0	C: 77771 0
13,3720	C: 77775 1	C: 77775 1	C: 00000 1	C: 77763 0	C: 77766 0	C: 77773 1	C: 77770 1	C: 77771 0
13,3730	C: 27446 1	C: 14620 0	C: 16471 1	C: 01352 1	C: 22437 1	C: 16067 1	C: 00000 1	C: 00000 1
13,3740	C: 02302 1	C: 24736 0	C: 77651 0	C: 76237 0	C: 77776 1	C: 53032 0	C: 10407 0	C: 05344 1
13,3750	C: 13710 0	C: 35320 0	C: 12160 0	C: 12124 0	C: 24000 1	C: 00000 1	C: 74631 0	C: 63145 1
13,3760	C: 00243 1	C: 32703 1	C: 03654 0	C: 21000 1	C: 03654 0	C: 21000 1	C: 04627 0	C: 25200 1
13,3770	I: 71214 0	C: 00343 0	C: 23220 0	C: 00017 1	I: 52116 0	C: 25754 0	C: 03776 1	CKSM 65466 0

OCTAL LISTING FOR PARAGRAPH # 100, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "a" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

14,2000	I: 43573 1	C: 31761 0	C: 02547 0	I: 51025 1	C: 15652 1	C: 30002 0	I: 52145 0	C: 03656 1
14,2010	C: 11407 1	I: 43020 1	C: 02576 1	C: 04265 1	I: 77776 1	00006 1	30036 1	53161 1
14,2020	06006 1	I: 43131 0	C: 01304 1	C: 00000 1	C: 00271 0	I: 77776 1	06006 1	I: 43014 0
14,2030	C: 00073 0	C: 00705 0	C: 30112 0	I: 77414 0	C: 03660 1	31314 0	00006 1	62140 0
14,2040	04662 1	C: 26244 1	12170 1	12133 0	05546 0	C: 00013 0	35006 1	70075 1
14,2050	10000 0	02061 1	35012 1	70074 0	10000 0	12061 0	32160 1	04662 1
14,2060	C: 20676 1	31314 0	00006 1	62074 0	40074 0	75014 0	10000 0	02072 0
14,2070	31775 0	55160 0	31773 0	55161 1	35036 1	04662 1	C: 01732 0	35006 1
14,2100	70075 1	10000 0	12113 1	35001 0	70103 1	00006 1	12035 1	06006 1
14,2110	I: 77650 1	C: 02576 1	I: 77776 1	04662 1	C: 76557 1	30075 0	75013 1	00006 1
14,2120	12107 1	40075 1	75011 0	10000 0	12131 1	30101 1	75006 0	10000 0
14,2130	02040 1	32204 0	12075 0	05560 1	C: 00013 0	05650 1	C: 00407 1	02046 1
14,2140	35012 1	70074 0	10000 0	02074 0	00004 0	37661 1	05147 0	C: 02153 1
14,2150	C: 30065 1	00003 1	12074 1	06006 1	I: 77624 1	C: 31300 0	I: 77776 1	05217 0
14,2160	C: 01534 1	C: 01531 1	C: 10464 0	C: 12470 1	C: 00000 1	C: 00000 1	C: 15373 1	C: 11554 0
14,2170	35006 1	70075 1	10000 0	02133 1	32203 1	04662 1	C: 21766 0	12205 0
14,2200	12074 1	12074 1	15217 1	C: 00404 1	C: 00264 1	05536 1	04662 1	C: 16063 0
14,2210	35021 1	55323 0	04662 1	C: 20560 0	04106 1	I: 43020 1	C: 02576 1	C: 04065 0
14,2220	I: 43014 0	C: 01463 1	C: 00462 1	I: 77650 1	C: 30014 1	I: 77620 0	C: 00300 1	C: 36607 0
14,2230	C: 54110 0	C: 26752 0	C: 00003 1	C: 16744 1	C: 02607 1	C: 34041 0	C: 27114 0	I: 61131 0
14,2240	C: 00052 0	C: 00000 1	C: 30265 0	I: 52375 1	C: 02752 0	C: 00001 0	I: 77656 1	C: 26752 0
14,2250	C: 00001 0	I: 57456 1	C: 16736 1	C: 32250 1	I: 77624 1	C: 30325 0	C: 14017 1	C: 32266 1
14,2260	C: 24023 0	C: 02744 1	I: 77656 1	C: 36744 0	C: 30312 1	I: 40575 1	C: 02752 0	I: 51362 1
14,2270	C: 02744 1	I: 77656 1	C: 26744 1	C: 02752 0	I: 53455 0	C: 00001 0	I: 77676 0	C: 26736 1
14,2300	C: 00001 0	I: 57456 1	C: 16752 0	C: 32246 0	I: 77624 1	C: 30325 0	C: 14023 0	C: 32266 1
14,2310	C: 24017 1	C: 02744 1	I: 77635 1	C: 32256 1	C: 27474 0	C: 00007 0	I: 53361 0	C: 32254 0
14,2320	C: 03474 0	C: 17474 0	C: 32270 0	C: 34021 0	C: 00300 1	I: 70471 1	C: 00045 0	I: 43336 0
14,2330	C: 32252 0	I: 70546 1	I: 77616 0	04711 1	55777 0	06006 1	I: 77624 1	C: 47477 0
14,2340	I: 77624 1	C: 34612 0	I: 77601 0	C: 00001 0	I: 71214 0	C: 01465 1	C: 11566 1	C: 24303 1
14,2350	C: 02714 1	I: 63361 0	C: 30511 1	C: 02730 1	I: 74370 0	C: 00344 1	C: 30513 0	I: 77655 1
14,2360	I: 53505 1	C: 01736 1	C: 02760 1	I: 66331 0	C: 00051 0	C: 00006 1	C: 00052 0	C: 00006 1
14,2370	I: 52100 1	C: 30373 0	C: 30522 1	I: 45173 0	C: 31761 0	C: 30466 0	I: 73014 0	C: 01710 0

OCTAL LISTING FOR PARAGRAPH # 101. WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

14,2400	C: 30370 0	C: 00046 0	I: 52104 0	C: 30405 0	C: 30370 0	I: 45173 0	C: 46016 1	C: 30466 0
14,2410	I: 76614 0	C: 01710 0	C: 30402 1	C: 31761 0	I: 45237 0	C: 46016 1	C: 30515 0	I: 43240 0
14,2420	C: 30402 1	C: 30517 1	I: 77644 1	C: 30402 1	I: 50373 0	C: 31761 0	C: 02760 1	I: 50025 0
14,2430	C: 30521 1	C: 30370 0	I: 50373 0	C: 46016 1	C: 02760 1	I: 51025 1	C: 30521 1	C: 30442 0
14,2440	I: 77650 1	C: 30402 1	I: 77614 1	C: 01605 0	C: 30461 1	I: 65120 1	C: 00302 0	C: 00303 1
14,2450	I: 47773 1	C: 31761 0	C: 46016 1	I: 43006 0	C: 01545 1	C: 30445 1	I: 45345 1	I: 77644 1
14,2460	C: 30402 1	I: 67130 1	C: 00302 0	C: 00303 1	I: 77650 1	C: 30402 1	I: 51321 0	C: 02736 1
14,2470	C: 00017 1	I: 77654 0	C: 30505 1	I: 75240 0	C: 30505 1	C: 00160 0	I: 75240 0	C: 30505 1
14,2500	C: 00162 1	I: 43040 1	C: 30505 1	C: 01630 0	C: 00052 0	I: 77614 1	C: 01430 1	C: 00052 0
14,2510	C: 21150 0	C: 25157 0	C: 32766 1	C: 22713 1	C: 01736 1	C: 35137 1	C: 73003 0	C: 65403 0
14,2520	C: 06233 0	C: 26112 1	I: 77414 0	C: 01745 0	C: 30526 0	02530 0	I: 77776 1	25777 1
14,2530	31777 1	04666 0	I: 77776 1	35017 1	54304 1	54301 1	06006 1	I: 43014 0
14,2540	C: 00666 1	C: 00665 1	I: 77776 1	05412 0	C: 05024 1	C: 13000 0	50304 0	30302 0
14,2550	00006 1	72713 1	54735 1	32712 1	04662 1	C: 21057 0	04106 1	02564 1
14,2560	02553 0	36211 0	05526 0	15217 1	03366 1	04400 1	02553 0	06006 1
14,2570	I: 45034 1	C: 45510 1	C: 32340 1	I: 72131 1	C: 00051 0	C: 00000 1	C: 00304 0	I: 77700 0
14,2600	C: 30603 1	C: 36617 1	C: 30604 0	C: 02611 0	I: 77776 1	41011 1	62711 1	00006 1
14,2610	12704 1	06006 1	I: 77624 1	C: 30011 1	I: 77624 1	C: 36022 1	C: 02617 0	I: 77776 1
14,2620	04662 1	C: 16063 0	06006 1	I: 45145 0	C: 02607 1	C: 32340 1	I: 77776 1	10304 1
14,2630	02671 0	06006 1	I: 53521 1	C: 01736 1	C: 02736 1	I: 77775 1	C: 02617 0	C: 24007 0
14,2640	C: 02611 0	C: 24015 0	C: 02601 1	C: 36744 0	C: 30714 0	I: 45014 0	C: 00354 0	C: 30655 1
14,2650	C: 47401 1	I: 77624 1	C: 32271 1	I: 77614 1	C: 01273 0	I: 77776 1	35771 0	04662 1
14,2660	C: 21045 0	04106 1	02664 1	02666 0	04662 1	C: 32120 0	06006 1	I: 77650 1
14,2670	C: 32145 0	06006 1	I: 53521 1	C: 01736 1	C: 26601 1	C: 02617 0	C: 02611 0	I: 77731 1
14,2700	C: 00305 1	C: 00000 1	I: 77650 1	C: 30537 0	06006 1	I: 77624 1	C: 36056 1	I: 77650 1
14,2710	C: 30614 1	C: 00066 1	C: 00306 1	C: 05253 0	I: 43020 1	C: 02777 1	C: 00074 1	I: 77760 0
14,2720	C: 02735 1	I: 47773 1	C: 00001 0	C: 00007 0	I: 65552 0	C: 00025 0	I: 43014 0	C: 00354 0
14,2730	C: 30740 1	C: 00174 0	I: 71360 1	C: 00006 1	C: 00025 0	C: 00023 0	I: 77650 1	C: 30721 0
14,2740	I: 45345 1	C: 00025 0	C: 00023 0	I: 47046 0	C: 45544 0	C: 01046 1	I: 77414 0	C: 00074 1
14,2750	35021 1	04662 1	C: 20703 1	32767 0	04662 1	C: 20720 0	14106 0	02764 0
14,2760	06006 1	I: 52014 0	C: 00274 0	C: 02777 1	06006 1	I: 77650 1	C: 02777 1	C: 01405 1
14,2770	I: 77624 1	C: 22331 0	I: 66234 1	C: 32324 0	C: 00051 0	C: 00001 0	I: 40370 1	C: 00003 1

OCTAL LISTING FOR PARAGRAPH # 102. WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD. "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

14,3000	C: 00005 1	I: 70543 1	C: 01161 0	I: 70523 1	C: 00005 1	I: 51425 0	I: 45206 1	C: 31066 0
14,3010	I: 71240 1	C: 31042 0	I: 51025 1	C: 31067 1	C: 31042 0	I: 77776 1	05412 0	C: 04024 0
14,3020	04662 1	C: 16663 0	04662 1	C: 17577 1	05757 1	04662 1	C: 17073 0	04662 1
14,3030	C: 17577 1	05757 1	06006 1	I: 77234 1	C: 31275 0	C: 11566 1	C: 01472 1	I: 52014 0
14,3040	C: 01060 0	C: 31044 0	I: 77700 0	C: 31001 1	I: 75160 1	C: 02671 0	C: 01735 1	I: 77624 1
14,3050	C: 31053 0	I: 77650 1	C: 32116 0	I: 77773 1	C: 00001 0	C: 10001 1	I: 77773 1	C: 00007 0
14,3060	C: 10007 1	I: 77773 1	C: 00015 0	C: 10015 1	I: 77616 0	C: 00056 1	C: 37722 1	41320 0
14,3070	75007 1	10000 0	03076 0	05650 1	C: 00210 1	04106 1	04662 1	C: 17667 0
14,3100	35025 0	04662 1	C: 21045 0	04106 1	03140 1	05412 0	C: 05024 1	C: 13000 0
14,3110	35021 1	55155 0	55156 0	55157 1	33273 1	04662 1	C: 20673 1	33274 0
14,3120	04662 1	C: 20673 1	04662 1	C: 16663 0	04662 1	C: 17577 1	05757 1	04662 1
14,3130	C: 17073 0	04662 1	C: 17577 1	05757 1	05412 0	C: 05024 1	C: 13000 0	13100 1
14,3140	05412 0	C: 00014 1	06006 1	I: 40331 1	C: 00305 1	C: 00000 1	C: 00001 0	I: 77234 1
14,3150	C: 31275 0	C: 11566 1	C: 01472 1	I: 43014 0	C: 01060 0	C: 00666 1	I: 77776 1	35017 1
14,3160	54301 1	05412 0	C: 05024 1	C: 13000 0	05364 0	C: 00065 1	13174 1	06006 1
14,3170	I: 77624 1	C: 36056 1	I: 77650 1	C: 31177 1	06006 1	I: 77624 1	C: 31300 0	I: 77624 1
14,3200	C: 36022 1	I: 77606 1	I: 53135 0	C: 00305 1	C: 31211 1	I: 45575 1	C: 75160 1	I: 77650 1
14,3210	C: 31217 1	I: 45575 1	C: 61166 1	C: 02607 1	I: 77624 1	C: 32340 1	C: 02601 1	I: 77776 1
14,3220	05412 0	C: 05024 1	C: 13000 0	04662 1	C: 16063 0	10304 1	13235 1	05412 0
14,3230	C: 05024 1	C: 13000 0	35017 1	54304 1	13161 0	05412 0	C: 05024 1	C: 13000 0
14,3240	06006 1	I: 45145 0	C: 02607 1	C: 32340 1	C: 24015 0	C: 02601 1	C: 24007 0	C: 02611 0
14,3250	C: 26736 1	C: 02617 0	C: 36744 0	C: 30714 0	I: 77414 0	C: 00314 1	C: 31260 1	03100 0
14,3260	I: 77624 1	C: 47401 1	I: 75160 1	C: 02713 0	C: 01735 1	I: 45014 0	C: 01662 1	C: 31053 0
14,3270	I: 52014 0	C: 01462 0	C: 32145 0	C: 01426 0	C: 12200 0	30025 0	55074 1	16030 0
14,3300	I: 43020 1	C: 03501 0	C: 00071 1	I: 77776 1	30301 0	75023 1	04662 1	C: 16002 1
14,3310	04662 1	C: 17573 0	05757 1	51330 0	10052 1	13326 1	13320 1	13320 1
14,3320	35021 1	57330 0	10000 0	50000 1	54000 0	13304 1	05364 0	C: 00026 0
14,3330	13332 1	13361 1	05364 0	C: 00027 1	13336 0	13361 1	35021 1	04662 1
14,3340	C: 20703 1	33365 1	04662 1	C: 20720 0	04106 1	13347 0	03341 1	03366 1
14,3350	04400 1	03341 1	47713 1	70735 1	00006 1	76211 1	56001 0	50304 0
14,3360	54302 1	06006 1	I: 77614 1	C: 03420 1	C: 03501 0	C: 00307 0	10735 1	63376 0
14,3370	10000 0	00002 0	13374 0	13374 0	50002 0	00002 0	C: 77730 0	I: 51575 1

OCTAL LISTING FOR PARAGRAPH # 103, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

14,3400	C: 02723 0	C: 24045 0	C: 02731 0	I: 41446 1	I: 50025 0	C: 00045 0	C: 31411 1	I: 45545 1
14,3410	C: 77732 1	I: 51575 1	C: 02737 0	I: 45206 1	C: 00045 0	I: 71240 1	C: 73635 0	I: 77626 0
14,3420	C: 43732 0	C: 73635 0	C: 15262 0	C: 21773 1	C: 74130 0	C: 42420 1	C: 70033 0	C: 41533 1
14,3430	C: 15014 0	C: 04650 0	C: 67067 1	C: 60150 0	C: 02551 1	C: 15723 0	C: 07210 0	C: 01664 1
14,3440	C: 67276 0	C: 62232 0	C: 13262 0	C: 00563 1	C: 05076 0	C: 35561 0	C: 70716 0	C: 40260 1
14,3450	C: 62466 1	C: 64656 0	C: 10652 1	C: 04246 0	C: 63235 0	C: 44200 0	C: 73710 0	C: 66230 0
14,3460	C: 07204 0	C: 33712 0	C: 61747 1	C: 72343 0	C: 02343 1	C: 21362 0	C: 03237 1	C: 13301 1
14,3470	C: 62030 0	C: 65332 0	C: 70715 0	C: 71267 1	C: 01745 0	C: 06477 0	C: 63531 0	C: 75365 0
14,3500	C: 12010 0	C: 03005 1	C: 76146 0	C: 77014 1	C: 60371 1	C: 75073 1	C: 03370 0	C: 12003 1
14,3510	C: 76125 0	C: 40037 1	C: 72436 0	C: 77062 0	C: 61041 0	C: 54164 0	C: 72277 0	C: 51044 0
14,3520	C: 62641 0	C: 45471 1	C: 70711 1	C: 70546 1	C: 67364 1	C: 47073 0	C: 64425 0	C: 77777 0
14,3530	C: 07157 0	C: 16322 0	C: 63327 1	C: 64446 0	C: 67515 1	C: 55266 0	C: 05230 0	C: 25476 0
14,3540	C: 64754 0	C: 72604 0	C: 71235 0	C: 72553 1	C: 66427 0	C: 42171 0	C: 66546 0	C: 70765 1
14,3550	C: 73260 1	C: 71643 0	C: 14121 0	C: 30153 0	C: 61247 1	C: 73310 1	C: 72313 0	C: 41247 0
14,3560	C: 74744 0	C: 44566 1	C: 70606 0	C: 54564 1	C: 77153 0	C: 61536 0	C: 61601 1	C: 47046 0
14,3570	C: 60604 0	C: 76224 1	C: 77031 0	C: 73354 1	C: 73161 0	C: 63065 1	C: 60431 1	C: 51702 0
14,3600	C: 00656 1	C: 33013 0	C: 04044 0	C: 10627 0	C: 62164 0	C: 45040 1	C: 07325 1	C: 37443 0
14,3610	C: 03267 1	C: 06626 0	C: 63471 0	C: 50471 0	C: 11660 1	C: 04151 0	C: 75501 1	C: 46664 1
14,3620	C: 70430 1	C: 46540 1	C: 07507 1	C: 20100 1	C: 13727 1	C: 05455 0	C: 72160 0	C: 64202 0
14,3630	C: 11144 0	C: 05203 0	C: 64200 1	C: 65331 0	C: 71322 1	C: 41512 1	C: 16402 0	C: 16205 1
14,3640	C: 01365 0	C: 04034 1	C: 75054 1	C: 56052 0	C: 17030 1	C: 17635 1	C: 73321 0	C: 57603 0
14,3650	C: 77010 0	C: 47623 0	C: 11515 0	C: 01640 1	C: 63215 1	C: 52176 0	C: 02143 0	C: 26755 1
14,3660	C: 12715 1	C: 31470 0	C: 13401 0	C: 31222 1	C: 03157 1	C: 27504 0	C: 17402 1	C: 12312 1
14,3670	C: 75552 1	C: 63657 0	C: 05471 0	C: 06122 0	C: 16220 0	C: 16362 1	C: 04417 1	C: 32762 0
14,3700	C: 06443 1	C: 12622 1	C: 07766 1	C: 10237 0	C: 14154 1	C: 36154 1	C: 13200 1	C: 31653 0
14,3710	C: 13244 1	C: 21036 1	C: 01067 1	C: 23106 1	C: 10560 0	C: 27227 0	C: 10402 0	C: 00275 1
14,3720	C: 65477 0	C: 77044 1	C: 00153 0	C: 11212 0	C: 00077 1	C: 36275 1	C: 17777 0	C: 01417 1
14,3730	C: 07674 0	C: 21771 0	C: 03416 1	C: 07626 1	C: 62413 0	C: 57536 0	C: 07510 1	C: 06414 0
14,3740	C: 01673 1	C: 06065 1	C: 15735 1	C: 31531 1	C: 16745 0	C: 17555 1	C: 02615 1	C: 13716 0
14,3750	C: 73010 1	C: 40311 0	C: 15776 0	C: 34660 0	C: 00325 0	C: 26625 1	C: 07572 0	C: 05105 0
14,3760	C: 15472 1	C: 03761 1	C: 03762 1	CKSM 56756 0	@	@	@	@
14,3770	@	@	@	@	@	@	@	@

OCTAL LISTING FOR PARAGRAPH # 104, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

15,2000	05412 0	C: 00254 1	05560 1	C: 00027 1	05560 1	C: 00031 0	04662 1	C: 17653 1
15,2010	35014 1	70076 1	10000 0	02016 1	35016 0	02017 0	35017 1	55132 1
15,2020	35017 1	04662 1	C: 21135 0	04106 1	02031 1	02020 1	05412 0	C: 00014 1
15,2030	05217 0	31132 0	76214 1	50000 1	02035 0	02041 0	02110 0	02041 0
15,2040	12120 1	00006 1	35021 1	53046 0	32157 0	04662 1	C: 20720 0	04106 1
15,2050	02052 1	02044 0	00006 1	31046 1	00006 1	12057 0	12062 0	00006 1
15,2060	30025 0	53046 0	31132 0	75016 1	10000 0	12073 0	06006 1	I: 77624 1
15,2070	C: 34531 1	I: 77650 1	C: 32100 1	06006 1	I: 77745 1	C: 01046 1	I: 77624 1	C: 34661 1
15,2100	I: 77624 1	C: 22331 0	I: 77776 1	32160 1	04662 1	C: 20720 0	04106 1	02161 0
15,2110	06006 1	I: 77650 1	C: 32100 1	06006 1	I: 77624 1	C: 30770 1	I: 77414 0	C: 01462 0
15,2120	05412 0	C: 04024 0	35025 0	04662 1	C: 21045 0	04106 1	02130 1	02142 1
15,2130	06006 1	I: 43234 0	C: 45510 1	C: 32264 0	I: 77624 1	C: 30225 1	I: 77776 1	04662 1
15,2140	C: 30333 1	02147 1	06006 1	I: 77624 1	C: 30532 0	I: 77776 1	04106 1	05650 1
15,2150	C: 00405 0	35050 1	04662 1	C: 20720 0	04106 1	02142 1	02120 0	C: 01442 1
15,2160	C: 01426 0	35024 1	04662 1	C: 21045 0	14106 0	12113 1	06006 1	I: 64375 1
15,2170	C: 00307 0	C: 01736 1	I: 77656 1	C: 26714 1	C: 00315 0	I: 53521 1	C: 01736 1	C: 26722 1
15,2200	C: 00323 0	I: 53521 1	C: 01736 1	C: 36730 0	C: 47205 0	I: 43014 0	C: 01260 1	C: 01662 1
15,2210	I: 77776 1	32244 1	04662 1	C: 20676 1	32323 1	04662 1	C: 17206 0	04662 1
15,2220	C: 17577 1	05757 1	05412 0	C: 04024 0	06006 1	I: 75160 1	C: 00306 1	C: 01735 1
15,2230	I: 77624 1	C: 31053 0	I: 43014 0	C: 01273 0	C: 01462 0	I: 77234 1	C: 31275 0	C: 11566 1
15,2240	C: 01472 1	I: 52014 0	C: 01060 0	C: 30655 1	C: 04024 0	C: 00065 1	C: 01265 1	C: 00302 0
15,2250	C: 24533 1	C: 00343 0	C: 21616 0	C: 00000 1	C: 13143 0	C: 00000 1	C: 00000 1	C: 77777 0
15,2260	C: 53231 1	C: 00001 0	C: 17570 0	C: 00001 0	C: 16700 1	C: 07760 1	C: 14473 1	C: 07564 1
15,2270	C: 15042 0	I: 77620 0	C: 02777 1	I: 77624 1	C: 47205 0	I: 77776 1	32322 0	04662 1
15,2300	C: 20720 0	04106 1	02304 1	02317 0	05412 0	C: 00314 1	32323 1	04662 1
15,2310	C: 17206 0	04662 1	C: 17577 1	05757 1	05412 0	C: 05024 1	C: 13000 0	06006 1
15,2320	I: 77650 1	C: 02777 1	C: 01535 0	C: 02757 0	00004 0	30032 0	50120 1	54001 1
15,2330	30033 1	50120 1	54002 1	30034 0	50120 1	54003 0	00003 1	06030 1
15,2340	C: 02607 1	I: 45020 1	C: 02777 1	C: 30225 1	I: 77775 1	C: 02736 1	C: 24001 0	C: 02744 1
15,2350	C: 26736 1	C: 00001 0	C: 02744 1	I: 77776 1	47713 1	70735 1	00006 1	76211 1
15,2360	56001 0	50304 0	54302 1	10000 0	12401 1	32431 0	04662 1	C: 20720 0
15,2370	04106 1	02373 1	02365 0	06006 1	I: 74375 0	C: 03705 0	C: 32433 1	I: 52056 0

OCTAL LISTING FOR PARAGRAPH # 105. WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD. "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

15,2400	C: 32424 1	40000 0	62430 1	00006 1	62415 0	50304 0	30302 0	50120 1
15,2410	54046 1	06006 1	I: 52173 0	C: 31761 0	C: 32424 1	06006 1	I: 70740 0	C: 00304 0
15,2420	C: 00303 1	I: 76740 0	C: 00154 1	C: 02372 0	I: 53455 0	C: 03474 0	I: 77650 1	C: 02777 1
15,2430	C: 00343 0	C: 01530 0	C: 22363 1	C: 11623 0	34377 0	27725 1	35012 1	71321 1
15,2440	00006 1	12447 0	45017 0	70102 0	54102 0	06000 1	02514 0	30032 0
15,2450	57661 1	00006 1	21661 0	55675 0	30033 1	57662 1	00006 1	21662 0
15,2460	55676 0	30034 0	57663 0	00006 1	21663 1	55677 1	40102 0	76214 1
15,2470	50000 1	02472 1	02501 1	02512 0	12475 1	06000 1	05412 0	C: 00006 1
15,2500	05324 1	35017 1	55720 1	34377 0	05245 1	C: 02434 0	C: 32066 0	11720 1
15,2510	02536 0	05324 1	26102 0	35021 1	55711 0	55706 0	55707 1	55710 1
15,2520	55723 1	02502 1	54001 1	00002 0	50000 1	35000 1	26001 1	00002 0
15,2530	40000 0	61720 0	00006 1	75002 1	61720 0	00002 0	31663 0	05074 1
15,2540	55511 1	31661 1	05075 0	55512 1	00006 1	71511 1	55514 1	31661 1
15,2550	05074 1	55513 0	00006 1	71511 1	55515 0	41677 1	00006 1	71512 1
15,2560	53721 0	41676 0	00006 1	71515 0	21721 0	31720 0	57707 0	02530 0
15,2570	55702 1	41677 1	00006 1	71513 0	53721 0	31676 1	00006 1	71514 1
15,2600	21721 0	31720 0	57710 0	02530 0	55703 0	31663 0	05075 0	55510 0
15,2610	00006 1	71676 0	55720 1	35021 1	20001 1	61675 1	61720 0	40000 0
15,2620	55720 1	57706 1	02530 0	55701 1	11723 1	02627 0	02651 1	41664 0
15,2630	05075 0	00006 1	71723 1	55721 0	00006 1	73177 1	27701 1	31664 1
15,2640	05074 1	40000 0	00006 1	71723 1	27702 1	41721 0	00006 1	73200 1
15,2650	27703 0	35004 0	70102 0	00006 1	15324 0	34777 1	54030 0	00006 1
15,2660	32664 1	53313 0	05324 1	C: 02665 0	C: 32066 0	22016 0	00006 1	22012 1
15,2670	30021 1	60000 1	55623 0	31702 0	61665 0	02522 0	55665 1	05074 1
15,2700	55506 1	55705 0	00006 1	71701 1	57705 1	00006 1	71703 0	55704 1
15,2710	31665 0	05075 0	55507 0	00006 1	71703 0	27705 0	41507 0	00006 1
15,2720	71701 1	27704 1	27666 1	05075 0	00006 1	71705 0	61665 0	02522 0
15,2730	55665 1	40000 0	61603 0	02522 0	55477 0	55572 1	31705 1	61664 1
15,2740	02522 0	55714 0	55664 0	41666 1	61604 1	55573 0	35015 0	70102 0
15,2750	00006 1	13037 1	45017 0	55700 0	55477 0	55500 1	41701 1	00006 1
15,2760	73177 1	61703 1	03027 1	50000 1	33202 1	55720 1	31702 0	03027 1
15,2770	50000 1	33205 0	27720 1	00006 1	01005 0	11711 0	03216 1	03677 1

OCTAL LISTING FOR PARAGRAPH # 106, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

15,3000	03704 1	10000 0	63175 1	13033 0	63175 1	13034 1	55624 1	10000 0
15,3010	43174 1	13013 1	33174 0	60001 0	22002 0	03001 0	52002 1	11624 1
15,3020	63172 0	13023 1	63172 0	54000 0	13026 1	22007 0	57624 0	10000 0
15,3030	63173 1	13034 1	63173 1	40000 0	55721 0	35021 1	00002 0	55700 0
15,3040	11506 1	63176 1	13044 0	63176 1	54000 0	13126 0	11506 1	13050 0
15,3050	11727 0	03064 0	03054 0	03064 0	05412 0	C: 40334 1	45017 0	55727 0
15,3060	33171 0	05245 1	C: 02374 0	C: 54066 0	11711 0	13073 1	13073 1	35021 1
15,3070	00006 1	01006 0	55711 0	11506 1	31573 1	13101 0	45021 0	55700 0
15,3100	41573 0	55573 0	55500 1	54001 1	11700 0	03110 1	35017 1	50000 1
15,3110	31703 1	03006 1	00006 1	04001 1	50000 1	33202 1	55720 1	31572 0
15,3120	54001 1	31702 0	03006 1	00006 1	04001 1	12770 1	25700 1	45017 0
15,3130	55711 0	11727 0	55727 0	13134 0	11507 0	41573 0	13140 0	31573 1
15,3140	55713 1	00006 1	75002 1	57713 0	54001 1	11507 0	41704 1	03151 1
15,3150	31704 0	03006 1	00006 1	04001 1	50000 1	33205 0	00006 1	01006 0
15,3160	31717 1	00006 1	21664 0	54001 1	11507 0	30001 0	03101 1	40001 1
15,3170	03101 1	C: 04064 1	C: 37734 0	C: 37756 1	C: 00067 0	C: 37267 0	C: 11277 0	C: 65033 1
15,3200	C: 36044 1	C: 00120 1	C: 00000 1	C: 00240 1	C: 00005 1	C: 00000 1	C: 00012 1	40025 1
15,3210	55712 0	35017 1	55711 0	05412 0	C: 00001 0	05324 1	45017 0	55617 1
15,3220	45033 0	00006 1	71701 1	60001 0	55613 0	41664 0	54021 0	40102 0
15,3230	75014 0	00006 1	13240 0	26102 0	31715 0	60021 1	57614 0	13300 0
15,3240	35002 0	60000 1	61715 0	57614 0	30021 1	65000 1	65000 1	57614 0
15,3250	27614 1	11613 0	65017 1	13255 1	65017 1	00006 1	71613 0	00006 1
15,3260	73750 1	00006 1	11506 1	54001 1	11614 1	35002 0	13270 0	45002 1
15,3270	61614 0	60001 0	54001 1	13300 0	50000 1	45001 1	60000 1	27614 1
15,3300	31614 0	00006 1	71506 1	55614 1	11700 0	03675 0	03307 0	31614 0
15,3310	55614 1	55571 1	55713 1	31613 1	54021 0	30021 1	55570 0	57613 1
15,3320	00006 1	71613 0	00006 1	73750 1	55616 0	60000 1	40000 0	63754 1
15,3330	54001 1	11613 0	40001 1	13335 0	30001 0	61614 0	63754 1	00006 1
15,3340	63355 1	40000 0	63754 1	63754 1	00006 1	63364 0	43747 1	61616 1
15,3350	00006 1	63657 0	41617 1	55620 0	03437 1	41613 0	55613 0	54021 0
15,3360	41614 1	55614 1	41617 1	55617 1	43747 1	61616 1	00006 1	63371 1
15,3370	13376 1	43752 0	61614 0	60021 1	00006 1	63657 0	41617 1	55620 0

OCTAL LISTING FOR PARAGRAPH # 107. WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

15,3400	43754 0	61616 1	61614 0	55615 0	63753 0	40000 0	00006 1	63415 1
15,3410	31615 1	00006 1	75002 1	20001 1	03420 1	00006 1	22007 0	43753 1
15,3420	55567 0	61613 1	60000 1	00006 1	73750 1	55621 1	00006 1	63431 1
15,3430	03443 1	10002 1	13437 0	31620 1	55617 1	41621 1	13442 1	41613 0
15,3440	55567 0	35021 1	55621 1	31567 1	60000 1	00006 1	73750 1	60000 1
15,3450	55607 0	40000 0	00006 1	63457 1	55607 0	31617 0	55620 0	41607 0
15,3460	00006 1	71567 0	55615 0	41567 0	00006 1	13501 1	61613 1	00006 1
15,3470	71621 1	61615 1	61614 0	22007 0	56001 0	00006 1	11567 0	00006 1
15,3500	13503 0	35045 0	13510 1	56001 0	00006 1	11567 0	00006 1	75045 1
15,3510	55605 1	33751 1	00006 1	71621 1	55621 1	33751 1	00006 1	71607 0
15,3520	55607 0	35021 1	55711 0	35017 1	54305 0	30025 0	65002 0	65002 0
15,3530	27712 0	33746 1	27712 0	45016 1	61621 0	00006 1	63550 1	51617 0
15,3540	33205 0	55622 1	31621 0	27712 0	00006 1	63552 0	35021 1	13603 0
15,3550	45017 0	55621 1	45016 1	61605 0	00006 1	63564 0	31605 0	27712 0
15,3560	00006 1	63566 1	35021 1	13605 0	45017 0	55605 1	45016 1	61607 1
15,3570	00006 1	63606 1	51620 1	33205 0	55610 0	31607 1	27712 0	00006 1
15,3600	63610 0	35021 1	13607 1	55621 1	45017 0	55605 1	45017 0	55607 0
15,3610	35021 1	55611 1	55612 1	55606 1	53622 1	10000 0	13633 0	23612 0
15,3620	45017 0	53606 1	10000 0	13633 0	23612 0	45017 0	53610 0	10000 0
15,3630	13633 0	23612 0	03642 1	56001 0	27612 1	56001 0	65017 1	05245 1
15,3640	C: 03650 1	C: 32066 0	31612 0	00006 1	01006 0	11611 1	05324 1	03705 0
15,3650	35016 0	55611 1	70102 0	00006 1	13643 1	22007 0	13617 0	41700 0
15,3660	75017 0	54001 1	50000 1	31714 1	50001 0	54000 0	60001 0	02522 0
15,3670	55717 0	35021 1	00006 1	01006 0	55567 0	55711 0	03647 1	41705 0
15,3700	00006 1	71506 1	00006 1	75002 1	27713 1	35002 0	00006 1	71713 1
15,3710	55476 1	40305 0	54305 0	00006 1	63720 1	04740 0	C: 42420 1	03736 0
15,3720	66214 0	00006 1	63726 1	30025 0	54304 1	45025 1	54305 0	00006 1
15,3730	31702 0	50305 1	52324 0	31703 1	50305 1	54325 1	31623 1	54021 0
15,3740	00006 1	33745 1	53313 0	05333 1	C: 03153 0	C: 12062 0	C: 77464 1	C: 00012 1
15,3750	C: 23617 0	C: 01440 0	C: 00266 0	C: 70706 1	C: 00133 0	C: 03755 0	C: 03756 0	CKSM 67323 1
15,3760	@	@	@	@	@	@	@	@
15,3770	@	@	@	@	@	@	@	@

OCTAL LISTING FOR PARAGRAPH # 110, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

16,2000	I: 77776 1	32017 0	04662 1	C: 20720 0	04106 1	02007 1	02001 1	06006 1
16,2010	I: 77775 1	C: 03705 0	I: 53561 0	C: 32433 1	C: 02617 0	I: 77650 1	C: 62563 0	C: 01530 0
16,2020	I: 77214 0	C: 01070 1	C: 11566 1	C: 03705 0	I: 43020 1	C: 03657 0	C: 01347 0	C: 34116 0
16,2030	I: 51575 1	C: 03646 0	C: 03654 0	I: 77201 1	C: 00001 0	C: 03640 0	C: 03576 0	I: 53435 0
16,2040	C: 03632 0	C: 27713 1	C: 03632 0	C: 03570 0	I: 65236 0	C: 00045 0	I: 56275 1	C: 34152 0
16,2050	I: 41205 0	C: 03654 0	C: 03076 0	I: 77671 1	C: 03727 0	C: 24017 1	C: 03646 0	I: 74241 0
16,2060	C: 03713 1	C: 03713 1	I: 41552 0	I: 65245 1	C: 03646 0	C: 00017 1	I: 63356 1	C: 00007 0
16,2070	I: 53435 0	C: 03713 1	I: 45561 1	C: 50056 1	I: 65256 0	C: 00017 1	I: 74346 0	I: 74255 0
16,2100	C: 03721 0	C: 00045 0	I: 53352 0	I: 77626 0	C: 74056 1	I: 77656 1	C: 27713 1	C: 03721 0
16,2110	I: 43006 0	C: 01072 0	I: 77624 1	C: 10647 0	I: 77650 1	C: 03657 0	I: 45345 1	C: 03413 1
16,2120	C: 36001 0	C: 14041 1	C: 03656 1	I: 77625 0	C: 00041 1	C: 37423 0	C: 61651 1	I: 77775 1
16,2130	C: 03612 1	C: 17713 1	C: 03413 1	C: 00041 1	I: 77621 1	C: 03656 1	C: 37423 0	C: 61651 1
16,2140	I: 41575 0	C: 03646 0	C: 03721 0	I: 45014 0	C: 01072 0	C: 10647 0	I: 52001 1	C: 00001 0
16,2150	C: 61704 0	C: 00024 1	C: 13714 1	I: 44001 0	C: 00001 0	C: 03657 0	I: 51375 1	C: 03433 0
16,2160	C: 03705 0	I: 77655 1	C: 03721 0	C: 03460 0	I: 77646 0	C: 03773 1	I: 77776 1	05412 0
16,2170	C: 10035 0	06006 1	I: 77775 1	C: 03460 0	C: 03721 0	I: 77214 0	C: 01344 0	C: 03657 0
16,2200	C: 03433 0	I: 41446 1	I: 41335 1	C: 01354 1	C: 36011 1	I: 77621 1	I: 77440 1	C: 40222 1
16,2210	31466 1	75002 1	10000 0	35017 1	50000 1	31421 1	55642 1	06006 1
16,2220	I: 51375 1	C: 03433 0	C: 03705 0	I: 77656 1	I: 41441 0	C: 03460 0	I: 56244 0	C: 40214 1
16,2230	C: 36005 1	I: 41215 1	C: 11564 0	I: 70501 1	C: 00047 1	I: 60325 0	C: 00045 0	C: 00050 1
16,2240	I: 77665 1	I: 53664 0	C: 00046 0	C: 57607 1	I: 41405 0	C: 36003 1	I: 54335 0	C: 03013 0
16,2250	C: 20617 0	I: 45421 1	C: 74347 1	I: 77615 0	C: 01205 1	C: 17413 1	C: 03430 0	I: 50025 0
16,2260	C: 36007 0	C: 40201 0	I: 74375 0	C: 03705 0	C: 03703 0	I: 52352 1	C: 03433 0	I: 63256 0
16,2270	C: 03460 0	I: 47256 0	I: 45121 1	C: 01736 1	C: 47644 1	I: 77761 1	C: 03235 0	C: 03126 1
16,2300	I: 77650 1	C: 03657 0	06006 1	I: 71201 1	C: 00001 0	C: 11566 1	I: 77725 1	C: 34424 1
16,2310	I: 71214 0	C: 03705 0	C: 34314 0	C: 34426 0	I: 77606 1	I: 45014 0	C: 00675 0	C: 22002 0
16,2320	I: 77776 1	05412 0	C: 05021 1	C: 10000 0	06006 1	I: 77614 1	C: 01310 1	C: 34345 1
16,2330	I: 52375 1	C: 03612 1	C: 03466 0	I: 45325 1	C: 03474 0	C: 03476 1	I: 55261 1	C: 20222 1
16,2340	C: 34420 0	I: 77761 1	I: 76451 0	C: 01207 0	C: 03705 0	I: 57535 0	C: 03747 0	I: 77640 0
16,2350	C: 34365 0	I: 53575 0	C: 01171 1	I: 45345 1	C: 01205 1	C: 03450 0	I: 56205 0	C: 34422 1
16,2360	C: 00043 0	I: 53361 0	C: 01215 0	C: 03646 0	C: 03646 0	I: 77776 1	05412 0	C: 04021 0
16,2370	06006 1	I: 77745 1	C: 03474 0	C: 27476 1	C: 03612 1	C: 03466 0	I: 77414 0	C: 01270 0

OCTAL LISTING FOR PARAGRAPH # 111, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

16,2400	45017 0	55742 0	05412 0	C: 00001 0	15217 1	06006 1	I: 77775 1	C: 11566 1
16,2410	C: 17345 0	C: 11566 1	C: 27343 0	C: 03721 0	C: 03646 0	I: 77776 1	12400 0	C: 01440 0
16,2420	C: 00000 1	C: 55340 0	C: 61710 0	C: 04000 0	C: 00000 1	C: 00707 1	C: 03434 1	06006 1
16,2430	I: 43001 1	C: 00001 0	C: 01066 0	I: 51575 1	C: 03721 0	I: 77776 1	35011 1	00006 1
16,2440	06031 0	75011 0	00006 1	12525 0	06006 1	I: 56325 0	C: 36021 1	C: 03076 0
16,2450	I: 72414 0	C: 00700 0	C: 34453 1	I: 77621 1	I: 56325 0	C: 01770 0	C: 03076 0	I: 50021 1
16,2460	C: 00001 0	C: 34504 1	I: 41325 0	C: 00111 0	C: 36015 0	I: 65221 0	C: 03076 0	C: 01775 0
16,2470	I: 60405 0	C: 36017 1	I: 41471 0	I: 51021 0	C: 00003 1	C: 34520 1	I: 55345 0	I: 43205 1
16,2500	C: 36017 1	C: 36013 0	I: 77650 1	C: 34511 0	I: 41345 0	C: 03076 0	I: 56215 1	C: 01772 1
16,2510	C: 01774 1	I: 77776 1	07226 0	30154 1	56001 0	35021 1	53430 0	02522 0
16,2520	I: 77414 0	C: 01266 1	05412 0	C: 00003 1	15217 1	06006 1	I: 77650 1	C: 34454 0
16,2530	C: 01531 1	I: 43020 1	C: 00300 1	C: 01463 1	I: 77745 1	C: 01046 1	C: 02607 1	I: 43175 0
16,2540	C: 02026 1	C: 00462 1	C: 14001 0	C: 02607 1	C: 34007 1	C: 55344 1	I: 77742 0	C: 16152 0
16,2550	C: 02607 1	I: 77624 1	C: 26370 1	I: 77624 1	C: 62365 0	I: 77776 1	32530 0	04662 1
16,2560	C: 20720 0	04106 1	02564 1	02556 0	06006 1	I: 77624 1	C: 62374 0	I: 45145 0
16,2570	C: 02607 1	C: 26441 1	I: 53575 0	C: 02152 0	C: 14307 0	C: 02607 1	C: 34041 0	C: 27071 1
16,2600	I: 47375 0	C: 00001 0	C: 00007 0	I: 53435 0	C: 00307 0	C: 00323 0	I: 53435 0	C: 00307 0
16,2610	C: 34315 1	C: 00300 1	I: 41345 0	C: 00737 1	C: 00747 0	I: 77676 0	I: 70525 1	C: 00741 0
16,2620	I: 41325 0	C: 00745 1	C: 00747 0	I: 76466 1	C: 02714 1	I: 41345 0	C: 00743 1	C: 00741 0
16,2630	I: 77752 1	C: 00033 1	I: 77605 1	C: 00737 1	I: 41325 0	C: 00751 1	C: 00745 1	I: 77625 0
16,2640	I: 41325 0	C: 00743 1	C: 00747 0	I: 77676 0	I: 41325 0	C: 00751 1	C: 00737 1	I: 41325 0
16,2650	C: 00745 1	C: 00033 1	I: 55415 1	I: 77772 0	C: 02730 1	I: 76435 1	C: 02714 1	C: 02722 1
16,2660	I: 77616 0	I: 77620 0	C: 00300 1	C: 34041 0	C: 27071 1	I: 77601 0	C: 00001 0	I: 57575 1
16,2670	C: 00001 0	I: 77656 1	C: 24323 0	C: 00007 0	I: 53435 0	C: 00001 0	C: 00315 0	I: 53435 0
16,2700	C: 00323 0	C: 34307 1	C: 00300 1	I: 45345 1	C: 03726 1	C: 03724 0	I: 45246 0	C: 34716 0
16,2710	I: 67240 0	C: 65071 1	C: 34720 0	I: 77650 1	C: 65073 0	C: 00040 0	C: 30447 0	C: 00613 0
16,2720	40102 0	74105 0	00006 1	63134 1	35036 1	05245 1	C: 02720 0	C: 34066 0
16,2730	30032 0	57662 1	57663 0	31450 1	00006 1	21662 0	55476 1	00006 1
16,2740	77705 0	55664 0	36214 0	05245 1	C: 03272 0	C: 34066 0	04740 0	C: 42420 1
16,2750	35003 1	00006 1	02011 0	10000 0	12760 0	35016 0	55651 0	13011 0
16,2760	11643 0	12765 0	12771 0	12763 0	12755 0	55653 1	31474 1	55652 0
16,2770	13002 1	04740 0	C: 13422 1	04740 0	C: 36462 1	41637 0	61474 1	55652 0

OCTAL LISTING FOR PARAGRAPH # 112, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "a" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

16,3000	34374 0	55653 1	25651 1	31652 1	55474 0	31653 0	55643 0	55444 0
16,3010	25651 1	11447 0	13016 1	13031 1	13022 0	13031 1	55676 0	36211 0
16,3020	55651 0	13132 0	31642 0	00006 1	63134 1	55446 1	35015 0	55651 0
16,3030	13043 1	35003 1	00006 1	02011 0	10000 0	13037 1	13134 0	25651 1
16,3040	33137 1	55446 1	25651 1	31466 1	75003 0	00006 1	13050 0	31446 0
16,3050	61446 0	55445 1	37716 0	55676 0	00006 1	31606 0	53673 0	00006 1
16,3060	41606 1	20001 1	20001 1	53612 1	00006 1	31602 1	20001 1	20001 1
16,3070	21612 1	00006 1	31612 0	00006 1	71445 1	21673 0	00006 1	31610 1
16,3100	53675 0	00006 1	41610 0	20001 1	20001 1	53612 1	00006 1	31604 1
16,3110	20001 1	20001 1	21612 1	00006 1	31612 0	00006 1	71445 1	21675 0
16,3120	25651 1	00006 1	31673 1	55423 1	53606 1	00006 1	31675 1	55424 0
16,3130	53610 0	25651 1	31676 1	55447 0	35021 1	55651 0	15324 0	C: 10000 0
16,3140	22016 0	00006 1	22012 1	11651 0	13146 0	13152 0	34334 1	05245 1
16,3150	C: 03253 0	C: 34066 0	47700 0	71644 1	10000 0	13240 0	13163 1	41644 1
16,3160	75016 1	00006 1	13244 1	35010 0	65005 1	00006 1	05012 1	33257 1
16,3170	55312 1	33263 0	54030 0	15333 0	22016 0	35016 0	00006 1	05012 1
16,3200	33261 1	55312 1	37700 1	54030 0	15335 0	22016 0	00006 1	22012 1
16,3210	45021 0	61623 1	54054 1	45021 0	61624 0	54053 0	35062 0	00006 1
16,3220	05014 1	11644 1	13232 0	13232 0	10000 0	03230 0	04701 0	C: 36152 1
16,3230	04740 0	C: 36361 0	11574 1	13250 1	13236 1	13250 1	04701 0	C: 36324 1
16,3240	51644 0	33257 1	04744 1	13163 1	00006 1	31424 1	53624 1	13163 1
16,3250	35021 1	55574 1	13236 1	51651 1	33263 0	50000 1	10000 0	C: 03174 0
16,3260	C: 40675 1	C: 03205 0	C: 41051 0	C: 37772 1	C: 03003 1	C: 03011 1	C: 03040 0	C: 03043 0
16,3270	C: 03121 0	C: 03132 1	31662 1	00006 1	21663 1	00006 1	75013 1	22000 1
16,3300	55533 1	31571 0	00006 1	13305 0	13313 1	31573 1	00006 1	13313 1
16,3310	35021 1	55573 0	15324 0	41533 1	00006 1	71640 0	00006 1	71533 1
16,3320	63706 0	55573 0	31533 0	00006 1	63327 1	35017 1	13330 0	45017 0
16,3330	55666 1	00006 1	71573 0	40001 1	61664 1	55667 0	00006 1	63342 1
16,3340	34371 0	13343 1	35001 0	55670 0	51670 1	01666 0	40000 0	00006 1
16,3350	63421 0	51670 1	01533 0	55671 1	63714 0	00006 1	63500 1	31533 0
16,3360	00006 1	75002 1	55573 0	31664 1	00006 1	73707 0	20001 1	20001 1
16,3370	20001 1	61573 1	51670 1	00000 1	40000 0	63711 0	40000 0	00006 1

OCTAL LISTING FOR PARAGRAPH # 113. WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD. "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

16,3400	63611 1	31671 0	63712 0	00006 1	63611 1	51670 1	01664 1	40000 0
16,3410	63706 0	40000 0	00006 1	63611 1	31664 1	55667 0	31533 0	55665 1
16,3420	13430 1	51670 1	03706 0	27667 0	43710 0	51670 1	00000 1	55665 1
16,3430	00006 1	71640 0	60000 1	00006 1	73707 0	55573 0	00006 1	71665 1
16,3440	55665 1	45005 0	51670 1	00000 1	27573 0	51670 1	01667 1	40000 0
16,3450	63706 0	40000 0	00006 1	73707 0	27665 1	33710 1	00006 1	75005 0
16,3460	61665 0	56001 0	35021 1	00006 1	11573 0	00006 1	13474 1	10000 0
16,3470	34777 1	13503 0	44777 0	13503 0	22000 1	00006 1	11573 0	13503 0
16,3500	43714 1	51670 1	00000 1	55573 0	00006 1	61533 0	55573 0	13512 0
16,3510	50000 1	45000 0	00006 1	77665 1	00006 1	71640 0	20001 1	20001 1
16,3520	55573 0	13524 0	50000 1	45000 0	55573 0	00006 1	13611 0	31573 1
16,3530	00006 1	71571 1	10000 0	13537 1	13542 0	13611 0	13542 0	35021 1
16,3540	55670 0	13553 0	11573 0	65017 1	13546 1	65017 1	40000 0	63715 1
16,3550	40000 0	00006 1	63611 1	31573 1	00006 1	75015 1	00006 1	13565 0
16,3560	10000 0	33716 1	13564 1	43716 0	55573 0	11573 0	34777 1	13571 0
16,3570	35001 0	55571 1	40000 0	00006 1	63577 1	41573 0	55573 0	31670 1
16,3600	00006 1	13603 0	13614 0	30031 0	00006 1	61573 1	00006 1	65324 1
16,3610	13614 0	45021 0	55571 1	55573 0	00006 1	33705 0	53311 1	31573 1
16,3620	54031 1	31670 1	00006 1	15324 0	11571 1	13631 1	13672 0	13652 1
16,3630	13672 0	31572 0	75017 0	00006 1	13644 0	45017 0	71572 1	55572 1
16,3640	35037 0	00006 1	01006 0	13672 0	35017 1	27572 1	35022 1	00006 1
16,3650	01006 0	13672 0	31572 0	75016 1	00006 1	13665 0	45016 1	71572 1
16,3660	55572 1	33717 0	00006 1	01006 0	13672 0	35016 0	27572 1	34377 0
16,3670	00006 1	01006 0	35001 0	00006 1	05013 0	15324 0	22016 0	35021 1
16,3700	55571 1	00006 1	01006 0	15335 0	C: 03676 0	C: 34066 0	C: 00344 1	C: 06315 0
16,3710	C: 00111 0	C: 00510 0	C: 01330 0	C: 00027 1	C: 07071 0	C: 00030 1	C: 07640 1	C: 00240 1
16,3720	C: 03720 1	C: 03721 0	CKSM 55656 1	@	@	@	@	@
16,3730	@	@	@	@	@	@	@	@
16,3740	@	@	@	@	@	@	@	@
16,3750	@	@	@	@	@	@	@	@
16,3760	@	@	@	@	@	@	@	@
16,3770	@	@	@	@	@	@	@	@

OCTAL LISTING FOR PARAGRAPH # 114, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

17,2000	C: 00000 1	C: 00310 0	C: 77715 1	C: 77777 0	C: 17602 0	C: 25124 1	C: 00000 1	C: 00620 0
17,2010	C: 00040 0	C: 00000 1	C: 00144 0	C: 00000 1	C: 01274 1	C: 00000 1	C: 00764 1	C: 00000 1
17,2020	C: 00000 1	C: 04263 1	I: 77620 0	C: 00300 1	I: 70740 0	C: 01330 0	C: 00001 0	C: 02607 1
17,2030	I: 66744 0	C: 00304 0	C: 41722 0	I: 76744 1	C: 00154 1	C: 00001 0	C: 10001 1	I: 77743 1
17,2040	C: 00006 1	C: 10006 0	I: 77624 1	C: 46000 0	I: 62150 1	C: 01330 0	C: 00002 0	I: 45130 1
17,2050	C: 00050 1	C: 47606 1	I: 77650 1	C: 00300 1	C: 03674 1	C: 03502 0	I: 77420 1	C: 03501 0
17,2060	32146 0	04662 1	C: 20720 0	04106 1	02066 0	02060 0	04662 1	C: 16004 1
17,2070	35021 1	04662 1	C: 20703 1	32145 0	04662 1	C: 20564 1	14106 0	12073 0
17,2100	06006 1	I: 77745 1	C: 03731 1	C: 16774 1	C: 03733 0	C: 02776 0	I: 77776 1	00004 0
17,2110	00006 1	30025 0	51330 0	52001 1	30033 1	51330 0	54002 1	31773 0
17,2120	51330 0	54003 0	30034 0	51330 0	54004 1	31775 0	51330 0	54005 0
17,2130	30032 0	51330 0	54006 0	00003 1	05536 1	34333 0	04662 1	C: 21045 0
17,2140	04106 1	12143 1	12070 0	04662 1	C: 31336 0	C: 15200 1	C: 01536 0	22016 0
17,2150	00006 1	22012 1	32534 1	10000 0	55447 0	35021 1	54001 1	51447 1
17,2160	53530 1	11447 0	12153 0	00006 1	32551 1	53313 0	34777 1	54030 0
17,2170	15333 0	22016 0	00006 1	22012 1	04740 0	C: 13366 0	30110 1	00006 1
17,2200	72545 0	55637 0	40000 0	61474 1	55652 0	31466 1	75002 1	10000 0
17,2210	35017 1	55447 0	51447 1	32531 1	55722 0	02422 1	51447 1	31416 0
17,2220	55636 1	02462 0	41447 0	50000 1	35016 0	55634 0	40000 0	64777 1
17,2230	65017 1	55625 0	45001 1	70105 1	54105 1	51447 1	31414 1	00006 1
17,2240	71634 0	22000 1	53635 1	51447 1	31421 1	55642 1	51447 1	32540 1
17,2250	55447 0	37716 0	55654 0	34374 0	55643 0	55444 0	31423 0	55605 1
17,2260	55623 0	55601 0	31424 1	55607 0	55624 1	55603 1	31466 1	75003 0
17,2270	00006 1	12317 1	35017 1	55611 1	51611 0	31702 0	00006 1	72537 0
17,2300	00006 1	12311 1	00006 1	62306 0	32536 0	12307 0	42536 1	51611 0
17,2310	55702 1	11611 1	12273 1	31702 0	55575 0	31703 1	55577 1	41501 0
17,2320	75015 1	27501 0	04740 0	C: 42420 1	35021 1	55644 1	30032 0	55662 0
17,2330	35003 1	00006 1	02011 0	00006 1	12337 0	31652 1	55474 0	35036 1
17,2340	05245 1	C: 02720 0	C: 34066 0	00006 1	32547 0	53313 0	31625 1	54030 0
17,2350	15333 0	02354 1	04701 0	C: 21272 0	00004 0	31644 0	55611 1	45016 1
17,2360	55644 1	00006 1	23613 1	32535 0	55676 0	35021 1	54001 1	51676 1
17,2370	53541 1	11676 0	10000 0	12364 0	40105 1	75001 1	26105 1	31420 0

OCTAL LISTING FOR PARAGRAPH # 115, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

17,2400	55636 1	02471 1	32542 0	55634 0	32543 1	55642 1	00006 1	31602 1
17,2410	53606 1	00006 1	31604 1	53610 0	32533 0	55722 0	02422 1	31611 0
17,2420	55644 1	01613 1	00006 1	51722 1	30001 0	53724 0	00006 1	51722 1
17,2430	30003 1	53726 1	00006 1	51722 1	30005 1	53730 0	00006 1	51722 1
17,2440	30007 0	53732 1	00006 1	51722 1	30011 1	53734 1	00006 1	51722 1
17,2450	30013 0	53736 0	00006 1	51722 1	30015 0	53740 1	51722 1	30016 0
17,2460	55741 0	00002 0	31470 0	00006 1	72544 1	20001 1	20001 1	20001 1
17,2470	55640 0	31636 0	00006 1	71472 0	20001 1	20001 1	55641 1	00002 0
17,2500	C: 37777 1	C: 67657 1	C: 01703 1	C: 47472 0	C: 27656 1	C: 37777 1	C: 60361 0	C: 00000 1
17,2510	C: 67304 1	C: 00000 1	C: 37777 1	C: 65371 1	C: 65337 0	C: 42700 0	C: 33045 0	C: 01000 0
17,2520	C: 00000 1	C: 00000 1	C: 42700 0	C: 33045 0	C: 20000 0	C: 60730 0	C: 17145 1	C: 41323 0
17,2530	C: 35773 1	C: 02500 0	C: 01425 0	C: 02512 0	C: 00063 1	C: 00027 1	C: 00210 1	C: 00170 1
17,2540	C: 00005 1	C: 00000 1	C: 00247 0	C: 00232 1	C: 33074 1	C: 03720 1	C: 03107 1	C: 40066 0
17,2550	C: 02171 1	C: 36066 1	22016 0	32634 1	61634 1	54030 0	12561 0	32635 0
17,2560	54030 0	33313 0	54031 1	35001 0	00006 1	05013 0	00006 1	22012 1
17,2570	32633 0	00006 1	06031 0	72633 1	00006 1	12636 1	55502 0	00006 1
17,2600	75007 1	76214 1	55513 0	55514 1	31502 1	00006 1	75011 0	76214 1
17,2610	55515 0	31502 1	00006 1	75013 1	76214 1	55516 0	31466 1	75002 1
17,2620	00006 1	12624 1	46214 1	12625 0	45016 1	55617 1	11631 0	55513 0
17,2630	12642 1	55514 1	12642 1	C: 07700 1	C: 37772 1	C: 37776 0	55513 0	55514 1
17,2640	55515 0	55516 0	11562 0	35017 1	12646 0	35016 0	55520 0	11626 0
17,2650	12654 0	12664 0	12656 1	12664 0	34334 1	12666 1	35771 0	12666 1
17,2660	C: 00000 1	C: 00003 1	C: 00006 1	C: 00000 1	51513 1	32660 0	61520 1	50000 1
17,2670	32714 1	72733 0	55453 0	00006 1	75011 0	55523 0	11563 1	35017 1
17,2700	12702 1	35016 0	55521 1	11627 1	12710 1	12735 0	12712 0	12735 0
17,2710	34334 1	12737 1	35771 0	12737 1	C: 00000 1	C: 05125 1	C: 05252 1	C: 00231 1
17,2720	C: 02421 1	C: 02610 1	C: 00146 1	C: 02504 1	C: 02442 1	C: 00000 1	C: 02421 1	C: 02442 1
17,2730	C: 00000 1	C: 02504 1	C: 02610 1	C: 01417 1	C: 06360 1	51514 0	32660 0	61521 0
17,2740	50000 1	32714 1	72734 1	55455 0	00006 1	75013 1	55524 1	11561 0
17,2750	35017 1	12753 0	35016 0	55517 1	11630 1	13046 1	13046 1	12760 0
17,2760	11626 0	12765 0	12775 1	12767 1	12775 1	34334 1	12777 0	35771 0
17,2770	12777 0	C: 00000 1	C: 00001 0	C: 00002 0	C: 00000 1	51515 1	32660 0	61517 0

OCTAL LISTING FOR PARAGRAPH # 116, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD. "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

17,3000	50000 1	33130 0	73147 1	55451 1	31516 1	00006 1	63040 0	11627 1
17,3010	36214 0	13013 1	36211 0	51516 1	62771 1	50000 1	33151 1	73162 0
17,3020	61451 0	55502 0	00006 1	75011 0	66061 0	55522 1	00006 1	13033 0
17,3030	31502 1	55451 1	13274 1	11561 0	13040 1	13030 0	13040 1	13030 0
17,3040	31451 0	00006 1	75011 0	67715 0	55522 1	13274 1	11627 1	13053 0
17,3050	13057 1	13055 0	13057 1	34334 1	13061 1	35771 0	13061 1	51516 1
17,3060	32660 0	61517 0	50000 1	33130 0	73150 1	55451 1	31515 1	00006 1
17,3070	13122 1	11626 0	36214 0	13075 1	36211 0	51515 1	62771 1	50000 1
17,3100	33151 1	73163 1	61451 0	55502 0	00006 1	75014 0	66061 0	55522 1
17,3110	00006 1	13115 0	31502 1	55451 1	13274 1	11561 0	13122 1	13112 1
17,3120	13122 1	13112 1	31451 0	00006 1	75014 0	67715 0	55522 1	13274 1
17,3130	C: 11000 1	C: 22125 1	C: 00252 1	C: 11231 1	C: 15421 1	C: 04610 1	C: 11146 1	C: 15504 1
17,3140	C: 04442 1	C: 11000 1	C: 15504 1	C: 04610 1	C: 11000 1	C: 15421 1	C: 04442 1	C: 03760 0
17,3150	C: 34017 0	C: 11000 1	C: 11231 1	C: 11146 1	C: 11000 1	C: 04610 1	C: 15504 1	C: 11000 1
17,3160	C: 15421 1	C: 04442 1	C: 03417 0	C: 34360 0	11562 0	13174 1	13170 0	13172 1
17,3170	55550 1	13372 0	41523 0	55523 0	31562 1	00006 1	51523 1	73353 0
17,3200	55461 1	63306 1	00006 1	63214 0	51523 1	33307 0	55550 1	40000 0
17,3210	27562 0	33310 0	55461 1	13357 1	41461 1	63313 0	00006 1	63222 0
17,3220	33313 0	55461 1	31461 0	00006 1	71523 0	23550 0	55562 0	13357 1
17,3230	11563 1	13240 0	13234 0	13236 1	55551 0	13536 0	41524 1	55524 1
17,3240	31563 0	00006 1	51524 0	73353 0	55463 0	63306 1	00006 1	63260 0
17,3250	51524 0	33307 0	55551 0	40000 0	27563 1	33310 0	55463 0	13523 1
17,3260	41463 0	63313 0	00006 1	63266 0	33313 0	55463 0	31463 1	00006 1
17,3270	71524 1	23551 1	55563 1	13523 1	11561 0	13314 0	13300 0	13314 0
17,3300	51522 0	33307 0	55547 1	13516 1	C: 77037 0	C: 77277 0	C: 77537 0	C: 00000 1
17,3310	C: 00240 1	C: 00500 1	C: 00740 1	C: 00027 1	31561 1	00006 1	51522 0	73353 0
17,3320	55457 1	63306 1	00006 1	63334 0	51522 0	33307 0	55547 1	40000 0
17,3330	27561 0	33310 0	55457 1	13377 0	41457 1	63313 0	00006 1	63342 1
17,3340	33313 0	55457 1	31457 0	00006 1	71522 1	23547 0	55561 0	13377 0
17,3350	C: 65252 1	C: 57777 1	C: 40000 0	C: 00000 1	C: 37777 1	C: 20000 0	C: 12525 0	11626 0
17,3360	13366 0	13363 0	13366 0	51513 1	32660 0	50000 1	32714 1	72733 0
17,3370	55454 1	13230 1	31453 1	55454 1	35021 1	55461 1	13230 1	11515 0

OCTAL LISTING FOR PARAGRAPH # 117. WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

17,3400	13410 0	35021 1	55452 1	11516 0	13453 1	35021 1	27452 1	13164 0
17,3410	11630 1	13426 0	13426 0	13414 1	11626 0	13401 0	13420 0	13401 0
17,3420	51515 1	32660 0	50000 1	33130 0	73147 1	13402 0	11626 0	36214 0
17,3430	13432 0	36211 0	51515 1	62771 1	50000 1	33151 1	73163 1	55452 1
17,3440	00006 1	75014 0	67715 0	55522 1	41457 1	63310 0	00006 1	71522 1
17,3450	30001 0	27547 1	13403 1	11630 1	13504 1	13504 1	13457 0	11627 1
17,3460	36214 0	13463 1	36211 0	51516 1	62771 1	50000 1	33151 1	73162 0
17,3470	27452 1	00006 1	75011 0	67715 0	55522 1	41457 1	63310 0	00006 1
17,3500	71522 1	30001 0	27547 1	13164 0	11627 1	13405 1	13510 1	13405 1
17,3510	51516 1	32660 0	50000 1	33130 0	73150 1	13406 1	31451 0	55452 1
17,3520	35021 1	55457 1	13164 0	11627 1	13532 1	13527 0	13532 1	51514 0
17,3530	32660 0	50000 1	32714 1	72734 1	55456 0	13542 0	31455 1	55456 0
17,3540	35021 1	55463 0	35021 1	55460 0	35015 0	55462 1	35024 1	55464 1
17,3550	41457 1	61461 0	00006 1	63577 1	41461 1	61463 1	00006 1	63603 1
17,3560	41461 1	27463 0	41457 1	27461 1	00006 1	33576 0	53313 0	45017 0
17,3570	71501 0	55501 0	45021 0	55465 0	15333 0	C: 02122 1	C: 42066 1	53460 0
17,3600	53462 1	53460 0	13554 1	53462 1	53464 1	53462 1	41457 1	61461 0
17,3610	00006 1	63613 0	13560 0	53460 0	53462 1	53460 0	13560 0	22016 0
17,3620	00006 1	22012 1	10031 1	15333 0	13626 1	15333 0	41501 0	75017 0
17,3630	00006 1	13642 0	27501 0	31451 0	00006 1	01006 0	31453 1	61455 1
17,3640	00006 1	01005 0	11457 1	13722 1	13661 1	13647 0	13661 1	11461 1
17,3650	13725 0	13666 0	13654 1	13666 0	11463 0	13730 1	13673 1	15333 0
17,3660	13673 1	51460 1	03700 0	45017 0	55457 1	13647 0	51462 0	03700 0
17,3670	45017 0	55461 1	13654 1	51464 0	03700 0	45017 0	55463 0	15333 0
17,3700	31452 0	00006 1	01006 0	00002 0	32734 0	00006 1	02005 0	61454 0
17,3710	00006 1	01005 0	00002 0	32733 1	00006 1	02005 0	61456 1	00006 1
17,3720	01005 0	00002 0	35021 1	57457 0	13732 0	35021 1	57461 0	13732 0
17,3730	35021 1	57463 1	54031 1	35001 0	00006 1	05013 0	15333 0	C: 03737 1
17,3740	C: 03740 1	CKSM 65302 0	@	@	@	@	@	@
17,3750	@	@	@	@	@	@	@	@
17,3760	@	@	@	@	@	@	@	@
17,3770	@	@	@	@	@	@	@	@

OCTAL LISTING FOR PARAGRAPH # 120. WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD. "a" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

20,2000	35021 1	54061 1	54062 1	00006 1	50061 0	30165 0	50062 0	52662 1
20,2010	50061 0	30167 1	50062 0	54663 0	40062 1	62064 1	00006 1	12025 0
20,2020	35771 0	26061 1	36214 0	26062 1	12003 1	35051 0	54003 0	35024 1
20,2030	05606 1	C: 01436 1	C: 00706 0	35021 1	54061 1	54062 1	50061 0	30753 0
20,2040	50062 0	54722 1	40062 1	65022 1	00006 1	12052 0	35016 0	26061 1
20,2050	24062 0	12036 1	30157 1	54730 1	00006 1	30066 1	52732 0	30067 0
20,2060	54707 0	30063 1	54713 0	04675 1	C: 00022 1	I: 77776 1	00006 1	30025 0
20,2070	21717 0	45041 0	54001 1	45021 0	21717 0	00004 0	45017 0	55332 0
20,2100	41130 0	66211 0	00006 1	62105 1	12110 1	41501 0	75001 1	27501 0
20,2110	53711 0	53526 0	53713 1	53530 1	53715 1	53532 0	31675 1	55564 0
20,2120	31677 0	55565 1	31701 0	55566 1	30025 0	65041 1	57671 0	04701 0
20,2130	C: 45056 0	00004 0	40025 1	61671 0	10000 0	65017 1	12141 0	65001 0
20,2140	40000 0	05245 1	C: 02150 1	C: 40066 0	00003 1	35041 1	27671 1	15217 1
20,2150	37663 0	05147 0	C: 03026 0	C: 44066 1	05324 1	30032 0	55646 0	30033 1
20,2160	55650 1	30034 0	55652 0	00002 0	35016 0	55051 0	35017 1	55052 0
20,2170	32200 1	04662 1	C: 20561 1	05534 0	02176 0	02170 0	04701 0	C: 63727 0
20,2200	C: 01014 0	I: 77214 0	C: 01066 0	C: 15335 0	C: 03126 1	I: 77776 1	34777 1	55447 0
20,2210	06006 1	I: 52014 0	C: 01264 0	C: 03657 0	I: 77776 1	05650 1	C: 01407 0	06006 1
20,2220	I: 77650 1	C: 03657 0	I: 77214 0	C: 00711 0	C: 03657 0	C: 15335 0	C: 03126 1	I: 77776 1
20,2230	45021 0	55643 0	55653 1	55642 1	55145 1	06006 1	I: 52014 0	C: 01264 0
20,2240	C: 03657 0	40102 0	74105 0	00006 1	62246 0	15324 0	45017 0	55445 1
20,2250	35017 1	55447 0	45021 0	55303 1	45016 1	00006 1	03012 1	32344 0
20,2260	00006 1	05012 1	05267 1	C: 00006 1	35016 0	00006 1	05012 1	05267 1
20,2270	C: 00002 0	11447 0	12332 0	31445 0	55447 0	00006 1	62330 0	45021 0
20,2300	55447 0	32346 1	02315 1	32345 1	02315 1	32346 1	02315 1	41447 0
20,2310	10000 0	12330 1	45017 0	55447 0	12301 0	00006 1	23146 0	51447 1
20,2320	54054 1	51447 1	35005 1	00006 1	05014 1	05267 1	C: 00310 0	01146 0
20,2330	05267 1	C: 00620 0	45021 0	61423 0	54054 1	45021 0	61424 1	54053 0
20,2340	35062 0	00006 1	05014 1	15324 0	C: 02200 1	C: 77527 1	C: 00124 0	31466 1
20,2350	76214 1	60000 1	55130 0	00004 0	31466 1	74371 1	67705 1	00006 1
20,2360	12365 1	45016 1	70103 1	54103 1	12370 0	40103 1	75016 1	26103 1
20,2370	00003 1	31466 1	75014 0	00006 1	62376 1	32476 0	62477 1	55655 1

OCTAL LISTING FOR PARAGRAPH # 121, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

20,2400	31466 1	75011 0	00006 1	62405 1	35017 1	55631 0	31466 1	75006 0
20,2410	00006 1	62413 0	45017 0	27631 0	00004 0	00006 1	12423 1	40075 1
20,2420	75001 1	26075 1	12426 1	45001 1	70075 1	54075 1	00003 1	31467 0
20,2430	75003 0	00006 1	62434 0	12435 0	45017 0	40000 0	55630 1	31467 0
20,2440	75006 0	10000 0	12446 1	35017 1	55626 0	12456 0	35021 1	55626 0
20,2450	31467 0	75014 0	10000 0	12456 0	45017 0	55626 0	31467 0	75011 0
20,2460	10000 0	12465 0	35017 1	55627 1	00002 0	35021 1	55627 1	31467 0
20,2470	75017 0	10000 0	00002 0	45017 0	55627 1	00002 0	C: 00631 0	C: 00056 1
20,2500	31470 0	00006 1	72525 0	55623 0	31471 1	00006 1	72525 0	55624 1
20,2510	55625 0	00006 1	32527 0	00006 1	11470 1	55620 0	00006 1	32527 0
20,2520	00006 1	11471 0	55621 1	55622 1	00002 0	C: 25137 0	C: 00023 0	C: 12522 1
20,2530	22016 0	00006 1	22012 1	33475 1	55312 1	31625 1	54030 0	11574 1
20,2540	03533 1	12543 0	03533 1	30033 1	57645 1	00006 1	21645 0	02560 0
20,2550	55647 1	30034 0	57646 1	00006 1	21646 0	02560 0	55650 1	12571 1
20,2560	55611 1	00006 1	73476 0	00006 1	12567 0	35021 1	55611 1	31611 0
20,2570	00002 0	00006 1	31576 1	53703 0	00006 1	31530 0	21703 0	40746 0
20,2600	00006 1	70750 1	20001 1	00006 1	71647 1	20001 1	53536 1	41650 1
20,2610	00006 1	70742 1	20001 1	21536 1	00006 1	41536 1	21703 0	03124 0
20,2620	00006 1	31542 0	53707 1	00006 1	31546 1	53713 1	00006 1	31552 1
20,2630	53717 0	03156 0	00006 1	31606 0	21705 0	03137 1	41623 0	61704 0
20,2640	26054 1	35005 1	00006 1	05014 1	00006 1	31544 0	53711 0	00006 1
20,2650	31550 0	53715 1	00006 1	31554 1	53721 0	03247 0	31602 1	00006 1
20,2660	73500 0	55701 1	31601 1	00006 1	73500 0	21701 1	31704 0	00006 1
20,2670	73477 1	21701 1	02674 0	15333 0	25644 0	00006 1	31707 0	53542 1
20,2700	00006 1	31711 1	53544 1	00006 1	31713 0	53546 0	00006 1	31715 0
20,2710	53550 1	00006 1	31717 1	53552 0	00006 1	31721 1	53554 0	00006 1
20,2720	31703 1	55477 0	53576 0	31704 0	55623 0	00006 1	31701 0	53602 0
20,2730	25644 0	00002 0	22016 0	00006 1	22012 1	33473 1	55312 1	31625 1
20,2740	54030 0	11574 1	03533 1	12745 1	03533 1	00006 1	31600 0	53703 0
20,2750	00006 1	31532 1	21703 0	30746 1	00006 1	70742 1	20001 1	00006 1
20,2760	71647 1	20001 1	53540 0	41650 1	00006 1	70750 1	20001 1	21540 0
20,2770	00006 1	41540 0	21703 0	03124 0	00006 1	31556 0	53707 1	00006 1

OCTAL LISTING FOR PARAGRAPH # 122, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

20,3000	31562 1	53713 1	00006 1	31566 0	53717 0	03156 0	00006 1	31610 1
20,3010	21705 0	03137 1	41624 1	61704 0	26053 0	35004 0	00006 1	05014 1
20,3020	00006 1	31560 0	53711 0	00006 1	31564 1	53715 1	00006 1	31570 1
20,3030	53721 0	03247 0	31604 1	00006 1	73500 0	55701 1	31603 0	00006 1
20,3040	73500 0	21701 1	31704 0	00006 1	73477 1	21701 1	03050 1	15333 0
20,3050	25644 0	00006 1	31707 0	53556 1	00006 1	31711 1	53560 1	00006 1
20,3060	31713 0	53562 0	00006 1	31715 0	53564 0	00006 1	31717 1	53566 1
20,3070	00006 1	31721 1	53570 0	00006 1	31703 1	55500 1	53600 1	31704 0
20,3100	55624 1	00006 1	31701 0	53604 0	35021 1	55644 1	00002 0	22016 0
20,3110	37716 0	61625 1	65001 0	61625 1	54030 0	33473 1	55312 1	30033 1
20,3120	55645 0	30034 0	55646 0	15335 0	31702 0	00006 1	75015 1	00006 1
20,3130	13136 1	11702 1	35003 1	13135 1	45003 0	55702 1	00002 0	31705 1
20,3140	60000 1	54001 1	35021 1	61704 0	00006 1	73472 1	00006 1	13155 1
20,3150	11704 1	33471 0	13154 0	43471 1	55704 1	00002 0	35021 1	55615 0
20,3160	55617 1	55621 1	55704 1	55700 0	31703 1	00006 1	71723 1	55616 0
20,3170	31702 0	00006 1	71723 1	21616 0	53707 1	21616 0	31616 1	00006 1
20,3200	71730 0	55620 0	31615 1	00006 1	71730 0	21620 0	53713 1	21620 0
20,3210	31466 1	75002 1	10000 0	13220 0	00006 1	31620 1	53622 1	13232 0
20,3220	31620 1	00006 1	71735 0	55622 1	31617 0	00006 1	71735 0	21622 1
20,3230	53717 0	21622 1	41622 1	00006 1	71641 1	55705 0	41621 1	00006 1
20,3240	71641 1	21705 0	53705 0	20001 1	20001 1	53705 0	00002 0	35021 1
20,3250	55611 1	55613 0	31703 1	00006 1	71724 0	55612 1	31702 0	00006 1
20,3260	71724 0	21612 1	41616 0	00006 1	71726 1	55614 1	41615 0	00006 1
20,3270	71726 1	21614 1	53614 1	21612 1	53612 1	20001 1	21711 0	53711 0
20,3300	53707 1	35021 1	55611 1	55710 1	31703 1	00006 1	71725 1	55612 1
20,3310	31702 0	00006 1	71725 1	21612 1	41616 0	00006 1	71727 0	55711 0
20,3320	41615 0	00006 1	71727 0	21711 0	53612 1	21711 0	35021 1	55611 1
20,3330	55613 0	31616 1	00006 1	71731 1	55612 1	31615 1	00006 1	71731 1
20,3340	21612 1	41620 0	00006 1	71733 0	55614 1	41617 1	00006 1	71733 0
20,3350	21614 1	53614 1	21612 1	53612 1	20001 1	21715 1	53715 1	53713 1
20,3360	35021 1	55611 1	55714 0	31616 1	00006 1	71732 1	55612 1	31615 1
20,3370	00006 1	71732 1	21612 1	41620 0	00006 1	71734 1	55715 1	41617 1

OCTAL LISTING FOR PARAGRAPH # 123. WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD. "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

20,3400	00006 1	71734 1	21715 1	53612 1	21715 1	31466 1	75003 0	10000 0
20,3410	00002 0	35021 1	55611 1	55613 0	31620 1	00006 1	71736 0	55612 1
20,3420	31617 0	00006 1	71736 0	21612 1	41622 1	00006 1	71740 1	55614 1
20,3430	41621 1	00006 1	71740 1	21614 1	53614 1	21612 1	53612 1	20001 1
20,3440	21721 0	53721 0	53717 0	35021 1	55611 1	55720 1	31620 1	00006 1
20,3450	71737 1	55612 1	31617 0	00006 1	71737 1	21612 1	41622 1	00006 1
20,3460	71741 0	55721 0	41621 1	00006 1	71741 0	21721 0	53612 1	21721 0
20,3470	00002 0	C: 00375 0	C: 00101 1	C: 02530 0	C: 03107 1	C: 02732 0	C: 00115 1	C: 00243 1
20,3500	C: 37535 0	03512 1	00004 0	31466 1	75002 1	00006 1	13511 0	31413 0
20,3510	55574 1	15217 1	43522 0	55655 1	55656 1	33523 0	55660 1	43524 0
20,3520	55661 0	00002 0	C: 00012 1	C: 00003 1	C: 00004 0	C: 00005 1	C: 00011 1	C: 00015 0
20,3530	C: 00006 1	C: 00005 1	C: 00004 0	00006 1	23657 1	35016 0	05245 1	C: 03542 1
20,3540	C: 40066 0	13544 0	34367 1	55657 0	31574 0	26054 1	35005 1	00006 1
20,3550	05014 1	25655 0	41655 1	00006 1	63556 1	01657 1	11660 1	13577 0
20,3560	13603 0	25661 1	41661 0	00006 1	13575 1	51661 1	33530 1	55660 1
20,3570	51661 1	43533 0	55656 1	55655 1	01657 1	55574 1	01657 1	55660 1
20,3600	31656 0	60000 1	13606 0	45017 0	55660 1	31656 0	55655 1	41574 1
20,3610	55574 1	01657 1	35057 0	54003 0	05560 1	C: 00132 1	05560 1	C: 00133 0
20,3620	00006 1	33737 1	53313 0	00006 1	33737 1	53311 1	06000 1	47707 1
20,3630	71466 0	55466 0	03636 1	35036 1	04662 1	C: 01732 0	35005 1	70102 0
20,3640	00006 1	13633 0	45017 0	55501 0	55727 0	30007 0	55711 0	55713 1
20,3650	00004 0	00006 1	31666 0	53604 0	31664 1	55717 0	00006 1	75002 1
20,3660	55715 1	40102 0	75004 1	26102 0	40076 1	75017 0	26076 1	00003 1
20,3670	04701 0	C: 54342 0	35057 0	54003 0	00004 0	41205 0	55720 1	35002 0
20,3700	65002 0	60025 0	27720 1	45022 0	61720 0	10000 0	63735 0	13705 1
20,3710	13711 1	65017 1	55725 1	05245 1	C: 02434 0	C: 32066 0	43734 0	70102 0
20,3720	64377 0	54102 0	30007 0	55666 1	35017 1	54305 0	05372 1	C: 40116 0
20,3730	C: 05024 1	C: 13000 0	04701 0	C: 54326 1	C: 16017 0	C: 77766 0	C: 03153 0	C: 12062 0
20,3740	C: 03740 1	C: 03741 0	CKSM 77241 0	@	@	@	@	@
20,3750	@	@	@	@	@	@	@	@
20,3760	@	@	@	@	@	@	@	@
20,3770	@	@	@	@	@	@	@	@

OCTAL LISTING FOR PARAGRAPH # 124. WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD. "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

21,2000	04537 1	04740 0	C: 45144 1	31155 1	55646 0	04526 1	31327 0	54063 0
21,2010	35021 1	53326 0	05160 0	05324 1	22016 0	00006 1	22012 1	02024 0
21,2020	15333 0	C: 02122 1	C: 42066 1	C: 37704 0	32023 1	54030 0	55465 0	41501 0
21,2030	75015 1	27501 0	00006 1	32022 0	53313 0	44105 0	70102 0	65002 0
21,2040	54102 0	00002 0	55512 1	00006 1	71511 1	55511 1	35021 1	57510 1
21,2050	00006 1	71512 1	21511 1	00002 0	21511 1	00006 1	12073 0	11510 0
21,2060	12074 1	12063 1	12076 0	11511 1	12101 1	12067 0	40000 0	64777 1
21,2070	55511 1	34777 1	55510 0	00002 0	65001 0	12072 1	40000 0	64777 1
21,2100	12072 1	65001 0	55511 1	35001 0	12072 1	22016 0	31465 1	00006 1
21,2110	62112 1	12114 0	45017 0	55465 0	00006 1	32121 1	53313 0	12123 1
21,2120	C: 02122 1	C: 42066 1	22016 0	00006 1	22012 1	35001 0	00006 1	02031 1
21,2130	00006 1	12160 0	41501 0	75002 1	27501 0	34777 1	55332 0	35021 1
21,2140	55567 0	55570 0	55571 1	35002 0	00006 1	02031 1	00006 1	12160 0
21,2150	55465 0	37676 1	54030 0	02632 1	12350 1	C: 37770 0	C: 37776 0	C: 37634 1
21,2160	11465 0	12544 1	12661 0	12546 0	55465 0	30030 1	55634 0	32156 1
21,2170	54030 0	41321 1	75012 0	10000 0	12210 1	41501 0	75002 1	27501 0
21,2200	35002 0	55332 0	00006 1	02031 1	00006 1	12417 0	12534 0	C: 00030 1
21,2210	31501 1	75002 1	00006 1	12215 1	12350 1	35016 0	55506 1	60000 1
21,2220	55507 0	51507 1	41552 0	00006 1	51617 0	73077 0	51507 1	21553 1
21,2230	00006 1	51507 1	41534 0	53511 1	35003 1	02042 0	53511 1	51507 1
21,2240	21553 1	11506 1	12216 1	30032 0	57635 0	00006 1	21635 1	40000 0
21,2250	22007 0	53516 0	30033 1	57636 0	00006 1	21636 1	40000 0	55502 0
21,2260	00006 1	71640 0	21516 0	31641 0	00006 1	71502 0	53520 0	31643 1
21,2270	00006 1	71502 0	53522 1	30034 0	57637 1	00006 1	21637 0	40000 0
21,2300	55502 0	00006 1	71642 1	21520 0	31644 0	00006 1	71502 0	21522 1
21,2310	35016 0	55506 1	60000 1	55507 0	00006 1	51507 1	31516 1	51507 1
21,2320	21553 1	00006 1	51507 1	31516 1	51507 1	21542 1	51507 1	31552 1
21,2330	60000 1	60000 1	00006 1	51617 0	73115 0	51507 1	21534 0	51506 0
21,2340	31620 1	00006 1	51506 0	71547 1	51507 1	21534 0	11506 1	12311 1
21,2350	31560 0	75026 1	10000 0	12361 0	37671 0	05134 1	C: 03447 0	C: 44066 1
21,2360	34334 1	55560 1	41332 0	00006 1	62411 1	35016 0	55506 1	60000 1
21,2370	55507 0	00006 1	50000 1	31647 0	53511 1	00006 1	51507 1	31576 1

OCTAL LISTING FOR PARAGRAPH # 125. WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

21,2400	02054 1	00006 1	31511 0	51506 0	55572 1	51507 1	53647 1	11506 1
21,2410	12366 1	41501 0	75014 0	00006 1	13160 1	27501 0	02420 0	15333 0
21,2420	35014 1	00006 1	02012 0	00006 1	12431 1	41501 0	75015 1	27501 0
21,2430	00002 0	31501 1	76211 1	00006 1	12471 0	75015 1	00006 1	12462 1
21,2440	45012 0	00006 1	03012 1	45021 0	55476 1	55477 0	55500 1	55503 1
21,2450	55504 0	55505 1	54050 0	54051 1	54052 1	46211 1	71501 0	65016 0
21,2460	55501 0	00002 0	35012 1	00006 1	05012 1	46211 1	71501 0	55501 0
21,2470	00002 0	35012 1	00006 1	02012 0	00006 1	12425 1	35016 0	55506 1
21,2500	45003 0	00006 1	51506 0	71476 1	54001 1	10000 0	32542 0	12511 1
21,2510	42542 1	60001 0	55502 0	12517 1	50000 1	32542 0	54001 1	51506 0
21,2520	41503 1	60001 0	51506 0	26050 0	51506 0	23503 0	11506 1	12477 0
21,2530	37707 0	00006 1	05014 1	00002 0	32540 1	54030 0	55465 0	15333 0
21,2540	C: 37754 0	C: 77177 0	C: 37200 1	C: 00600 1	35017 1	55332 0	04740 0	C: 40347 0
21,2550	04740 0	C: 40500 0	32623 1	55506 1	35021 1	51506 0	55525 0	11506 1
21,2560	12553 1	02632 1	45021 0	55633 1	55632 0	32624 0	55654 0	35015 0
21,2570	55634 0	35024 1	55617 1	30032 0	55635 1	30033 1	55636 1	30034 0
21,2600	55637 0	35021 1	55465 0	41321 1	75012 0	10000 0	12612 1	55617 1
21,2610	32626 1	12617 1	37671 0	05134 1	C: 03447 0	C: 44066 1	32625 1	55501 0
21,2620	32627 0	54030 0	05333 1	C: 00044 1	C: 07534 1	C: 00004 0	C: 20004 1	C: 37772 1
21,2630	C: 03617 1	C: 36066 1	35024 1	55506 1	35021 1	51506 0	55451 1	11506 1
21,2640	12633 1	35015 0	55462 1	35024 1	55464 1	45017 0	71501 0	55501 0
21,2650	00006 1	32631 1	53311 1	33050 1	54031 1	35001 0	00006 1	05013 0
21,2660	00002 0	11617 1	13146 0	12665 1	12665 1	32156 1	56030 1	27634 0
21,2670	31501 1	75001 1	00006 1	12675 0	45017 0	55617 1	43032 1	71501 0
21,2700	55501 0	00006 1	00031 0	54001 1	31632 1	00006 1	06001 0	73036 0
21,2710	00006 1	62724 1	22000 1	55632 0	30001 0	00006 1	75013 1	30001 0
21,2720	27501 0	41501 0	73037 1	27501 0	41632 0	73036 0	00006 1	63250 0
21,2730	55332 0	03130 0	40075 1	75002 1	26075 1	35002 0	00006 1	02031 1
21,2740	00006 1	63051 0	31501 1	75002 1	10000 0	12534 0	45022 0	61130 1
21,2750	00006 1	62754 0	45017 0	55617 1	35016 0	55506 1	60000 1	55507 0
21,2760	51506 0	31656 0	00006 1	13005 0	61130 1	54002 1	50002 0	33037 0
21,2770	00006 1	75007 1	51507 1	53526 0	31501 1	73037 1	00006 1	13015 1

OCTAL LISTING FOR PARAGRAPH # 126. WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD. "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

21,3000	35021 1	22007 0	51507 1	53542 1	13023 1	22007 0	51507 1	53526 0
21,3010	31501 1	73037 1	00006 1	13023 1	13000 0	50002 0	43037 1	00006 1
21,3020	75011 0	51507 1	21542 1	51507 1	31541 0	51506 0	55567 0	11506 1
21,3030	12755 0	13441 1	C: 01760 1	C: 01400 1	C: 00060 1	C: 00300 1	C: 00077 1	C: 16000 0
21,3040	C: 00165 0	C: 77612 1	C: 00722 0	C: 77055 1	C: 02215 0	C: 75562 1	C: 11064 0	C: 66713 1
21,3050	C: 00027 1	51656 0	33063 1	55561 0	51657 1	33063 1	55562 0	51660 0
21,3060	33063 1	55563 1	13067 1	C: 00000 1	C: 00740 1	C: 77037 0	C: 00000 1	35021 1
21,3070	55567 0	55570 0	55571 1	13757 0	C: 06604 0	C: 32703 1	C: 06604 0	C: 02031 1
21,3100	C: 12132 1	C: 13030 0	C: 14047 1	C: 15241 1	C: 16650 0	C: 20555 0	C: 23065 0	C: 26137 0
21,3110	C: 32053 0	C: 35712 0	C: 00435 0	C: 13412 1	C: 00435 0	C: 00032 0	C: 01350 0	C: 01575 1
21,3120	C: 02103 1	C: 02523 1	C: 03327 1	C: 04432 0	C: 06264 1	C: 11351 0	C: 17324 1	C: 33622 1
21,3130	55502 0	76214 1	55657 0	31502 1	00006 1	75003 0	55502 0	76214 1
21,3140	55660 1	31502 1	00006 1	75003 0	55656 1	00002 0	55617 1	32155 1
21,3150	61634 1	54030 0	13155 1	32156 1	54030 0	45021 0	55465 0	15333 0
21,3160	45014 0	71501 0	55501 0	40074 0	75007 1	00006 1	13175 0	00006 1
21,3170	41570 0	53477 0	41571 1	55500 1	15333 0	30105 0	75012 0	00006 1
21,3200	13243 0	00006 1	31157 0	53514 1	31155 1	00006 1	20032 1	55476 1
21,3210	31513 1	00006 1	20033 0	55502 0	00006 1	71640 0	27476 1	31502 1
21,3220	00006 1	71641 1	55477 0	31502 1	00006 1	71643 0	55500 1	31514 0
21,3230	00006 1	20034 1	55502 0	00006 1	71642 1	27477 0	31502 1	00006 1
21,3240	71644 1	27500 1	15333 0	00006 1	31335 0	53514 1	31333 0	13205 1
21,3250	00006 1	00031 0	75002 1	00006 1	63272 0	31501 1	75002 1	10000 0
21,3260	12534 0	00006 1	00031 0	75003 0	00006 1	63372 1	31332 1	00006 1
21,3270	63322 1	13376 1	35017 1	55332 0	00006 1	00032 0	54001 1	40000 0
21,3300	73036 0	71633 1	23633 0	03130 0	51656 0	33316 0	55561 0	51657 1
21,3310	33316 0	55562 0	51660 0	33316 0	55563 1	13067 1	C: 00000 1	C: 00027 1
21,3320	C: 77750 0	C: 00000 1	30032 0	00006 1	21572 1	55567 0	30033 1	00006 1
21,3330	21573 0	55502 0	00006 1	71640 0	27567 0	31502 1	00006 1	71641 1
21,3340	55570 0	31502 1	00006 1	71643 0	55571 1	30034 0	00006 1	21574 1
21,3350	55502 0	00006 1	71642 1	27570 0	31502 1	00006 1	71644 1	27571 1
21,3360	41332 0	00006 1	63441 0	31564 1	27567 0	31565 0	27570 0	31566 0
21,3370	27571 1	13441 1	11332 0	13376 1	13322 0	13376 1	35021 1	55525 0

OCTAL LISTING FOR PARAGRAPH # 127, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

21,3400	55526 0	55527 1	55530 1	55531 0	55532 0	55564 0	55565 1	55566 1
21,3410	31501 1	73037 1	00006 1	13421 1	35021 1	55567 0	55570 0	55571 1
21,3420	13441 1	55332 0	00006 1	30033 1	53573 0	30034 0	55574 1	13322 0
21,3430	C: 00114 0	C: 00055 1	C: 00022 1	C: 06426 1	C: 00012 1	C: 35415 1	C: 00016 0	C: 22021 1
21,3440	C: 12173 1	31655 0	65015 0	55502 0	35016 0	55506 1	60000 1	55507 0
21,3450	00006 1	50000 1	31534 1	53516 0	31332 1	00006 1	13463 1	00006 1
21,3460	51507 1	41526 0	21516 0	51506 0	31567 1	55517 1	11515 0	13477 1
21,3470	13472 1	13507 1	11516 0	13477 1	13477 1	13507 1	13507 1	00006 1
21,3500	31516 1	53521 1	31502 1	55523 0	31517 0	55522 1	03516 0	00006 1
21,3510	41516 0	53521 1	41502 0	55523 0	41517 1	55522 1	00006 1	61655 0
21,3520	63430 0	00006 1	63551 0	41502 0	61522 0	00006 1	63530 1	13542 0
21,3530	00006 1	41521 1	00006 1	11654 0	00006 1	61522 0	61655 0	00006 1
21,3540	63630 1	13704 0	43431 0	00006 1	61502 1	61522 0	00006 1	63634 0
21,3550	13645 1	00006 1	43433 1	53514 1	00006 1	31521 0	21514 1	11513 0
21,3560	13673 1	13563 0	13567 1	11514 1	13673 1	13673 1	13567 1	00006 1
21,3570	31521 0	00006 1	11654 0	61502 1	61522 0	10000 0	13704 0	13704 0
21,3600	13602 1	13704 0	00006 1	43435 1	53514 1	00006 1	31521 0	21514 1
21,3610	11513 0	13704 0	13614 0	13620 1	11514 1	13704 0	13704 0	13620 1
21,3620	31522 0	61502 1	63431 1	10000 0	13716 0	13716 0	13673 1	13673 1
21,3630	00006 1	41516 0	53511 1	13727 1	41517 1	61523 1	00006 1	73440 0
21,3640	53511 1	00006 1	41516 0	21511 1	13727 1	11515 0	13664 1	13651 1
21,3650	13655 0	11516 0	13664 1	13664 1	13655 0	00006 1	41516 0	53511 1
21,3660	00006 1	33437 1	21511 1	13727 1	00006 1	41516 0	53511 1	00006 1
21,3670	43437 0	21511 1	13727 1	11515 0	13655 0	13677 0	13664 1	11516 0
21,3700	13655 0	13655 0	13664 1	13664 1	51506 0	45003 0	71501 0	55501 0
21,3710	51506 0	33033 1	71501 0	00006 1	13750 1	13630 0	41517 1	00006 1
21,3720	61523 1	00006 1	73440 0	53511 1	00006 1	41516 0	21511 1	51506 0
21,3730	31623 1	02042 0	35005 1	02042 0	11510 0	13741 1	13745 0	13743 0
21,3740	13745 0	34777 1	13746 0	35001 0	13746 0	31511 0	51506 0	55561 0
21,3750	11506 1	13445 0	13757 0	35021 1	55561 0	55562 0	55563 1	00006 1
21,3760	33764 1	53313 0	15333 0	C: 02552 1	C: 36066 1	C: 03765 0	C: 03766 0	CKSM 54665 0
21,3770	@	@	@	@	@	@	@	@

OCTAL LISTING FOR PARAGRAPH # 130. WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

22,2000	06006 1	I: 77634 0	C: 44376 0	C: 03262 1	I: 72364 0	C: 03320 0	C: 03262 1	I: 77624 1
22,2010	C: 44405 0	I: 72364 0	C: 03425 1	C: 01156 1	I: 77624 1	C: 44405 0	I: 45160 1	C: 03320 0
22,2020	C: 44334 0	I: 77775 1	I: 77626 0	C: 50474 0	I: 77626 0	C: 50502 0	I: 77626 0	C: 74510 0
22,2030	I: 75160 1	C: 03266 0	C: 03425 1	I: 77624 1	C: 44304 0	I: 45575 1	C: 50335 1	I: 77626 0
22,2040	C: 50343 0	I: 77626 0	C: 74351 0	I: 45001 1	C: 00023 0	C: 44343 0	I: 45575 1	C: 50474 0
22,2050	I: 77626 0	C: 50502 0	I: 77626 0	C: 74510 0	I: 45345 1	C: 03271 0	C: 03430 0	I: 45325 1
22,2060	C: 03432 1	C: 03273 1	I: 45325 1	C: 03301 0	C: 03440 1	I: 77666 1	C: 03311 1	I: 43345 1
22,2070	C: 03426 1	C: 03446 1	I: 43225 0	C: 15325 1	C: 03436 0	C: 03317 1	I: 77726 1	C: 03365 1
22,2100	I: 51025 1	C: 04367 1	C: 44111 0	I: 77776 1	00004 0	45017 0	55332 0	03142 0
22,2110	12730 0	I: 45345 1	C: 03365 1	C: 04370 1	I: 77244 0	C: 44123 1	C: 03311 1	I: 77656 1
22,2120	C: 03343 0	I: 77650 1	C: 44737 1	I: 53375 0	C: 03426 1	C: 03267 1	I: 77762 1	C: 27267 1
22,2130	C: 03434 1	I: 74455 0	C: 03275 1	C: 27275 1	C: 03442 0	I: 74455 0	C: 03303 1	C: 03303 1
22,2140	I: 70545 1	C: 03317 1	I: 45325 1	C: 15333 0	C: 03317 1	I: 65204 1	C: 45712 1	C: 03307 0
22,2150	I: 56225 1	C: 00001 0	C: 00003 1	I: 65366 1	C: 03277 0	I: 56225 1	C: 00001 0	C: 00003 1
22,2160	I: 65366 1	C: 03267 1	I: 56225 1	C: 00001 0	C: 00003 1	I: 55566 1	I: 77656 1	C: 03343 0
22,2170	I: 45345 1	C: 03343 0	C: 03345 0	I: 71240 1	C: 44203 0	C: 03343 0	I: 50025 0	C: 03347 1
22,2200	C: 44260 0	I: 77650 1	C: 44234 1	I: 45345 1	C: 03345 0	C: 03347 1	I: 77640 0	C: 44260 0
22,2210	I: 51145 0	C: 03313 0	C: 44216 1	I: 57575 1	C: 03343 0	C: 03343 0	I: 51145 0	C: 03271 0
22,2220	C: 44224 0	I: 57545 1	C: 03343 0	C: 03343 0	I: 51145 0	C: 03301 0	C: 44737 1	I: 57545 1
22,2230	C: 03347 1	C: 03347 1	I: 77650 1	C: 44737 1	I: 51145 0	C: 03311 1	C: 44242 0	I: 57575 1
22,2240	C: 03343 0	C: 03343 0	I: 51145 0	C: 03271 0	C: 44250 0	I: 57545 1	C: 03345 0	C: 03345 0
22,2250	I: 51145 0	C: 03273 1	C: 44737 1	I: 57545 1	C: 03347 1	C: 03347 1	I: 77650 1	C: 44737 1
22,2260	I: 51145 0	C: 03315 0	C: 44266 0	I: 57575 1	C: 03343 0	C: 03343 0	I: 51145 0	C: 03273 1
22,2270	C: 44274 0	I: 57545 1	C: 03343 0	C: 03343 0	I: 51145 0	C: 03301 0	C: 44737 1	I: 57545 1
22,2300	C: 03345 0	C: 03345 0	I: 77650 1	C: 44737 1	I: 77601 0	C: 00001 0	I: 64743 0	C: 77762 1
22,2310	C: 77770 1	I: 55523 0	C: 77776 1	I: 64717 1	C: 00001 0	C: 77760 0	I: 64723 0	C: 77766 0
22,2320	C: 77774 0	I: 63666 1	C: 00001 0	I: 64723 0	C: 77756 0	C: 77764 1	I: 55523 0	C: 77772 0
22,2330	I: 41517 1	C: 00001 0	I: 77650 1	C: 44343 0	I: 76601 1	C: 00001 0	C: 00001 0	I: 62713 0
22,2340	C: 00007 0	C: 00015 0	I: 77606 1	I: 65345 0	C: 00003 1	C: 00007 0	C: 14003 1	I: 77626 0
22,2350	C: 63770 1	C: 00005 1	I: 77725 1	C: 00015 0	C: 14005 1	I: 77626 0	C: 63762 1	C: 00013 0
22,2360	I: 77725 1	C: 00017 1	C: 14013 0	I: 77626 0	C: 77760 0	I: 77616 0	C: 00013 0	C: 17071 1
22,2370	C: 15667 1	C: 33555 1	C: 67777 1	C: 04000 0	C: 00217 0	C: 17773 1	00004 0	30034 0

OCTAL LISTING FOR PARAGRAPH # 131. WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD. "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

22,2400	54156 1	00006 1	30033 1	00003 1	16445 0	I: 66370 0	C: 00003 1	C: 00051 0
22,2410	C: 00001 0	C: 00010 0	I: 77601 0	C: 00001 0	I: 47133 0	C: 00013 0	C: 45513 1	C: 00013 0
22,2420	I: 65356 1	C: 00013 0	I: 41546 0	I: 71300 1	C: 44414 0	C: 00007 0	I: 72405 0	C: 00013 0
22,2430	C: 10001 1	I: 77745 1	C: 00005 1	I: 65205 0	C: 00001 0	C: 00007 0	I: 41205 0	C: 00011 1
22,2440	C: 00003 1	I: 44352 0	C: 00015 0	I: 77752 1	C: 10003 0	I: 77745 1	C: 00003 1	I: 65205 0
22,2450	C: 00005 1	C: 00007 0	I: 41205 0	C: 00011 1	C: 00001 0	I: 77752 1	I: 72415 1	C: 00017 1
22,2460	C: 10005 0	I: 77745 1	C: 00011 1	C: 10007 1	I: 77745 1	C: 00013 0	I: 72405 0	C: 00003 1
22,2470	C: 10011 0	I: 77745 1	C: 00013 0	I: 57405 1	C: 00001 0	I: 77752 1	C: 10013 1	I: 77745 1
22,2500	C: 00005 1	I: 57405 1	C: 00013 0	I: 77752 1	C: 10015 1	I: 77745 1	I: 72405 0	C: 00011 1
22,2510	I: 41325 0	C: 00007 0	C: 00001 0	I: 72415 1	I: 77626 0	C: 67760 1	I: 77745 1	I: 72405 0
22,2520	C: 00011 1	I: 41325 0	C: 00007 0	C: 00003 1	I: 72425 1	I: 77626 0	C: 67756 1	I: 77616 0
22,2530	I: 41401 1	C: 00001 0	I: 65356 1	I: 41546 0	I: 65302 0	I: 41021 1	C: 15333 0	C: 45712 1
22,2540	I: 77725 1	C: 03343 0	I: 41316 0	C: 00005 1	I: 52415 0	C: 00003 1	I: 77604 0	C: 45712 1
22,2550	C: 17426 1	C: 03345 0	I: 41316 0	C: 00005 1	I: 52415 0	C: 00003 1	I: 77604 0	C: 45712 1
22,2560	C: 17436 0	C: 03347 1	I: 41316 0	C: 00005 1	I: 52415 0	C: 00003 1	I: 77604 0	C: 45712 1
22,2570	C: 03446 1	I: 41345 0	C: 03343 0	C: 03345 0	I: 72405 0	C: 00005 1	I: 41325 0	C: 03347 1
22,2600	C: 00001 0	I: 43206 1	C: 00007 0	I: 41112 0	C: 45712 1	C: 17434 1	I: 62421 1	I: 77604 0
22,2610	C: 45712 1	C: 17430 0	C: 03343 0	I: 41205 0	C: 03347 1	C: 00005 1	I: 65352 0	C: 03345 0
22,2620	I: 41405 0	C: 00001 0	I: 62415 0	C: 00007 0	I: 77604 0	C: 45712 1	C: 17432 1	I: 62421 1
22,2630	I: 77604 0	C: 45712 1	C: 17442 0	C: 03345 0	I: 41205 0	C: 03347 1	C: 00005 1	I: 65352 0
22,2640	C: 03343 0	I: 41405 0	C: 00001 0	I: 62415 0	C: 00007 0	I: 77604 0	C: 45712 1	C: 17444 0
22,2650	I: 62421 1	I: 77604 0	C: 45712 1	C: 03440 1	I: 77616 0	I: 67543 1	C: 00007 0	I: 71406 0
22,2660	I: 41152 1	C: 45712 1	C: 00051 0	I: 57543 1	C: 00015 0	I: 67471 1	C: 00051 0	I: 51123 0
22,2670	C: 00001 0	C: 44703 0	I: 57545 1	I: 43244 1	C: 44700 0	C: 15333 0	I: 77650 1	C: 44702 1
22,2700	I: 77625 0	C: 15333 0	I: 77606 1	I: 57543 1	C: 00013 0	I: 67471 1	C: 00051 0	I: 51123 0
22,2710	C: 00011 1	C: 44723 1	I: 57545 1	I: 43244 1	C: 44720 1	C: 15333 0	I: 77650 1	C: 44724 0
22,2720	I: 52025 1	C: 15333 0	C: 44724 0	I: 77745 1	I: 43466 1	00004 0	04662 1	C: 40155 1
22,2730	00004 0	04526 1	35016 0	05245 1	C: 02006 0	C: 42066 1	15217 1	I: 70740 0
22,2740	C: 01130 1	C: 04771 1	I: 45002 1	C: 44530 1	I: 74343 0	C: 04771 1	C: 03343 0	I: 77721 0
22,2750	C: 05003 1	C: 17311 1	C: 03365 1	I: 55605 1	C: 05001 0	C: 04771 1	I: 77661 0	C: 20606 0
22,2760	C: 27317 1	C: 03311 1	I: 77761 1	C: 05025 0	C: 03275 1	I: 77614 1	C: 01035 0	C: 45032 1
22,2770	C: 00044 1	C: 15053 0	C: 00221 0	C: 24255 0	C: 00554 0	C: 02660 0	C: 02660 0	C: 13301 1

OCTAL LISTING FOR PARAGRAPH # 132, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

22,3000	C: 00003 1	C: 04000 0	C: 03146 1	C: 14632 0	C: 00000 1	C: 00000 1	C: 00000 1	C: 00000 1
22,3010	C: 00000 1	C: 00000 1	C: 03131 1	C: 11275 1	C: 77461 1	C: 47370 0	C: 00000 1	C: 00000 1
22,3020	C: 00316 0	C: 30407 1	C: 03131 1	C: 11275 1	C: 00004 0	C: 05253 0	41332 0	00006 1
22,3030	62726 0	06006 1	I: 75160 1	C: 03320 0	C: 03425 1	I: 77624 1	C: 44304 0	I: 45575 1
22,3040	C: 50442 0	I: 77626 0	C: 50450 0	I: 77626 0	C: 74456 0	I: 45160 1	C: 03320 0	C: 44655 1
22,3050	I: 77634 0	C: 45552 1	C: 03267 1	I: 77414 0	C: 01215 0	C: 40065 0	35016 0	55664 0
22,3060	60000 1	55665 1	51664 1	31666 0	00006 1	51664 1	21661 0	00006 1
22,3070	73002 1	51665 0	53576 0	51664 1	31666 0	51664 1	57661 1	51665 0
22,3100	55646 0	11664 0	13057 1	00003 1	03115 1	04701 0	C: 40131 0	35017 1
22,3110	05245 1	C: 02000 0	C: 42066 1	00003 1	15217 1	00006 1	40025 1	53673 0
22,3120	00006 1	31717 1	21673 0	11672 1	00002 0	13127 1	13137 0	11673 0
22,3130	00002 0	13133 1	40000 0	65041 1	00006 1	63137 1	24002 0	24002 0
22,3140	24002 0	00002 0	31155 1	55646 0	31156 1	55650 1	31157 0	55652 0
22,3150	00002 0	C: 00302 0	C: 17755 0	I: 53754 1	C: 03746 1	C: 57176 0	C: 26746 0	I: 53750 0
22,3160	C: 03745 1	C: 57176 0	C: 02657 1	I: 45020 1	C: 01340 1	C: 45201 0	C: 37456 1	C: 25703 1
22,3170	I: 41401 1	C: 00003 1	I: 65225 1	C: 03456 0	C: 00001 0	I: 45206 1	C: 03456 0	I: 52006 0
22,3200	C: 01340 1	I: 41545 0	C: 05152 1	I: 63130 0	C: 00047 1	C: 00002 0	I: 46135 1	C: 00050 1
22,3210	C: 45214 1	I: 51575 1	C: 02026 1	I: 77725 1	I: 43545 1	I: 77620 0	C: 01340 1	C: 36635 1
22,3220	C: 27105 0	I: 77624 1	C: 45233 1	I: 77745 1	C: 02635 0	C: 34041 0	C: 27071 1	I: 77624 1
22,3230	C: 45243 0	I: 77650 1	C: 01340 1	I: 43175 0	C: 00001 0	C: 01352 1	C: 45247 1	C: 27540 0
22,3240	C: 00007 0	C: 03546 0	I: 77616 0	I: 43175 0	C: 00001 0	C: 01352 1	C: 45237 0	C: 27554 0
22,3250	C: 00007 0	C: 03562 0	I: 77616 0	I: 53754 1	C: 03746 1	C: 57176 0	I: 63350 1	C: 03745 1
22,3260	I: 63257 1	C: 57176 0	I: 77616 0	I: 53754 1	C: 03746 1	C: 57576 1	I: 77616 0	I: 41575 0
22,3270	C: 02541 0	I: 63256 0	C: 02611 0	I: 53435 0	I: 76561 1	C: 03462 1	C: 02445 0	I: 40055 0
22,3300	C: 03504 0	C: 45302 1	C: 37474 1	C: 45253 1	C: 26746 0	I: 77614 1	C: 03466 0	C: 26657 1
22,3310	C: 05426 1	C: 36732 1	C: 24744 0	I: 72142 0	C: 03745 1	C: 37472 1	C: 45163 1	I: 77624 1
22,3320	C: 45263 1	C: 17460 0	C: 03754 1	I: 52054 1	C: 45326 1	C: 47145 1	I: 77745 1	C: 02754 0
22,3330	I: 50025 0	C: 33454 1	C: 47145 1	I: 45145 0	C: 00041 1	C: 45263 1	I: 60201 1	C: 00003 1
22,3340	C: 00047 1	I: 50315 0	C: 02541 0	C: 03474 0	I: 56246 1	C: 00003 1	I: 45257 0	C: 20201 0
22,3350	C: 33450 0	I: 71240 1	C: 47145 1	C: 02742 1	I: 45312 0	C: 33502 0	C: 14017 1	C: 03752 1
22,3360	I: 56342 1	I: 41325 0	C: 02742 1	C: 00041 1	I: 77624 1	C: 45263 1	I: 72412 0	I: 41366 1
22,3370	I: 52414 1	C: 04343 1	C: 45373 1	I: 50315 0	C: 02541 0	C: 03474 0	C: 03502 0	I: 77646 0

OCTAL LISTING FOR PARAGRAPH # 133. WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD. "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

22,3400	I: 41301 0	C: 00050 1	I: 53660 1	C: 00047 1	C: 20204 0	C: 14015 0	C: 15335 0	C: 00021 1
22,3410	I: 53575 0	C: 00015 0	C: 26732 0	C: 02541 0	I: 75315 1	C: 03474 0	C: 03502 0	I: 45076 1
22,3420	C: 45253 1	C: 26746 0	I: 77614 1	C: 03426 1	C: 47134 1	C: 77776 1	C: 62460 1	C: 17777 0
22,3430	C: 37776 0	I: 45020 1	C: 03657 0	C: 47477 0	I: 77775 1	I: 45121 1	C: 01736 1	C: 47644 1
22,3440	I: 74321 1	C: 05003 1	C: 05446 1	I: 52072 0	C: 03657 0	C: 24000 1	C: 00000 1	30102 1
22,3450	00006 1	65217 0	75002 1	00006 1	15217 1	30034 0	05075 0	55640 0
22,3460	30034 0	05074 1	55645 0	33507 0	00006 1	20032 1	40000 0	05074 1
22,3470	55644 1	00006 1	71645 0	55641 1	33507 0	00006 1	20032 1	40000 0
22,3500	05075 0	55642 1	00006 1	71645 0	40000 0	55643 0	15217 1	C: 01224 1
22,3510	00006 1	30025 0	16024 0	10154 0	35021 1	13520 1	13517 0	45002 1
22,3520	54155 1	35021 1	56154 1	00006 1	75002 1	20155 1	16030 0	00004 0
22,3530	30037 0	54154 0	30040 0	54157 0	30041 1	00003 1	54161 0	35021 1
22,3540	54155 1	54160 1	54162 0	16470 0	07226 0	16030 0	03576 0	35021 1
22,3550	54155 1	16027 0	03576 0	52162 0	52155 1	03576 0	54156 1	52160 1
22,3560	52155 1	03576 0	54155 1	30161 1	54154 0	35017 1	16027 0	03576 0
22,3570	52160 1	52155 1	03576 0	54001 1	30157 1	16024 0	52155 1	20001 1
22,3600	10000 0	65017 1	13604 1	40000 0	54154 0	00002 0	50000 1	35000 1
22,3610	26154 0	00002 0	33625 0	54130 1	30154 1	03626 0	24130 0	30157 1
22,3620	03626 0	24130 0	30161 1	03626 0	13543 1	C: 01155 1	54142 1	50130 0
22,3630	10000 0	65017 1	13636 0	65017 1	65017 1	40000 0	60142 0	10000 0
22,3640	65017 1	13643 1	40000 0	54142 1	13650 0	50000 1	35000 1	60142 0
22,3650	50130 0	54000 0	00002 0	50120 1	30046 0	04662 1	C: 17206 0	16030 0
22,3660	C: 02713 0	C: 02554 1	33660 1	54003 0	53716 1	53722 0	53716 1	53720 1
22,3670	53730 0	53720 1	53726 1	53732 1	53726 1	16030 0	33661 0	54003 0
22,3700	53557 0	53563 1	53557 0	53561 0	53571 1	53561 0	53567 0	53573 0
22,3710	53567 0	16030 0	00006 1	34777 1	52155 1	10000 0	35021 1	16026 1
22,3720	13721 1	00006 1	44777 0	16024 0	35017 1	13727 1	35021 1	60120 1
22,3730	54156 1	04662 1	C: 01010 1	10154 0	13770 0	13737 0	13770 0	10157 0
22,3740	13770 0	13743 0	13770 0	10161 0	13770 0	13747 1	13770 0	30155 0
22,3750	00006 1	75002 1	20155 1	30160 0	00006 1	75002 1	20160 1	30162 1
22,3760	00006 1	75002 1	20162 0	35025 0	50156 0	54045 1	04701 0	C: 01024 0
22,3770	35021 1	13764 0	04662 1	C: 01010 1	06030 1	C: 03775 1	C: 03776 1	CKSM 65672 1

OCTAL LISTING FOR PARAGRAPH # 134, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD. "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

23,2000	I: 47133 0	C: 00006 1	C: 45513 1	I: 41434 1	C: 46027 0	I: 72556 1	I: 66606 1	C: 00004 0
23,2010	I: 41434 1	C: 45513 1	I: 41346 0	C: 00003 1	C: 14041 1	I: 41356 1	I: 77626 0	C: 63734 1
23,2020	I: 77746 1	C: 24045 0	C: 00041 1	I: 76521 0	C: 06302 0	C: 00041 1	I: 77616 0	32323 1
23,2030	26154 0	35003 1	07256 1	06030 1	I: 77220 1	C: 00034 0	C: 02766 1	I: 77624 1
23,2040	C: 47644 1	I: 76521 0	C: 06260 0	C: 26766 1	C: 15333 0	C: 26555 0	C: 15331 1	C: 26563 0
23,2050	C: 15327 0	C: 36571 1	C: 46076 1	I: 47020 0	C: 00034 0	C: 45662 1	I: 64375 1	C: 02714 1
23,2060	C: 06260 0	I: 77772 0	C: 26555 0	C: 02722 1	I: 76521 0	C: 06260 0	C: 26563 0	C: 02730 1
23,2070	I: 76521 0	C: 06260 0	C: 02571 0	I: 47034 0	C: 45662 1	C: 45676 1	I: 47375 0	C: 02571 0
23,2100	C: 02766 1	I: 77600 1	C: 46103 1	I: 40056 0	C: 46145 0	C: 00027 1	I: 57441 1	C: 02555 0
23,2110	C: 24023 0	C: 00027 1	I: 77641 1	C: 02563 0	C: 34021 0	C: 47256 0	I: 77634 0	C: 45546 1
23,2120	C: 26774 1	C: 02766 1	I: 77600 1	C: 46124 1	I: 72441 0	C: 02571 0	I: 77726 1	I: 62440 0
23,2130	C: 46142 1	I: 45200 1	C: 46142 1	C: 06331 0	I: 77634 0	C: 45546 1	C: 02776 0	I: 77614 1
23,2140	C: 01630 0	C: 00034 0	I: 77614 1	C: 01430 1	C: 00034 0	I: 77745 1	C: 06325 0	C: 16774 1
23,2150	C: 06327 1	C: 02776 0	I: 77614 1	C: 01630 0	C: 00034 0	I: 44301 0	C: 00160 0	C: 06212 0
23,2160	I: 77776 1	07171 1	C: 00002 0	C: 00000 1	C: 00000 1	C: 01001 1	C: 14636 1	C: 00325 0
23,2170	C: 07310 1	C: 00541 1	C: 16735 1	35021 1	54156 1	00006 1	32214 1	52155 1
23,2200	52160 1	40000 0	07256 1	52156 1	52155 1	52160 1	20155 1	06006 1
23,2210	I: 77616 0	C: 37777 1	C: 37777 1	C: 00542 1	C: 34414 1	I: 47375 0	C: 01714 1	C: 03452 1
23,2220	C: 03460 0	I: 77635 1	C: 01714 1	C: 17466 0	C: 03606 1	I: 56204 1	C: 57352 1	C: 06256 0
23,2230	I: 41400 0	C: 46245 0	I: 45346 1	C: 15333 0	I: 65361 0	C: 03466 0	I: 74356 1	C: 03460 0
23,2240	I: 76455 1	I: 53455 0	C: 03452 1	C: 03474 0	I: 77616 0	I: 75345 1	C: 06256 0	C: 03606 1
23,2250	I: 77621 1	C: 03606 1	C: 03606 1	I: 77650 1	C: 46225 0	C: 01015 1	C: 34732 0	C: 15373 1
23,2260	C: 11346 0	C: 00000 1	C: 00000 1	C: 67313 1	C: 65307 0	C: 00000 1	C: 00000 1	C: 20000 0
23,2270	C: 00000 1	C: 00000 1	C: 00000 1	C: 10464 0	C: 12470 1	C: 00000 1	C: 00000 1	C: 15373 1
23,2300	C: 11346 0	C: 15373 1	C: 11346 0	C: 00000 1	C: 00000 1	C: 10464 0	C: 12470 1	C: 00000 1
23,2310	C: 00000 1	C: 20000 0	C: 00000 1	C: 00000 1	C: 00000 1	C: 67313 1	C: 65307 0	C: 00000 1
23,2320	C: 00000 1	C: 15373 1	C: 11346 0	C: 07020 1	C: 60000 1	C: 00000 1	C: 61740 0	C: 77777 0
23,2330	C: 07020 1	C: 00000 1	06006 1	I: 52014 0	C: 00716 1	C: 46566 0	C: 46337 1	I: 77776 1
23,2340	35016 0	55051 0	35017 1	55052 0	32406 1	04662 1	C: 20561 1	05534 0
23,2350	02352 1	02344 0	35014 1	05245 1	C: 02531 1	C: 46064 1	00003 1	32410 0
23,2360	54003 0	35021 1	55742 0	35063 1	05147 0	C: 02411 1	C: 46064 1	00003 1
23,2370	36214 0	71742 0	10000 0	02400 1	35041 1	04662 1	C: 01732 0	02370 1

OCTAL LISTING FOR PARAGRAPH # 135, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

23,2400	32407 0	04662 1	C: 20561 1	05625 0	05625 0	02357 1	C: 01014 0	C: 04054 1
23,2410	C: 02343 1	06006 1	I: 77634 0	C: 45510 1	C: 00041 1	C: 02325 1	I: 77776 1	41052 0
23,2420	65017 1	00006 1	12446 1	06006 1	I: 77624 1	C: 27105 0	I: 77775 1	C: 00001 0
23,2430	C: 26327 0	C: 00007 0	C: 02335 0	I: 77743 1	C: 71321 1	C: 00037 0	I: 77743 1	C: 71315 0
23,2440	C: 02321 0	I: 46135 1	C: 00050 1	C: 46463 1	I: 77650 1	C: 46467 0	06006 1	I: 77624 1
23,2450	C: 27071 1	I: 77650 1	C: 46426 0	C: 27533 1	C: 07571 0	C: 25004 1	C: 06702 1	C: 00001 0
23,2460	C: 11530 1	C: 00002 0	C: 31230 1	I: 43145 0	C: 05152 1	C: 04622 0	C: 46473 0	I: 51575 1
23,2470	C: 02026 1	I: 77614 1	C: 04462 0	C: 36323 0	C: 46667 1	I: 77776 1	31011 0	00006 1
23,2500	12645 0	06006 1	I: 45234 0	C: 45510 1	C: 02325 1	C: 02325 1	I: 53145 1	C: 02346 1
23,2510	C: 46521 0	I: 43345 1	C: 02346 1	C: 02325 1	C: 02346 1	I: 77776 1	35017 1	55742 0
23,2520	05217 0	I: 43345 1	C: 02344 0	C: 02325 1	C: 02344 0	I: 77776 1	35016 0	55742 0
23,2530	05217 0	35013 0	71044 1	10000 0	02542 0	37662 1	05134 1	C: 05534 0
23,2540	C: 04062 1	05324 1	35041 1	05245 1	C: 02531 1	C: 46064 1	36214 0	71742 0
23,2550	50000 1	02552 1	05324 1	02561 1	35041 1	54001 1	35021 1	21744 0
23,2560	05324 1	35041 1	54001 1	35021 1	21746 1	05324 1	I: 77776 1	35063 1
23,2570	05147 0	C: 02604 1	C: 46064 1	00003 1	10067 1	05164 1	32407 0	04662 1
23,2600	C: 20561 1	05625 0	05625 0	02576 1	06006 1	I: 52175 0	C: 01171 1	C: 46610 1
23,2610	C: 26327 0	C: 01177 1	C: 02335 0	I: 52014 0	C: 00315 0	C: 46617 0	C: 46630 0	I: 71214 0
23,2620	C: 04462 0	C: 06454 1	C: 14037 0	C: 06460 0	C: 26321 0	C: 02026 1	I: 52046 1	C: 46637 1
23,2630	I: 71214 0	C: 04662 1	C: 06456 0	C: 14037 0	C: 06462 1	C: 16321 0	C: 05152 1	C: 36323 0
23,2640	C: 46667 1	I: 77776 1	05364 0	C: 00013 0	02657 1	06006 1	I: 77624 1	C: 27442 0
23,2650	I: 45145 0	C: 02344 0	C: 64017 0	I: 77776 1	31011 0	00006 1	12501 0	35013 0
23,2660	71044 1	00006 1	15534 1	35041 1	04662 1	C: 01732 0	02604 1	I: 44001 0
23,2670	C: 00001 0	C: 00051 0	I: 77214 0	C: 04742 1	C: 46703 1	C: 02327 0	I: 77752 1	C: 26327 0
23,2700	C: 02335 0	I: 77752 1	C: 02335 0	I: 77624 1	C: 56760 0	I: 77624 1	C: 57026 1	I: 77625 0
23,2710	C: 02323 1	I: 64414 1	C: 04742 1	C: 46714 1	I: 77624 1	C: 46754 0	C: 16352 1	C: 00017 1
23,2720	I: 77625 0	C: 02323 1	C: 00161 1	I: 64414 1	C: 04742 1	C: 46726 0	I: 77624 1	C: 46754 0
23,2730	C: 16354 1	C: 00161 1	I: 51025 1	C: 02321 0	C: 46740 0	I: 52145 0	C: 15335 0	C: 46744 1
23,2740	I: 45145 0	C: 00017 1	C: 57064 1	I: 77676 0	C: 16346 1	C: 02321 0	I: 45015 1	C: 02323 1
23,2750	C: 57067 1	I: 77676 0	C: 36344 1	C: 00051 0	I: 51025 1	C: 06764 1	C: 46761 0	I: 43415 0
23,2760	C: 06764 1	I: 43545 1	C: 06764 1	C: 01065 0	C: 05603 1	22016 0	00006 1	22012 1
23,2770	41501 0	75015 1	27501 0	04740 0	C: 42420 1	35007 0	00006 1	05012 1

OCTAL LISTING FOR PARAGRAPH # 136. WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

23,3000	00006 1	33042 1	53313 0	33040 0	54030 0	15333 0	22016 0	00006 1
23,3010	22012 1	33041 1	55312 1	33040 0	54030 0	33037 0	00006 1	06031 0
23,3020	73037 1	04740 0	C: 43130 1	51656 0	31721 1	55476 1	51657 1	31721 1
23,3030	55477 0	51660 0	31721 1	55500 1	04740 0	C: 42420 1	15333 0	C: 00077 1
23,3040	C: 37766 1	C: 03006 1	C: 46066 0	I: 77620 0	C: 02317 0	I: 53575 0	C: 03531 0	C: 14033 1
23,3050	C: 00045 0	C: 25301 1	C: 01245 0	I: 53435 0	C: 00033 1	C: 37502 1	C: 56750 0	I: 77775 1
23,3060	C: 03502 0	C: 01245 0	I: 72441 0	C: 01235 1	I: 45326 1	C: 15325 1	I: 41301 0	C: 00047 1
23,3070	C: 07103 1	I: 53605 1	C: 01301 1	C: 21576 0	C: 27524 1	C: 15335 0	C: 03510 0	C: 03516 0
23,3100	I: 77650 1	C: 02317 0	C: 31103 1	C: 36652 0	I: 40220 0	C: 02317 0	C: 00001 0	I: 76740 0
23,3110	C: 01242 1	C: 00002 0	C: 23676 1	C: 00001 0	C: 03675 0	I: 77774 0	C: 00002 0	I: 67064 1
23,3120	C: 00046 0	C: 00050 1	I: 77624 1	C: 46000 0	I: 77624 1	C: 47606 1	I: 76505 0	C: 01736 1
23,3130	I: 77650 1	C: 02317 0	C: 00000 1	C: 13560 0	C: 36657 0	C: 24744 0	I: 51125 0	C: 03502 0
23,3140	C: 47151 1	I: 45345 1	C: 03472 0	I: 52006 0	C: 47151 1	I: 71201 1	C: 00001 0	C: 15335 0
23,3150	I: 77606 1	I: 41345 0	C: 03766 0	C: 03472 0	I: 45261 0	C: 20217 1	I: 77615 0	C: 02637 1
23,3160	C: 02635 0	I: 77021 1	C: 03663 1	C: 00005 1	I: 40240 0	C: 63642 1	C: 00001 0	I: 63375 0
23,3170	C: 03474 0	C: 02541 0	I: 77624 1	C: 63662 0	C: 26453 1	C: 00007 0	C: 26533 0	C: 03512 1
23,3200	I: 63201 1	C: 00001 0	C: 03756 0	I: 77650 1	C: 22256 0	I: 71220 1	C: 00051 0	C: 02714 1
23,3210	I: 65325 0	C: 15335 0	C: 02720 0	I: 55476 1	I: 77656 1	C: 14027 1	C: 00027 1	I: 77742 0
23,3220	C: 14023 0	C: 00033 1	I: 77742 0	C: 34021 0	C: 47256 0	C: 16762 0	C: 02716 0	I: 77742 0
23,3230	C: 14023 0	C: 00027 1	I: 65205 0	C: 02720 0	C: 00033 1	I: 45205 1	C: 02714 1	I: 77626 0
23,3240	C: 43756 1	C: 47256 0	C: 26764 0	C: 00027 1	I: 77641 1	C: 02730 1	C: 24021 1	C: 00027 1
23,3250	I: 77641 1	C: 02722 1	C: 34023 1	C: 47256 0	C: 36760 0	C: 00051 0	I: 51545 1	C: 00023 0
23,3260	I: 50025 0	C: 07474 1	C: 47271 0	I: 72545 0	C: 00021 1	I: 75326 1	C: 00023 0	C: 00025 0
23,3270	I: 77616 0	I: 72545 0	C: 00023 0	I: 77736 0	C: 14025 0	C: 00021 1	I: 77640 0	C: 47302 0
23,3300	I: 43545 1	C: 00025 0	I: 75345 1	C: 15333 0	C: 00023 0	I: 77625 0	C: 00025 0	C: 00025 0
23,3310	I: 77616 0	I: 77601 0	C: 00001 0	I: 47375 0	C: 02714 1	C: 02700 1	I: 41456 0	I: 44041 1
23,3320	C: 02730 1	C: 00051 0	C: 24021 1	C: 00001 0	I: 77641 1	C: 02722 1	C: 34023 1	C: 47256 0
23,3330	C: 26760 1	C: 00001 0	I: 50235 0	C: 02714 1	C: 02700 1	I: 77752 1	C: 24021 1	C: 02700 1
23,3340	I: 77641 1	C: 02714 1	C: 34023 1	C: 47256 0	C: 02764 0	I: 45246 0	C: 07476 0	I: 77644 1
23,3350	C: 47371 1	I: 50375 0	C: 02706 1	C: 00001 0	C: 24021 1	C: 02672 0	I: 45441 1	C: 43754 0
23,3360	C: 47256 0	C: 26762 0	C: 02760 1	I: 43034 1	C: 45552 1	C: 00200 0	C: 00051 0	C: 35156 0
23,3370	C: 00051 0	I: 77776 1	05650 1	C: 00401 1	05546 0	C: 00056 1	06006 1	I: 77650 1

OCTAL LISTING FOR PARAGRAPH # 137. WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD. "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

23,3400	C: 47351 0	I: 66370 0	C: 02743 0	C: 00051 0	C: 02727 1	I: 77601 0	C: 00001 0	I: 46773 0
23,3410	C: 02752 0	C: 02760 1	I: 77656 1	C: 06760 0	I: 77773 1	C: 02752 0	I: 76433 1	C: 02760 1
23,3420	C: 06766 0	I: 77700 0	C: 47407 1	I: 66160 0	C: 00006 1	C: 00036 1	I: 66370 0	C: 00022 1
23,3430	C: 00051 0	C: 00006 1	I: 66374 1	C: 00006 1	C: 00052 0	C: 00002 0	I: 76720 0	C: 00036 1
23,3440	C: 00001 0	I: 62757 0	C: 75033 0	C: 00007 0	I: 77757 1	C: 75025 1	C: 30031 0	C: 00015 0
23,3450	I: 53357 0	C: 75017 0	I: 76455 1	C: 00031 0	I: 53520 0	C: 00036 1	C: 06736 0	I: 77700 0
23,3460	C: 47461 1	I: 77704 1	C: 47436 0	I: 77775 1	C: 02714 1	C: 26736 1	C: 02722 1	C: 26744 1
23,3470	C: 02730 1	C: 02752 0	I: 77616 0	C: 05520 0	C: 26075 1	C: 05252 1	C: 25253 1	I: 77776 1
23,3500	03507 0	06006 1	I: 77616 0	I: 77776 1	03515 0	06006 1	I: 77616 0	30032 0
23,3510	54772 1	30033 1	54766 1	30034 0	54770 0	00006 1	22142 0	35015 0
23,3520	76211 1	54143 0	50143 1	30766 0	52155 1	52127 1	04757 0	C: 45513 1
23,3530	00006 1	30155 0	50143 1	52767 0	04757 0	C: 01516 1	52155 1	50143 1
23,3540	52745 0	00006 1	50143 1	30767 1	04757 0	C: 01530 0	52127 1	52155 1
23,3550	50143 1	52737 0	10143 0	13520 1	00142 0	00004 0	00006 1	22061 0
23,3560	35015 0	76211 1	54062 1	50062 0	30766 0	05075 0	00006 1	75002 1
23,3570	50062 0	52737 0	50062 0	30766 0	05074 1	00006 1	75002 1	50062 0
23,3600	52745 0	10062 1	13561 1	30061 0	00003 1	00000 1	I: 77620 0	C: 00047 1
23,3610	I: 76740 0	C: 00050 1	C: 00001 0	C: 24767 1	C: 00041 1	I: 77624 1	C: 47637 0	C: 34041 0
23,3620	C: 00047 1	I: 77776 1	03507 0	13626 1	I: 77776 1	03515 0	07501 1	46214 1
23,3630	03650 1	06006 1	I: 43575 1	C: 00123 1	I: 77776 1	03507 0	13641 0	I: 77776 1
23,3640	03515 0	07501 1	36214 0	13630 0	I: 77776 1	13626 1	I: 77776 1	13641 0
23,3650	54142 1	00006 1	22145 1	10142 1	40142 1	66214 0	00006 1	50000 1
23,3660	33737 1	52144 1	35017 1	54130 1	00006 1	50143 1	40123 0	13671 0
23,3670	52131 0	52155 1	33735 0	60143 1	54116 0	07056 0	10142 1	52155 1
23,3700	13703 1	00006 1	40155 1	52134 0	36211 0	26116 0	00006 1	50130 0
23,3710	50143 1	30123 1	52155 1	07056 0	52155 1	20134 0	52134 0	20001 1
23,3720	50130 0	50143 1	52123 0	52131 0	10000 0	13670 1	00006 1	26142 1
23,3730	10142 1	13653 0	00145 1	13653 0	00145 1	C: 00736 0	C: 00004 0	C: 00002 0
23,3740	C: 00000 1	C: 00004 0	I: 41345 0	C: 03212 0	C: 00745 1	I: 41325 0	C: 03216 1	C: 00737 1
23,3750	I: 77621 1	I: 77671 1	C: 00747 0	C: 03204 1	I: 72405 0	C: 00741 0	I: 77621 1	C: 03214 0
23,3760	C: 17206 0	C: 03212 0	I: 65205 0	C: 00737 1	C: 03216 1	I: 43205 1	C: 00745 1	I: 77752 1
23,3770	C: 03210 1	I: 77616 0	C: 03772 0	C: 03773 1	CKSM 76501 1	@	@	@

OCTAL LISTING FOR PARAGRAPH # 140. WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

24,2000	C: 03431 1	C: 03672 1	I: 77745 1	C: 00013 0	I: 76561 1	I: 53455 0	C: 03540 0	I: 53515 0
24,2010	C: 03554 0	I: 53515 0	C: 03562 0	I: 63235 0	C: 00007 0	C: 00007 0	I: 50235 0	C: 00001 0
24,2020	I: 77626 0	C: 53762 1	I: 72441 0	I: 75326 1	C: 00015 0	I: 41542 1	I: 71214 0	C: 05701 1
24,2030	C: 50065 1	C: 00001 0	I: 65225 1	C: 03466 0	C: 03462 1	I: 60225 1	C: 03470 1	C: 00047 1
24,2040	I: 65265 0	C: 00003 1	C: 03462 1	C: 03470 1	I: 43014 0	C: 05742 0	C: 20307 1	C: 05743 1
24,2050	C: 20307 1	I: 41345 0	C: 00003 1	C: 03466 0	I: 71244 0	C: 20314 0	C: 33452 1	I: 77765 0
24,2060	C: 03464 1	C: 03464 1	I: 43014 0	C: 05462 1	C: 05663 1	I: 77745 1	C: 00001 0	C: 17466 0
24,2070	C: 03462 1	C: 37470 0	C: 20302 1	05560 1	C: 00023 0	06006 1	I: 43135 1	C: 03425 1
24,2100	C: 01347 0	C: 50104 1	I: 77745 1	C: 15335 0	C: 17703 0	C: 10411 1	C: 17727 0	C: 03413 1
24,2110	C: 03450 0	I: 77776 1	04662 1	C: 17653 1	06006 1	I: 77624 1	C: 34020 1	I: 77624 1
24,2120	C: 51574 0	I: 77414 0	C: 01073 1	02303 0	00003 1	04662 1	C: 56000 1	45017 0
24,2130	55742 0	05546 0	C: 00155 0	02326 1	02343 1	32425 0	55145 1	06006 1
24,2140	I: 51575 1	C: 03721 0	C: 17773 1	C: 15335 0	C: 03426 1	I: 77776 1	00006 1	33061 0
24,2150	53223 1	32420 0	04662 1	C: 21045 0	12275 1	12435 0	45017 0	55445 1
24,2160	35021 1	55447 0	35017 1	05245 1	C: 02252 0	C: 40066 0	11445 1	32417 1
24,2170	12172 0	33064 0	04662 1	C: 01732 0	05372 1	C: 40026 1	C: 00234 1	35017 1
24,2200	05245 1	C: 03260 0	C: 50067 0	00003 1	03366 1	06006 1	I: 45345 1	C: 03413 1
24,2210	C: 10416 0	C: 00041 1	I: 77624 1	C: 27553 1	12216 1	02237 0	00006 1	30155 0
24,2220	53673 0	00006 1	43064 1	21673 0	00006 1	31673 1	05342 1	C: 02437 0
24,2230	C: 50067 0	05412 0	C: 20214 1	15217 1	04662 1	C: 20703 1	15217 1	00006 1
24,2240	31246 0	53413 1	00006 1	32416 0	21413 1	12216 1	32426 0	04662 1
24,2250	C: 20704 0	12275 1	12254 1	12246 1	00006 1	32462 0	53223 1	35042 1
24,2260	04662 1	C: 01732 0	02303 0	00003 1	05412 0	C: 05024 1	C: 20000 0	32424 1
24,2270	04662 1	C: 20704 0	12275 1	12275 1	12264 1	00006 1	32460 1	53223 1
24,2300	14106 0	C: 00056 1	C: 00707 1	00004 0	30032 0	55572 1	00006 1	30034 0
24,2310	53574 1	32301 1	55655 1	45014 0	71466 0	55466 0	00002 0	00004 0
24,2320	32302 1	55655 1	41466 0	75014 0	27466 0	00002 0	41011 1	75017 0
24,2330	00006 1	12333 1	24002 0	00002 0	35002 0	05134 1	C: 02264 0	C: 50066 1
24,2340	05560 1	C: 00155 0	15324 0	32423 0	55145 1	06006 1	I: 77624 1	C: 50370 0
24,2350	I: 77776 1	00006 1	32462 0	53223 1	05372 1	C: 40036 0	C: 00234 1	12177 0
24,2360	32424 1	55145 1	32416 0	05245 1	C: 02334 1	C: 50066 1	45015 1	12566 1
24,2370	I: 40220 0	C: 03730 0	C: 00001 0	I: 41575 0	C: 03721 0	I: 77624 1	C: 45431 0	C: 37665 0

OCTAL LISTING FOR PARAGRAPH # 141. WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

24,2400	C: 03730 0	06006 1	I: 77624 1	C: 51104 0	I: 77624 1	C: 50370 0	I: 77776 1	03215 1
24,2410	C: 02217 1	C: 06650 1	C: 00013 0	C: 06112 0	C: 04700 1	C: 00000 1	C: 05664 0	C: 03410 1
24,2420	C: 00204 1	C: 37730 1	C: 04123 0	C: 01525 1	C: 04125 0	C: 01450 1	C: 04050 0	C: 00027 1
24,2430	C: 00053 1	C: 00035 1	C: 03153 0	C: 12066 1	C: 00026 0	35017 1	12157 1	33064 0
24,2440	05245 1	C: 02555 0	C: 50067 0	35021 1	55145 1	35066 1	05134 1	C: 02234 0
24,2450	C: 50067 0	44362 0	04114 1	C: 00004 0	05324 1	C: 02511 0	C: 50067 0	C: 03227 0
24,2460	C: 76067 1	C: 02401 0	C: 50066 1	04662 1	C: 17653 1	06006 1	I: 77624 1	C: 27543 0
24,2470	30155 0	55672 1	05245 1	C: 02500 0	C: 50067 0	05412 0	C: 40574 0	15217 1
24,2500	00006 1	32456 1	53223 1	34371 0	05134 1	C: 02534 1	C: 50067 0	45016 1
24,2510	12566 1	06006 1	I: 77601 0	C: 00001 0	I: 53375 0	C: 03665 1	C: 03433 0	C: 03460 0
24,2520	I: 45006 0	C: 45431 0	C: 37675 1	C: 70542 0	I: 77776 1	05412 0	C: 10035 0	35022 1
24,2530	05606 1	C: 01457 0	C: 01664 1	03215 1	06006 1	I: 77775 1	C: 15335 0	C: 03675 0
24,2540	C: 03665 1	I: 77776 1	35067 0	05210 1	05412 0	C: 05024 1	C: 15000 0	32422 1
24,2550	04662 1	C: 20720 0	04106 1	04106 1	12534 0	02326 1	12360 1	32425 0
24,2560	55145 1	32414 1	05245 1	C: 02574 0	C: 50067 0	46211 1	04114 1	C: 00004 0
24,2570	10763 1	15324 0	04701 0	C: 76701 0	33064 0	05245 1	C: 02612 0	C: 50066 1
24,2600	45007 1	55145 1	05372 1	C: 40074 0	C: 00033 1	35002 0	05147 0	C: 02427 1
24,2610	C: 34067 1	15324 0	40103 1	75003 0	26103 1	30103 0	75004 1	00006 1
24,2620	15324 0	32425 0	55145 1	05412 0	C: 00614 1	30032 0	55450 0	00006 1
24,2630	30025 0	53337 0	40101 0	75011 0	26101 0	35003 1	00006 1	05011 1
24,2640	35007 0	70076 1	10000 0	12733 0	40102 0	75003 0	26102 0	44105 0
24,2650	70102 0	54102 0	00006 1	32433 1	53313 0	46214 1	04114 1	C: 00004 0
24,2660	05267 1	C: 00050 1	45017 0	55644 1	35021 1	55651 0	44105 0	70102 0
24,2670	65001 0	54102 0	36214 0	54001 1	40000 0	52765 1	00006 1	41571 1
24,2700	53703 0	45022 0	04114 1	C: 00004 0	34777 1	54030 0	00006 1	33067 0
24,2710	53313 0	05267 1	C: 00240 1	35003 1	70102 0	10000 0	02724 1	02727 1
24,2720	00006 1	35021 1	52761 0	15324 0	40076 1	75005 0	26076 1	35021 1
24,2730	00006 1	01005 0	00002 0	45003 0	70102 0	54102 0	03366 1	00006 1
24,2740	31430 1	53413 1	00006 1	30025 0	21413 1	05372 1	C: 40153 1	C: 07014 0
24,2750	C: 77777 0	C: 02757 0	C: 50066 1	31430 1	05245 1	C: 02766 1	C: 50067 0	45007 1
24,2760	70076 1	54076 1	03371 1	35021 1	55444 0	12647 1	03371 1	31474 1
24,2770	55652 0	05372 1	C: 00003 1	C: 40634 1	03017 1	42427 0	04114 1	C: 00004 0

OCTAL LISTING FOR PARAGRAPH # 142. WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

24,3000	05267 1	C: 00372 1	02320 1	04740 0	C: 42024 1	04740 0	C: 13366 0	03071 1
24,3010	05412 0	C: 00354 0	34710 0	05134 1	C: 02246 0	C: 50066 1	15324 0	00006 1
24,3020	30025 0	53337 0	45011 0	70101 0	54101 0	45003 0	00006 1	03011 1
24,3030	35002 0	00006 1	05012 1	31444 1	00006 1	70110 0	22000 1	00006 1
24,3040	75041 0	61652 1	55474 0	31644 0	65017 1	00006 1	13057 1	40102 0
24,3050	74105 0	00006 1	63057 0	31601 1	55423 1	31603 0	55424 0	00002 0
24,3060	C: 03205 0	C: 50066 1	C: 37703 1	C: 00000 1	C: 00764 1	C: 02202 0	C: 02147 1	C: 36066 1
24,3070	00004 0	43065 0	00006 1	03012 1	45017 0	55303 1	35021 1	55145 1
24,3100	45005 0	70103 1	54103 1	00002 0	I: 43020 1	C: 03730 0	C: 01307 1	C: 51133 1
24,3110	I: 50135 0	C: 03343 0	C: 51137 0	I: 53375 0	C: 03345 0	C: 03433 0	C: 03353 1	I: 77776 1
24,3120	35017 1	61742 1	55743 1	05412 0	C: 10035 0	31743 0	55742 0	06006 1
24,3130	I: 77775 1	C: 03353 1	C: 03345 0	I: 77624 1	C: 34153 1	I: 77650 1	C: 03730 0	I: 67214 1
24,3140	C: 01310 1	C: 51154 0	C: 03344 1	I: 74301 0	C: 00047 1	C: 03705 0	I: 53257 1	C: 20563 0
24,3150	C: 03646 0	I: 77651 0	C: 03345 0	C: 03721 0	I: 77776 1	35003 1	05147 0	C: 02302 1
24,3160	C: 34066 0	05372 1	C: 00051 0	C: 10035 0	06006 1	I: 77775 1	C: 01171 1	C: 27570 0
24,3170	C: 01177 1	C: 17576 0	C: 01205 1	C: 03474 0	I: 77621 1	C: 03656 1	C: 27423 1	C: 15335 0
24,3200	C: 17345 0	C: 15335 0	C: 03343 0	I: 77650 1	C: 51133 1	06006 1	I: 77624 1	C: 51104 0
24,3210	I: 77776 1	35007 0	70076 1	10000 0	13217 1	04701 0	C: 77227 0	35003 1
24,3220	00006 1	02011 0	00006 1	13215 0	03366 1	00004 0	00006 1	31413 0
24,3230	52155 1	00006 1	40025 1	20155 1	07224 1	30155 0	10000 0	13242 1
24,3240	13242 1	35021 1	65017 1	56001 0	35021 1	53430 0	31430 1	05245 1
24,3250	C: 02766 1	C: 50067 0	05372 1	C: 40153 1	C: 10035 0	05560 1	C: 00044 1	13215 0
24,3260	35005 1	70103 1	10000 0	13267 0	05412 0	C: 00006 1	05324 1	00006 1
24,3270	30025 0	53661 0	00006 1	41413 1	21661 0	35041 1	05245 1	C: 03260 0
24,3300	C: 50067 0	11145 1	13305 0	13315 1	13305 0	42423 1	61145 0	00006 1
24,3310	13320 1	37664 1	05134 1	C: 03332 0	C: 50066 1	40025 1	55065 1	15324 0
24,3320	37664 1	05147 0	C: 03325 0	C: 50066 1	13315 1	06006 1	I: 77624 1	C: 50370 0
24,3330	I: 77776 1	13342 0	30032 0	54772 1	30033 1	54766 1	30034 0	54770 0
24,3340	04662 1	C: 47555 1	00004 0	11145 1	13363 0	15217 1	13355 0	32425 0
24,3350	04662 1	C: 20715 0	13432 0	13465 1	13514 0	32425 0	04662 1	C: 20715 0
24,3360	13402 0	13410 0	13374 0	31145 0	04662 1	C: 20707 0	35060 1	54003 0
24,3370	00002 0	35057 0	54003 0	00002 0	05372 1	C: 00006 1	C: 05024 1	C: 27000 1

OCTAL LISTING FOR PARAGRAPH # 143, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

24,3400	03070 0	12254 1	05372 1	C: 00006 1	C: 05024 1	C: 27000 1	03070 0	12275 1
24,3410	00004 0	30103 0	75004 1	10000 0	13427 1	35004 0	26103 1	30103 0
24,3420	75003 0	00006 1	13427 1	35017 1	05245 1	C: 02625 1	C: 50066 1	32425 0
24,3430	55145 1	15217 1	05372 1	C: 00006 1	C: 40674 0	35017 1	05235 0	C: 03441 0
24,3440	15217 1	35021 1	55145 1	32434 0	61474 1	55652 0	05412 0	C: 05014 1
24,3450	C: 77777 0	03017 1	05412 0	C: 00714 0	05267 1	C: 00372 1	04740 0	C: 42024 1
24,3460	37664 1	05134 1	C: 03402 1	C: 50066 1	15324 0	05412 0	C: 40734 0	35017 1
24,3470	05235 0	C: 03473 1	15217 1	31444 1	55643 0	32425 0	55145 1	05546 0
24,3500	C: 00030 1	05546 0	C: 00042 1	05412 0	C: 00134 1	05267 1	C: 00310 0	05560 1
24,3510	C: 00030 1	05412 0	C: 00004 0	15324 0	05412 0	C: 40534 1	35017 1	05245 1
24,3520	C: 03523 0	C: 50067 0	15217 1	44112 0	55412 0	32425 0	55145 1	03371 1
24,3530	32434 0	61474 1	55652 0	05412 0	C: 00754 1	03017 1	05412 0	C: 00114 0
24,3540	05267 1	C: 00372 1	35017 1	05245 1	C: 02241 1	C: 40066 0	04740 0	C: 42024 1
24,3550	05372 1	C: 00026 0	C: 05014 1	C: 77777 0	45066 0	70103 1	65003 1	54103 1
24,3560	05267 1	C: 00036 1	45007 1	55145 1	05372 1	C: 40774 1	C: 00033 1	35002 0
24,3570	05147 0	C: 02427 1	C: 34067 1	15324 0	I: 64375 1	C: 03713 1	C: 01736 1	I: 44172 0
24,3600	C: 03657 0	C: 03357 0	I: 43001 1	C: 00001 0	C: 00704 1	C: 51715 0	I: 77745 1	C: 15335 0
24,3610	I: 67206 1	C: 03025 0	I: 72405 0	C: 11754 1	I: 41415 1	C: 11756 0	I: 65346 0	I: 41556 1
24,3620	I: 77735 0	C: 03024 1	I: 72405 0	C: 11754 1	I: 41415 1	C: 11760 0	I: 65346 0	I: 41556 1
24,3630	C: 14323 0	C: 00007 0	I: 72405 0	C: 00005 1	I: 65276 1	C: 00007 0	I: 72405 0	C: 00003 1
24,3640	I: 77666 1	C: 14307 0	C: 00323 0	I: 72405 0	C: 00005 1	I: 41325 0	C: 00323 0	C: 00003 1
24,3650	I: 57552 1	I: 77666 1	C: 14323 0	I: 77666 1	C: 14315 0	C: 00323 0	I: 65325 0	C: 00315 0
24,3660	C: 00307 0	I: 77666 1	C: 27351 0	C: 03713 1	I: 53515 0	C: 03632 0	I: 57435 1	C: 00001 0
24,3670	I: 41456 0	I: 77624 1	C: 51734 0	I: 57435 1	C: 00001 0	I: 63372 1	C: 00307 0	I: 76505 0
24,3700	C: 00001 0	C: 24307 0	C: 00315 0	I: 76505 0	C: 00001 0	C: 24315 0	C: 00323 0	I: 76505 0
24,3710	C: 00001 0	C: 00323 0	I: 52001 1	C: 00001 0	C: 03657 0	I: 77775 1	C: 15333 0	C: 27351 0
24,3720	C: 03713 1	C: 00307 0	I: 53435 0	C: 03632 0	C: 34007 1	C: 51734 0	C: 00315 0	I: 57435 1
24,3730	C: 00307 0	I: 77772 0	C: 34323 1	C: 03657 0	I: 46145 0	C: 00045 0	C: 51741 1	I: 43575 1
24,3740	C: 00007 0	I: 53575 0	C: 03632 0	I: 53515 0	C: 03640 0	I: 53322 1	I: 53435 0	C: 03713 1
24,3750	I: 77676 0	C: 00007 0	I: 77616 0	C: 21215 1	C: 12215 1	C: 00053 1	C: 07423 0	C: 77636 1
24,3760	C: 44653 1	C: 37405 1	C: 02014 0	C: 42066 1	C: 37704 0	C: 03765 0	C: 03766 0	CKSM 55773 1
24,3770	@	@	@	@	@	@	@	@

OCTAL LISTING FOR PARAGRAPH # 144, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

25,2000	I: 77776 1	42113 1	00004 0	70102 0	62114 1	54102 0	00003 1	06006 1
25,2010	I: 77735 0	C: 03011 1	C: 03626 0	I: 77735 0	C: 03010 0	C: 03624 1	I: 77605 1	C: 15323 1
25,2020	C: 17630 1	C: 15146 0	I: 70405 1	C: 03624 1	C: 17632 0	C: 15177 1	C: 17175 1	C: 17372 1
25,2030	C: 17614 1	C: 03624 1	I: 57565 0	C: 03327 1	C: 37634 1	C: 52063 0	I: 47375 0	C: 01177 1
25,2040	C: 01760 1	I: 50256 0	C: 03474 0	C: 03676 0	I: 47076 0	C: 45712 1	C: 17644 1	C: 03624 1
25,2050	I: 43205 1	C: 15201 0	C: 15203 1	C: 03712 0	I: 66331 0	C: 03646 0	C: 52260 1	C: 03325 0
25,2060	C: 52115 0	I: 77634 0	C: 53611 1	I: 77220 1	C: 03645 0	C: 03401 1	I: 43014 0	C: 00662 0
25,2070	C: 01663 0	C: 15104 0	C: 15335 0	C: 15110 0	C: 01205 1	C: 37524 0	C: 26441 1	I: 77656 1
25,2100	C: 17452 1	C: 12112 0	C: 37606 0	C: 46215 0	I: 72441 0	C: 01760 1	I: 77726 1	C: 37702 0
25,2110	C: 03645 0	C: 00003 1	C: 01520 1	C: 11774 0	C: 11010 0	I: 77624 1	C: 52125 0	I: 77776 1
25,2120	05412 0	C: 10035 0	06006 1	I: 77650 1	C: 03645 0	I: 77214 0	C: 03346 0	C: 52133 1
25,2130	C: 03526 0	I: 52076 1	C: 52136 1	I: 74375 0	C: 01177 1	C: 15231 0	C: 03516 0	I: 44056 1
25,2140	C: 03373 0	C: 17510 0	C: 00043 0	C: 03622 1	I: 77625 0	C: 15325 1	C: 17654 0	C: 00045 0
25,2150	C: 27674 1	C: 03516 0	I: 72441 0	C: 01760 1	C: 27700 0	C: 01163 1	I: 41246 1	C: 15233 1
25,2160	I: 53152 1	C: 55133 0	C: 27640 0	C: 03516 0	I: 53435 0	C: 01760 1	C: 03502 0	I: 71214 0
25,2170	C: 03346 0	C: 55074 1	C: 15335 0	I: 43225 0	C: 03524 1	C: 01205 1	C: 37606 0	C: 46225 0
25,2200	I: 40241 1	C: 03502 0	C: 00001 0	C: 27676 0	C: 03474 0	I: 77614 1	C: 03667 0	I: 50235 0
25,2210	C: 01760 1	C: 03502 0	I: 43044 0	C: 52215 0	C: 03467 1	I: 77775 1	C: 03474 0	I: 45241 1
25,2220	C: 01760 1	C: 15163 1	I: 43244 1	C: 55136 0	C: 15163 1	I: 65552 0	C: 03702 1	I: 57414 1
25,2230	C: 03707 1	C: 52232 0	C: 17714 0	C: 03640 0	I: 50025 0	C: 15241 1	C: 52255 1	I: 77214 0
25,2240	C: 03074 1	C: 03433 0	I: 50206 0	C: 03542 1	I: 63552 0	I: 47515 0	I: 56225 1	C: 00001 0
25,2250	I: 75400 1	C: 52253 1	C: 03727 0	I: 77650 1	C: 03373 0	I: 52014 0	C: 03274 0	C: 52253 1
25,2260	I: 43014 0	C: 03312 1	C: 52362 1	C: 03354 0	C: 53526 0	I: 63545 0	C: 03654 0	I: 56205 0
25,2270	C: 03654 0	C: 15305 0	I: 47015 0	C: 15307 1	C: 54433 1	C: 03720 1	I: 50025 0	C: 15315 1
25,2300	C: 52304 1	I: 77745 1	C: 15315 1	C: 03720 1	I: 45345 1	C: 03674 1	C: 15303 0	I: 51014 0
25,2310	C: 03265 0	C: 52316 1	I: 52131 0	C: 03646 0	C: 53317 1	C: 52351 1	I: 41345 0	C: 03654 0
25,2320	C: 15311 0	I: 77615 0	C: 15313 1	C: 03710 1	I: 40065 0	C: 15267 0	C: 52327 0	C: 17706 0
25,2330	C: 03624 1	C: 17634 0	C: 03700 0	I: 41471 0	C: 03674 1	I: 41316 0	I: 45271 1	C: 15277 1
25,2340	C: 15301 1	I: 40015 1	C: 03674 1	C: 52351 1	I: 71240 1	C: 52351 1	C: 03624 1	I: 77676 0
25,2350	C: 03634 0	I: 77614 1	C: 03052 0	C: 53526 0	I: 45345 1	C: 03720 1	C: 03640 0	I: 52044 0
25,2360	C: 53526 0	C: 53232 1	I: 43345 1	C: 03700 0	C: 15261 0	I: 45040 1	C: 52354 1	C: 53022 1
25,2370	I: 77731 1	C: 03646 0	C: 52373 1	I: 77745 1	C: 03640 0	C: 17664 0	C: 03624 1	C: 17647 1

OCTAL LISTING FOR PARAGRAPH # 145. WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD. "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

25,2400	C: 03700 0	I: 71240 1	C: 52406 1	C: 03725 1	C: 17647 1	C: 03700 0	I: 43271 1	C: 03647 1
25,2410	C: 03674 1	C: 14326 0	C: 03700 0	I: 56316 0	C: 03647 1	I: 43271 1	C: 15273 0	C: 03640 0
25,2420	I: 41205 0	C: 00326 0	C: 00326 0	I: 77671 1	C: 03622 1	C: 14330 1	C: 03700 0	I: 71244 0
25,2430	C: 52433 1	C: 00330 1	C: 03664 0	I: 51145 0	C: 03634 0	C: 52442 1	I: 45345 1	C: 00326 0
25,2440	C: 15215 0	C: 00326 0	I: 41345 0	C: 00330 1	C: 15273 0	I: 40271 1	C: 00326 0	C: 00001 0
25,2450	I: 56271 0	C: 00326 0	C: 03725 1	C: 03704 1	I: 55221 0	C: 17372 1	C: 00326 0	C: 17616 0
25,2460	C: 03704 1	I: 41225 1	C: 17372 1	C: 03704 1	I: 77671 1	C: 00330 1	C: 03620 0	I: 43205 1
25,2470	C: 03175 1	C: 03704 1	I: 44366 1	C: 17372 1	I: 77605 1	C: 03616 0	C: 03767 1	I: 41221 0
25,2500	C: 00326 0	C: 03725 1	I: 77671 1	C: 03767 1	C: 14027 1	C: 03767 1	I: 50025 0	C: 15205 1
25,2510	C: 53333 1	I: 63545 0	C: 03767 1	C: 17666 1	C: 15333 0	I: 50025 0	C: 03767 1	C: 53226 1
25,2520	C: 17662 0	C: 15333 0	C: 03672 1	I: 50025 0	C: 00326 0	C: 52533 0	I: 77621 1	C: 03662 0
25,2530	C: 17662 0	C: 00326 0	C: 03672 1	I: 45145 0	C: 03672 1	C: 53004 0	C: 03656 1	I: 56261 1
25,2540	C: 20607 1	C: 03175 1	I: 77625 0	C: 15251 0	C: 03660 1	I: 41215 1	C: 17366 1	C: 15255 1
25,2550	I: 41205 0	C: 03662 0	C: 03662 0	I: 56271 0	C: 03656 1	C: 03666 1	I: 50021 1	C: 00027 1
25,2560	C: 52751 0	C: 03771 0	I: 77625 0	C: 00027 1	I: 43205 1	C: 15333 0	C: 00027 1	C: 14027 1
25,2570	C: 03771 0	I: 60516 0	I: 77621 1	C: 15333 0	C: 17670 0	C: 03666 1	I: 41225 1	C: 15333 0
25,2600	C: 03666 1	I: 41205 0	C: 03670 0	C: 03670 0	I: 43312 0	C: 17366 1	I: 65366 1	C: 03666 1
25,2610	I: 41205 0	C: 03670 0	C: 03771 0	I: 67471 1	I: 41552 0	C: 17731 1	C: 03767 1	I: 43205 1
25,2620	C: 15171 1	C: 03712 0	C: 03732 1	I: 63525 0	C: 00326 0	I: 56205 0	C: 03175 1	C: 03666 1
25,2630	I: 45071 0	C: 00330 1	C: 46155 1	I: 56205 0	C: 15207 0	C: 00027 1	C: 03733 0	I: 41325 0
25,2640	C: 15257 0	C: 03700 0	I: 56205 0	C: 03674 1	C: 00330 1	I: 41471 0	C: 03624 1	C: 17734 1
25,2650	C: 15175 0	I: 41225 1	C: 03771 0	C: 15173 0	C: 27735 0	C: 03731 1	C: 17126 1	C: 03735 0
25,2660	I: 43215 0	I: 43215 0	I: 41025 0	C: 03702 1	C: 57352 1	C: 03610 0	I: 45246 0	C: 15223 0
25,2670	I: 43040 1	C: 53033 1	C: 03311 1	C: 52677 0	I: 51145 0	C: 03610 0	C: 53221 0	I: 41345 0
25,2700	C: 03642 1	C: 03610 0	I: 45325 1	C: 03612 1	C: 03610 0	I: 77665 1	I: 77626 0	C: 74135 0
25,2710	I: 50015 0	C: 03725 1	C: 52745 0	I: 77600 1	C: 52741 1	C: 03725 1	I: 77776 1	35060 1
25,2720	54003 0	35070 0	55064 0	05412 0	C: 00474 0	35070 0	05210 1	33032 0
25,2730	55645 0	06006 1	I: 43145 0	C: 03610 0	C: 03071 1	C: 17612 1	C: 15177 1	C: 37175 0
25,2740	C: 52373 1	I: 77745 1	C: 17372 1	C: 37725 0	C: 53221 0	I: 70545 1	C: 03725 1	I: 52076 1
25,2750	C: 52706 1	I: 41205 0	C: 03767 1	C: 15147 1	I: 41325 0	C: 03725 1	C: 15147 1	I: 43325 1
25,2760	C: 03660 1	C: 15253 1	I: 41205 0	C: 03662 0	C: 15255 1	I: 56271 0	C: 03656 1	C: 03767 1
25,2770	I: 55221 0	I: 77615 0	C: 03767 1	C: 37767 0	C: 53004 0	C: 17175 1	C: 03767 1	I: 77716 1

OCTAL LISTING FOR PARAGRAPH # 146, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

25,3000	C: 17666 1	C: 15335 0	I: 77650 1	C: 52561 1	I: 56342 1	C: 03616 0	I: 72421 0	C: 15333 0
25,3010	I: 45316 1	C: 03704 1	I: 43471 1	C: 03620 0	06006 1	I: 45014 0	C: 03271 0	C: 53022 1
25,3020	I: 77650 1	C: 52373 1	I: 77745 1	C: 15335 0	C: 17612 1	C: 15157 0	C: 17642 1	C: 15151 0
25,3030	C: 03725 1	I: 77616 0	C: 53576 0	I: 77634 0	C: 54441 1	I: 45345 1	C: 03640 0	C: 15221 1
25,3040	I: 43040 1	C: 53043 0	C: 03070 0	I: 45345 1	C: 03674 1	C: 00326 0	I: 71244 0	C: 53260 0
25,3050	C: 03640 0	I: 50025 0	C: 03175 1	C: 53313 0	I: 51145 0	C: 03700 0	C: 53065 1	I: 45345 1
25,3060	C: 03674 1	C: 03767 1	I: 50025 0	C: 15165 1	C: 53333 1	I: 77745 1	C: 03640 0	I: 50025 0
25,3070	C: 00330 1	C: 53075 0	I: 52145 0	C: 03624 1	C: 53525 0	I: 41345 0	C: 03640 0	C: 03620 0
25,3100	I: 75415 0	C: 03704 1	I: 41221 0	C: 17372 1	C: 03616 0	C: 01160 1	I: 41221 0	C: 00326 0
25,3110	C: 03725 1	C: 15156 1	C: 03672 1	I: 50025 0	C: 01160 1	C: 53134 1	I: 41406 0	I: 56205 0
25,3120	C: 03660 1	C: 03662 0	I: 41215 1	C: 17366 1	C: 15255 1	I: 41205 0	I: 77671 1	C: 03656 1
25,3130	I: 44271 0	C: 01160 1	C: 01156 1	C: 01156 1	I: 45345 1	C: 03640 0	C: 15313 1	I: 50004 0
25,3140	C: 57352 1	C: 53152 1	I: 45345 1	C: 03664 0	C: 03175 1	I: 45325 1	C: 03640 0	C: 03175 1
25,3150	I: 45471 1	C: 74163 0	I: 77745 1	C: 03700 0	I: 41225 1	C: 01156 1	C: 03614 1	I: 43271 1
25,3160	C: 15211 1	C: 03674 1	I: 41225 1	C: 01160 1	C: 03614 1	I: 41471 0	C: 15213 0	I: 51400 1
25,3170	C: 53472 0	I: 50025 0	C: 15275 0	C: 53200 0	I: 43205 1	C: 15153 1	C: 15275 0	I: 41565 1
25,3200	I: 42545 0	I: 77615 0	C: 03725 1	I: 41400 0	C: 53472 0	C: 17634 0	C: 03640 0	I: 50025 0
25,3210	C: 15217 1	C: 53526 0	I: 71214 0	C: 03273 1	I: 71244 0	C: 53526 0	C: 15335 0	C: 37634 1
25,3220	C: 53526 0	I: 77745 1	C: 03610 0	C: 17612 1	C: 15177 1	C: 03175 1	I: 47131 1	C: 03646 0
25,3230	C: 52373 1	C: 54506 0	I: 77604 0	C: 57352 1	I: 41345 0	C: 03654 0	C: 03706 0	I: 41325 0
25,3240	C: 15263 1	C: 03710 1	I: 43271 1	C: 03674 1	C: 03700 0	I: 43205 1	C: 15227 1	I: 77725 1
25,3250	C: 03710 1	I: 77621 1	C: 03640 0	I: 43205 1	C: 15225 0	I: 52061 1	C: 20211 1	C: 53203 0
25,3260	I: 77604 0	C: 57352 1	I: 54345 1	C: 03624 1	C: 20611 0	I: 45325 1	C: 03674 1	C: 00326 0
25,3270	I: 43205 1	C: 03624 1	C: 03700 0	I: 43205 1	C: 15227 1	I: 45325 1	C: 00326 0	C: 03674 1
25,3300	I: 41316 0	C: 03624 1	I: 65271 0	C: 15273 0	C: 00326 0	I: 56316 0	C: 03622 1	I: 45265 1
25,3310	C: 00330 1	I: 77650 1	C: 53251 1	I: 66234 1	C: 54474 1	C: 03646 0	C: 53317 1	I: 45345 1
25,3320	C: 15167 0	C: 03640 0	I: 72240 1	C: 53333 1	C: 03316 0	I: 72214 0	C: 03314 1	C: 53331 0
25,3330	C: 15335 0	C: 37316 1	C: 54401 0	I: 47131 1	C: 03646 0	C: 53333 1	C: 54500 0	I: 66214 0
25,3340	C: 03067 0	C: 03646 0	C: 53343 0	I: 45345 1	C: 03674 1	C: 15215 0	I: 77440 1	C: 53613 0
25,3350	35060 1	54003 0	35771 0	55771 0	41673 0	51771 1	63637 0	10000 0
25,3360	11771 0	13353 0	65017 1	55646 0	51771 1	43637 1	51771 1	63640 0
25,3370	57646 1	22007 0	00006 1	11646 0	55651 0	35022 1	55650 1	35025 0

OCTAL LISTING FOR PARAGRAPH # 147. WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

25,3400	27771 0	50000 1	43637 1	51771 1	63640 0	00006 1	71651 0	51771 1
25,3410	63637 0	51650 0	55652 0	11650 1	13376 1	57653 0	61637 1	00006 1
25,3420	71657 0	52155 1	00006 1	41700 0	20001 1	20001 1	20001 1	61655 0
25,3430	00006 1	71656 1	61654 1	20155 1	30154 1	55770 1	06006 1	I: 45242 1
25,3440	C: 03702 1	I: 43014 0	C: 03305 1	C: 53470 1	C: 03747 0	C: 53453 0	I: 43145 0	C: 13773 0
25,3450	C: 03065 1	C: 37716 0	C: 53470 1	C: 03716 1	I: 77676 0	I: 56204 1	C: 57352 1	C: 03653 1
25,3460	I: 40061 1	C: 20206 1	C: 53472 0	I: 40015 1	C: 03626 0	C: 53472 0	C: 37634 1	C: 53476 1
25,3470	I: 77745 1	C: 13471 1	I: 41234 1	C: 45712 1	C: 03624 1	C: 03634 0	I: 45345 1	C: 15161 0
25,3500	C: 03640 0	I: 43244 1	C: 53526 0	C: 15161 0	I: 41240 1	C: 53523 0	C: 15263 1	I: 41325 0
25,3510	C: 03654 0	C: 15333 0	I: 41215 1	C: 03624 1	I: 56325 0	C: 15265 1	C: 03622 1	I: 75415 0
25,3520	I: 51015 1	C: 03700 0	C: 53526 0	I: 77745 1	C: 03624 1	C: 03634 0	I: 77745 1	C: 03634 0
25,3530	C: 17636 1	C: 03622 1	I: 77614 1	C: 03305 1	C: 53566 1	I: 43205 1	C: 03632 0	C: 15243 0
25,3540	I: 51525 1	C: 03634 0	I: 50025 0	C: 03630 1	C: 53553 1	I: 75345 1	C: 03676 0	C: 03644 1
25,3550	I: 71240 1	C: 53632 0	I: 41542 1	I: 75345 1	C: 03676 0	C: 03644 1	I: 77625 0	I: 71240 1
25,3560	C: 53566 1	C: 03644 1	I: 57414 1	C: 03210 1	C: 53566 1	C: 03644 1	I: 56345 0	C: 03636 1
25,3570	C: 03624 1	I: 65542 1	I: 43165 1	C: 03644 1	C: 03270 1	C: 03316 0	I: 77776 1	35003 1
25,3600	70102 0	00006 1	13606 0	31263 1	04662 1	C: 20712 1	00004 0	10067 1
25,3610	05164 1	04701 0	C: 77227 0	I: 77776 1	35060 1	54003 0	35070 0	05134 1
25,3620	C: 02512 0	C: 54066 0	05372 1	C: 00414 0	C: 10035 0	33631 0	55645 0	06006 1
25,3630	I: 77650 1	C: 54531 1	I: 75345 1	C: 03630 1	C: 03634 0	C: 37636 0	C: 53566 1	C: 00474 0
25,3640	C: 01235 1	C: 02337 1	C: 03721 0	C: 05230 0	C: 06213 1	C: 10550 0	C: 11717 0	C: 13314 0
25,3650	C: 14736 0	C: 16255 1	C: 16457 0	C: 25570 1	C: 77526 0	C: 77360 1	C: 77106 0	C: 76516 1
25,3660	C: 76071 0	C: 75570 1	C: 74661 0	C: 74436 0	C: 73212 1	C: 71640 0	C: 54557 1	C: 40000 0
25,3670	C: 40000 0	C: 77635 1	C: 77563 1	C: 77354 0	C: 76712 1	C: 76066 0	C: 75322 0	C: 73237 0
25,3700	C: 72104 1	C: 70301 1	C: 65635 1	C: 57311 0	C: 50575 0	C: 50575 0	C: 74443 1	C: 74333 1
25,3710	C: 74433 0	C: 74763 0	C: 75432 0	C: 75735 1	C: 76200 1	C: 75735 1	C: 75140 0	C: 74075 0
25,3720	C: 73312 0	C: 73732 0	C: 73732 0	C: 00015 0	C: 00066 1	C: 00206 0	C: 00431 1	C: 00712 0
25,3730	C: 01136 1	C: 02015 1	C: 02374 0	C: 03123 1	C: 04051 1	C: 05767 1	C: 07476 0	C: 11324 1
25,3740	C: 76272 1	C: 75472 1	C: 74604 0	C: 74210 1	C: 74052 0	C: 73735 1	C: 73217 1	C: 73013 1
25,3750	C: 73155 1	C: 74151 1	C: 76703 1	C: 77575 0	C: 77575 0	C: 00112 0	C: 00204 1	C: 00407 1
25,3760	C: 01113 0	C: 02161 0	C: 03260 0	C: 03717 0	C: 05411 0	C: 10057 1	C: 13476 0	C: 20324 0
25,3770	C: 21677 1	C: 21677 1	C: 16631 1	C: 06755 0	C: 03774 0	C: 03775 1	CKSM 72651 0	@

OCTAL LISTING FOR PARAGRAPH # 150, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

26,2000	I: 77601 0	C: 00001 0	I: 41575 0	C: 15327 0	I: 41434 1	C: 45510 1	C: 36356 1	C: 55344 1
26,2010	C: 16766 1	C: 02356 0	C: 34041 0	C: 27114 0	I: 47375 0	C: 00007 0	C: 00001 0	I: 77656 1
26,2020	C: 24031 0	C: 00001 0	I: 57456 1	I: 41401 1	C: 00001 0	I: 77776 1	31751 0	75023 1
26,2030	00006 1	75005 0	56001 0	50120 1	54036 0	06006 1	I: 41335 1	C: 00037 0
26,2040	C: 14107 1	C: 36356 1	C: 54057 1	I: 77775 1	C: 00031 0	C: 16766 1	C: 14105 0	I: 77625 0
26,2050	C: 02356 0	C: 36356 1	C: 54057 1	I: 77775 1	C: 00001 0	C: 36766 0	C: 26326 1	I: 73545 1
26,2060	C: 02356 0	I: 47315 0	C: 02766 1	C: 00001 0	I: 72561 0	I: 50315 0	C: 02766 1	C: 00001 0
26,2070	I: 72561 0	C: 02766 1	I: 71525 0	C: 02356 0	I: 51315 1	C: 00015 0	C: 00001 0	I: 76561 1
26,2100	I: 53255 0	I: 40256 1	C: 00001 0	I: 43406 1	C: 05252 1	C: 25251 0	C: 01414 1	C: 06044 1
26,2110	I: 77774 0	C: 54161 0	I: 52170 0	C: 54143 0	C: 54126 0	I: 52170 0	C: 54162 0	C: 54126 0
26,2120	I: 52170 0	C: 54173 0	C: 54126 0	I: 76020 1	C: 00047 1	C: 54143 0	I: 54201 0	C: 00001 0
26,2130	C: 20617 0	I: 57571 0	C: 01707 0	I: 57571 0	C: 02034 1	I: 66261 1	C: 20221 1	C: 00051 0
26,2140	C: 00006 1	I: 77650 1	C: 00046 0	I: 41206 0	C: 02147 1	I: 71406 0	I: 65361 0	C: 02133 1
26,2150	I: 63356 1	C: 02133 1	I: 53406 0	I: 53435 0	C: 02141 1	I: 76435 1	I: 53361 0	I: 52172 1
26,2160	C: 00047 1	C: 14003 1	I: 63370 0	C: 00066 1	C: 02037 1	I: 52761 0	C: 00001 0	C: 02133 1
26,2170	I: 72500 1	C: 54165 1	I: 77616 0	I: 65370 0	C: 00060 1	C: 14214 0	I: 74206 0	C: 02037 1
26,2200	I: 77761 1	C: 00001 0	C: 14005 1	I: 41425 1	C: 14216 1	I: 53357 0	C: 02125 0	C: 00005 1
26,2210	I: 72500 1	C: 54200 1	I: 77616 0	C: 22000 1	C: 00000 1	C: 02000 0	C: 00000 1	35002 0
26,2220	55044 1	45017 0	55726 1	02544 0	32425 0	04662 1	C: 21057 0	04106 1
26,2230	02235 1	02224 1	05412 0	C: 00014 1	05217 0	22007 0	11726 1	35002 0
26,2240	12241 0	53716 1	06006 1	I: 77745 1	C: 01205 1	C: 37651 1	C: 52063 0	I: 77775 1
26,2250	C: 01171 1	C: 02327 0	I: 77656 1	C: 26343 1	C: 01177 1	C: 02335 0	I: 53435 0	C: 02343 1
26,2260	C: 03502 0	I: 45345 1	C: 03651 0	C: 01205 1	I: 45040 1	C: 54243 0	C: 54651 1	05536 1
26,2270	32424 1	04662 1	C: 20720 0	04106 1	02276 0	02270 0	06006 1	I: 45234 0
26,2300	C: 45510 1	C: 03651 0	I: 77615 0	C: 03733 0	C: 03727 0	I: 77776 1	32426 0	04662 1
26,2310	C: 20720 0	04106 1	02314 0	02276 0	05354 0	C: 00076 0	35017 1	54332 1
26,2320	02544 0	06006 1	I: 47131 1	C: 03325 0	C: 54401 0	C: 41672 1	00006 1	32432 0
26,2330	53223 1	34270 0	04662 1	C: 21125 1	04106 1	02340 1	02331 1	02232 0
26,2340	04701 0	C: 41612 1	32425 0	04662 1	C: 20720 0	02342 0	02350 0	02342 0
26,2350	05412 0	C: 04024 0	11726 1	35002 0	12355 1	55715 1	31411 1	22007 0
26,2360	53604 0	35017 1	55727 0	35052 0	55263 0	05546 0	C: 00134 1	41700 0
26,2370	75017 0	00006 1	12421 0	02405 1	35065 1	05134 1	C: 02405 1	C: 54066 0

OCTAL LISTING FOR PARAGRAPH # 151, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

26,2400	05324 1	I: 52131 0	C: 00053 1	C: 53576 0	C: 20376 1	05354 0	C: 00077 1	32430 1
26,2410	55724 0	32427 1	55263 0	45017 0	55727 0	05412 0	C: 00004 0	04662 1
26,2420	C: 20703 1	05412 0	C: 00004 0	05217 0	C: 01474 1	C: 01475 0	C: 01477 1	C: 01500 0
26,2430	C: 52000 0	C: 03470 1	C: 76067 1	05354 0	C: 00100 0	32440 0	55263 0	06030 1
26,2440	C: 01512 0	05354 0	C: 00101 1	35065 1	05134 1	C: 02457 0	C: 54062 1	05372 1
26,2450	C: 00554 0	C: 10035 0	06006 1	I: 47131 1	C: 03646 0	C: 53035 1	C: 52120 0	05560 1
26,2460	C: 00134 1	32473 0	04662 1	C: 21057 0	02461 0	02470 0	02461 0	02232 0
26,2470	05546 0	C: 00134 1	02421 1	C: 04105 1	05354 0	C: 00102 1	35052 0	02503 0
26,2500	05354 0	C: 00103 0	32511 0	55263 0	05546 0	C: 00134 1	05412 0	C: 00004 0
26,2510	06030 1	C: 01502 1	32543 1	04662 1	C: 20720 0	02520 1	02520 1	02512 0
26,2520	46214 1	00004 0	70102 0	54102 0	00003 1	00006 1	32643 1	53223 1
26,2530	14106 0	I: 43175 0	C: 01171 1	C: 00662 0	C: 16152 0	C: 01205 1	I: 45014 0	C: 01663 0
26,2540	C: 26370 1	I: 77634 0	C: 53611 1	C: 04103 1	00006 1	23773 0	04662 1	C: 17653 1
26,2550	06006 1	I: 45014 0	C: 00716 1	C: 54604 1	C: 27543 0	30155 0	55774 0	05245 1
26,2560	C: 02565 0	C: 54067 1	05412 0	C: 40434 0	05217 0	35065 1	05147 0	C: 02603 0
26,2570	C: 54066 0	00006 1	32643 1	53223 1	05372 1	C: 00454 1	C: 00415 1	35060 1
26,2600	54003 0	04701 0	C: 76701 0	06006 1	I: 77204 1	C: 57352 1	C: 01177 1	I: 64235 1
26,2610	C: 01171 1	C: 01736 1	I: 71256 0	C: 00160 0	I: 43240 0	C: 54622 0	C: 14645 0	I: 47004 0
26,2620	C: 54641 0	C: 54626 1	I: 43276 0	C: 14645 0	I: 77404 1	C: 54631 1	05650 1	C: 01426 0
26,2630	02633 0	05650 1	C: 01427 1	35050 1	04662 1	C: 20676 1	32646 1	04662 1
26,2640	C: 01732 0	01773 0	C: 03227 0	C: 76067 1	C: 22111 0	C: 17335 1	C: 01750 1	C: 00000 1
26,2650	C: 13560 0	I: 45345 1	C: 02020 1	C: 15001 1	I: 71244 0	C: 54775 0	C: 17354 0	I: 77624 1
26,2660	C: 56757 1	I: 45145 0	C: 15021 0	C: 57067 1	I: 77624 1	C: 56631 0	I: 77624 1	C: 55030 1
26,2670	I: 45015 1	C: 02020 1	C: 57067 1	I: 77676 0	C: 03733 0	C: 37727 1	C: 56631 0	I: 77624 1
26,2700	C: 55030 1	I: 77624 1	C: 56664 0	I: 77624 1	C: 56651 0	I: 77624 1	C: 56651 0	C: 37714 1
26,2710	C: 55051 0	I: 77605 1	I: 43265 1	C: 15027 0	C: 00001 0	C: 17725 1	C: 02241 1	I: 77615 0
26,2720	C: 06462 1	C: 34023 1	C: 55046 0	I: 45325 1	C: 00001 0	C: 15005 0	I: 63471 0	C: 15007 1
26,2730	C: 00001 0	I: 43205 1	C: 15011 0	I: 41215 1	C: 15013 1	C: 15015 1	I: 77725 1	I: 43271 1
26,2740	C: 15025 1	C: 17366 1	I: 77665 1	I: 51015 1	C: 15017 0	C: 54750 1	I: 77745 1	C: 15335 0
26,2750	C: 17722 0	C: 02241 1	I: 45015 1	C: 15023 1	C: 57067 1	I: 77624 1	C: 56631 0	I: 77624 1
26,2760	C: 55030 1	I: 73015 1	C: 15023 1	C: 03713 1	C: 34023 1	C: 55046 0	I: 67076 1	C: 00155 0
26,2770	C: 17771 0	I: 77626 0	C: 74010 0	I: 77634 0	C: 54267 0	I: 52145 0	C: 06456 0	C: 54657 1

OCTAL LISTING FOR PARAGRAPH # 152, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

26,3000	C: 00002 0	C: 26244 1	C: 00052 0	C: 05716 1	C: 33335 1	C: 05707 1	C: 36365 1	C: 30244 0
26,3010	C: 77113 1	C: 42770 1	C: 77354 0	C: 65030 1	C: 21450 0	C: 00001 0	C: 01750 1	C: 00000 1
26,3020	C: 00305 1	C: 04541 0	C: 00003 1	C: 27040 0	C: 32525 1	C: 12525 0	C: 77777 0	C: 76601 1
26,3030	I: 47315 0	C: 02343 1	C: 03502 0	I: 76561 1	I: 74315 0	C: 02343 1	C: 00017 1	I: 45455 1
26,3040	C: 74235 0	I: 72441 0	C: 01714 1	C: 02156 1	I: 77650 1	C: 26505 0	I: 77657 0	C: 20201 0
26,3050	C: 00021 1	I: 41345 0	C: 00041 1	C: 00021 1	I: 45325 1	C: 00041 1	C: 00021 1	I: 56257 1
26,3060	C: 20171 1	I: 77625 0	C: 00025 0	I: 41566 1	I: 65271 0	C: 00037 0	I: 65205 0	C: 00021 1
26,3070	C: 00035 1	I: 56366 1	I: 65542 1	I: 77616 0	I: 56345 0	C: 03700 0	C: 15317 0	I: 41325 0
26,3100	C: 03640 0	C: 15321 0	I: 43271 1	C: 03674 1	I: 43205 1	C: 03640 0	C: 03640 0	C: 03640 0
26,3110	I: 71214 0	C: 03307 0	C: 55117 0	C: 03702 1	I: 52005 0	C: 15235 1	C: 52173 0	I: 45345 1
26,3120	C: 03674 1	C: 15325 1	I: 43044 0	C: 55125 1	C: 03066 1	I: 41345 0	C: 03702 1	C: 15237 0
26,3130	I: 52071 0	C: 03674 1	C: 52173 0	I: 52145 0	C: 16326 1	C: 52162 0	I: 51425 0	C: 16327 0
26,3140	I: 75461 0	C: 20216 0	I: 52005 0	C: 15247 1	C: 52226 0	C: 02525 1	C: 12525 0	C: 12525 0
26,3150	C: 04631 1	C: 23146 0	C: 03146 1	C: 14632 0	C: 06314 1	C: 31463 1	C: 76314 0	C: 71462 1
26,3160	C: 05075 0	C: 16051 1	C: 07777 1	C: 00000 1	C: 00236 0	C: 36763 0	C: 00204 1	C: 11303 1
26,3170	C: 05260 0	C: 05572 1	C: 12343 0	C: 21616 0	C: 01073 1	C: 31515 1	C: 00172 0	C: 03571 1
26,3200	C: 00573 0	C: 10230 1	C: 76226 0	C: 45761 0	C: 13132 0	C: 33062 0	C: 00160 0	C: 05104 1
26,3210	C: 11322 1	C: 32265 1	C: 75047 0	C: 72454 1	C: 00475 1	C: 35746 1	C: 06751 1	C: 27515 0
26,3220	C: 05441 0	C: 14412 0	C: 00022 1	C: 36641 1	C: 01003 0	C: 06315 0	C: 71435 0	C: 75516 1
26,3230	C: 32047 0	C: 24367 0	C: 37200 1	C: 05636 1	C: 00046 0	C: 13137 0	C: 00017 1	C: 30730 0
26,3240	C: 00040 0	C: 30447 0	C: 00000 1	C: 17565 1	C: 01727 1	C: 20103 1	C: 00121 0	C: 17460 0
26,3250	C: 00400 0	C: 00000 1	C: 01252 0	C: 25253 1	C: 24365 1	C: 30244 0	C: 77152 1	C: 51354 1
26,3260	C: 00336 1	C: 21610 0	C: 00433 0	C: 02775 0	C: 00000 1	C: 20017 0	C: 77765 0	C: 70243 0
26,3270	C: 31463 1	C: 06315 0	C: 00541 1	C: 33575 0	C: 00146 1	C: 14632 0	C: 00052 0	C: 30013 0
26,3300	C: 20411 1	C: 03041 1	C: 20610 1	C: 10513 1	C: 11473 1	C: 02355 0	C: 00203 0	C: 02234 0
26,3310	C: 16237 0	C: 00146 1	C: 01456 1	C: 03450 0	C: 01727 1	C: 01217 1	C: 56232 1	C: 72332 0
26,3320	C: 77000 1	C: 43741 1	C: 36702 1	C: 21727 0	C: 10000 0	C: 00000 1	C: 00000 1	C: 00000 1
26,3330	C: 00000 1	C: 00000 1	C: 20000 0	C: 00000 1	C: 00000 1	C: 00000 1	C: 00000 1	C: 00000 1
26,3340	C: 00000 1	C: 00000 1	C: 37777 1	C: 37777 1	I: 46020 1	C: 00050 1	C: 55361 0	I: 77624 1
26,3350	C: 55421 0	I: 77775 1	C: 02012 0	I: 53235 0	C: 00001 0	C: 00001 0	I: 52105 1	C: 00025 0
26,3360	C: 55407 1	I: 77624 1	C: 55573 0	I: 77624 1	C: 55625 0	I: 76521 0	C: 00025 0	I: 77650 1
26,3370	C: 55353 1	I: 46020 1	C: 00050 1	C: 55413 1	I: 77624 1	C: 55421 0	I: 61375 1	C: 02012 0

OCTAL LISTING FOR PARAGRAPH # 153. WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD. "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

26,3400	C: 00025 0	I: 77772 0	I: 51235 1	C: 00001 0	C: 00001 0	I: 77721 0	C: 00025 0	I: 40372 0
26,3410	C: 00001 0	I: 77650 1	C: 00050 1	I: 77624 1	C: 55573 0	I: 77624 1	C: 55625 0	I: 77650 1
26,3420	C: 55402 1	I: 40220 0	C: 00051 0	C: 00011 1	I: 77770 1	C: 00005 1	I: 65345 0	C: 15655 0
26,3430	C: 15647 0	I: 45006 0	C: 55546 0	I: 71406 0	C: 14041 1	I: 77756 0	C: 14043 0	C: 15653 0
26,3440	I: 41525 0	C: 15645 1	I: 45170 0	C: 00004 0	C: 55546 0	C: 14027 1	C: 15651 1	I: 41525 0
26,3450	C: 15643 1	I: 45170 0	C: 00005 1	C: 55546 0	I: 71406 0	I: 77606 1	C: 00025 0	I: 76405 1
26,3460	C: 00041 1	C: 14035 1	I: 76405 1	C: 00043 0	C: 14037 0	I: 41556 1	I: 77676 0	C: 14033 1
26,3470	C: 00027 1	C: 14007 0	I: 76405 1	C: 00041 1	C: 14027 1	C: 00011 1	I: 76405 1	C: 00043 0
26,3500	C: 14031 0	C: 15335 0	I: 57525 1	C: 00043 0	I: 63325 0	C: 00041 1	C: 00033 1	I: 63361 0
26,3510	C: 15641 0	C: 00011 1	I: 53361 0	C: 15637 1	I: 77772 0	C: 24041 1	I: 63361 0	C: 15641 0
26,3520	C: 00033 1	I: 52361 1	C: 15637 1	I: 65372 1	C: 00007 0	I: 74346 0	C: 00011 1	I: 73525 1
26,3530	C: 00007 0	I: 52361 1	C: 00025 0	I: 77772 0	C: 14033 1	C: 00007 0	I: 74356 1	I: 71525 0
26,3540	C: 00007 0	I: 53361 0	C: 00025 0	I: 57572 0	C: 34025 1	C: 00051 0	I: 54345 1	C: 00007 0
26,3550	C: 20617 0	I: 72371 1	C: 01707 0	C: 00155 0	C: 14017 1	C: 00020 0	I: 77605 1	I: 43257 0
26,3560	C: 20206 1	I: 67206 1	C: 00017 1	I: 41261 1	C: 20212 1	C: 00013 0	I: 43257 0	C: 20213 0
26,3570	I: 77600 1	C: 55572 1	I: 77616 0	I: 40220 0	C: 00051 0	C: 00011 1	I: 77770 1	C: 00000 1
26,3600	I: 65345 0	C: 01712 1	C: 15657 1	I: 45006 0	C: 55546 0	I: 41401 1	C: 00023 0	I: 65346 0
26,3610	C: 00023 0	I: 65356 1	C: 15335 0	I: 73525 1	C: 00023 0	I: 65276 1	C: 00023 0	I: 63346 0
26,3620	C: 15335 0	I: 41525 0	C: 15333 0	I: 77650 1	C: 00051 0	I: 57545 1	C: 01716 0	C: 14017 1
26,3630	C: 01714 1	C: 14021 1	C: 15335 0	C: 24023 0	C: 00017 1	I: 77616 0	C: 17775 1	C: 02052 1
26,3640	C: 00333 1	C: 10374 0	C: 77665 1	C: 42175 1	C: 22211 0	C: 00625 0	C: 77777 0	C: 77767 1
26,3650	C: 37436 1	C: 01613 1	C: 32417 1	C: 32160 1	C: 02052 1	C: 35552 0	C: 37116 0	C: 32523 1
26,3660	05546 0	C: 00054 0	00004 0	00006 1	30025 0	53151 1	03717 0	03662 0
26,3670	52155 1	53153 0	00004 0	04662 1	C: 17060 1	05560 1	C: 00007 0	05560 1
26,3700	C: 00010 0	35005 1	00006 1	05013 0	05412 0	C: 07024 0	C: 20000 0	C: 03737 1
26,3710	C: 54062 1	35036 1	04662 1	C: 21045 0	13711 1	13711 1	13711 1	00006 1
26,3720	22156 0	04554 1	00003 1	52155 1	35013 0	54001 1	35021 1	20155 1
26,3730	44362 0	70155 1	56155 0	74362 0	10000 0	24156 0	00156 0	45005 0
26,3740	00006 1	03013 0	00004 0	35021 1	54001 1	52025 1	03717 0	03742 0
26,3750	00006 1	41153 0	20155 1	35006 1	07256 1	35021 1	54156 1	07226 0
26,3760	10154 0	03766 0	03766 0	03764 1	35006 1	26154 0	00006 1	31151 0
26,3770	20155 1	07226 0	52155 1	20025 1	05560 1	C: 00054 0	04106 1	CKSM 64710 0

OCTAL LISTING FOR PARAGRAPH # 154, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

27,2000	04711 1	55146 1	35012 1	70101 0	10000 0	12013 0	06006 1	I: 77624 1
27,2010	C: 56126 1	C: 01156 1	I: 77776 1	32125 0	04662 1	C: 21132 1	02114 1	02023 1
27,2020	12052 0	02056 0	05217 0	35012 1	70101 0	10000 0	12034 0	06006 1
27,2030	I: 77624 1	C: 56126 1	C: 01156 1	I: 77776 1	34371 0	00006 1	06031 0	77707 1
27,2040	00006 1	12043 0	12013 0	32125 0	04662 1	C: 20676 1	02056 0	04662 1
27,2050	C: 17627 1	12013 0	05560 1	C: 00124 0	31146 0	04704 0	40100 1	75004 1
27,2060	10000 0	00002 0	30002 0	54156 1	46214 1	60133 0	55053 1	05412 0
27,2070	C: 00071 1	35011 1	05526 0	00156 0	35013 0	70075 1	00006 1	12111 0
27,2100	05546 0	C: 00077 1	05546 0	C: 00024 1	35021 1	55303 1	35066 1	05210 1
27,2110	01053 0	05412 0	C: 00111 0	05217 0	31011 0	00006 1	12052 0	30100 0
27,2120	75004 1	00006 1	14106 0	04622 0	C: 20100 1	C: 01422 1	I: 40020 1	C: 03310 0
27,2130	C: 56131 1	I: 47164 1	C: 03320 0	C: 44376 0	C: 34032 1	C: 44405 0	I: 61375 1	C: 03357 0
27,2140	C: 03321 1	I: 77656 1	C: 00035 1	I: 53435 0	C: 03351 0	I: 57400 1	C: 56256 0	C: 17343 0
27,2150	C: 00045 0	I: 50025 0	C: 16327 0	C: 56256 0	I: 50375 0	C: 03351 0	C: 00035 1	I: 65552 0
27,2160	I: 77624 1	C: 44530 1	I: 75160 1	C: 03320 0	C: 03425 1	I: 77624 1	C: 44304 0	I: 51545 1
27,2170	C: 00007 0	I: 50025 0	C: 16314 0	C: 56246 1	I: 51545 1	C: 03351 0	I: 51025 1	C: 16316 1
27,2200	C: 56246 1	I: 77775 1	I: 77626 0	C: 50442 0	I: 77626 0	C: 50450 0	I: 77626 0	C: 50456 0
27,2210	C: 03327 1	I: 57444 1	C: 56213 1	I: 50035 1	C: 03351 0	C: 56222 0	I: 57575 1	C: 03351 0
27,2220	C: 37343 1	C: 56225 1	I: 77775 1	C: 03351 0	C: 03343 0	I: 51545 1	C: 03351 0	I: 51025 1
27,2230	C: 16320 1	C: 56235 0	I: 52145 0	C: 16324 0	C: 56237 1	I: 77745 1	C: 16322 0	I: 77624 1
27,2240	C: 44530 1	I: 75160 1	C: 03320 0	C: 03425 1	I: 77624 1	C: 44304 0	I: 45160 1	C: 00000 1
27,2250	C: 44655 1	I: 40234 0	C: 45552 1	C: 00001 0	I: 77650 1	C: 03310 0	I: 50375 0	C: 00035 1
27,2260	C: 03351 0	I: 72240 1	C: 56266 0	C: 00032 0	I: 77650 1	C: 03310 0	I: 47375 0	C: 03327 1
27,2270	C: 15333 0	I: 47256 0	C: 03351 0	I: 40056 0	C: 56310 0	C: 17343 0	C: 00045 0	I: 50025 0
27,2300	C: 16327 0	C: 56310 0	I: 77775 1	C: 03343 0	C: 17343 0	C: 15333 0	I: 77650 1	C: 56160 0
27,2310	I: 52175 0	C: 15333 0	C: 56304 0	C: 15555 0	C: 35172 0	C: 14113 1	C: 36326 0	C: 07701 0
27,2320	C: 35703 0	C: 04343 1	C: 21616 0	C: 03070 0	C: 34344 0	C: 00000 1	C: 00001 0	C: 00000 1
27,2330	35052 0	04662 1	C: 20720 0	15534 1	12336 1	12330 1	05546 0	C: 00124 0
27,2340	04662 1	C: 56000 1	15534 1	I: 45020 1	C: 02317 0	C: 27442 0	I: 43145 0	C: 01225 0
27,2350	C: 01472 1	C: 00041 1	I: 43014 0	C: 01673 1	C: 01676 1	I: 43014 0	C: 01474 1	C: 01635 0
27,2360	C: 02317 0	I: 77620 0	C: 01150 1	I: 77614 1	C: 01742 1	C: 30156 0	I: 50135 0	C: 03376 0
27,2370	C: 56406 0	I: 43014 0	C: 00710 1	C: 01150 1	C: 00752 1	C: 30156 0	I: 77776 1	05412 0

OCTAL LISTING FOR PARAGRAPH # 155. WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

27,2400	C: 00132 1	37663 0	05210 1	02407 0	I: 77620 0	C: 01150 1	I: 77776 1	35045 0
27,2410	04662 1	C: 01732 0	05006 1	I: 77650 1	C: 56363 1	I: 77776 1	00004 0	42500 1
27,2420	00006 1	03013 0	34334 1	00006 1	05013 0	00003 1	00006 1	30025 0
27,2430	53225 1	05560 1	C: 00043 0	04662 1	C: 17575 0	02464 0	05631 0	11703 0
27,2440	02444 1	02470 0	02453 1	02453 1	06006 1	I: 41335 1	C: 03704 1	C: 16503 0
27,2450	C: 01257 0	I: 43414 1	C: 04467 0	31703 1	74777 0	54154 0	06006 1	I: 77605 1
27,2460	C: 16503 0	I: 52015 1	C: 16477 1	C: 56450 0	31256 1	00006 1	12470 1	05643 0
27,2470	06006 1	I: 77745 1	C: 01225 0	C: 01152 0	I: 77650 1	C: 70641 0	C: 00045 0	C: 01217 1
27,2500	C: 00017 1	C: 40200 1	C: 00045 0	C: 01217 1	00006 1	04007 1	54016 1	45021 0
27,2510	54734 0	00006 1	22012 1	40076 1	75006 0	00006 1	15324 0	35011 1
27,2520	70075 1	00006 1	12542 1	40100 1	75004 1	00006 1	12542 1	30046 0
27,2530	55703 0	35016 0	00006 1	02033 0	00006 1	12544 1	55256 0	35016 0
27,2540	04701 0	C: 17545 0	35021 1	02536 0	35016 0	04701 0	C: 17550 1	I: 43174 1
27,2550	C: 00000 1	C: 00707 1	C: 56560 1	I: 43414 1	C: 04304 1	C: 56556 1	I: 43514 0	C: 77775 1
27,2560	I: 43414 1	C: 04303 0	C: 56563 1	I: 43514 0	C: 77775 1	I: 66370 0	C: 00044 1	C: 00051 0
27,2570	C: 00006 1	I: 77775 1	C: 15335 0	C: 06445 1	I: 76100 1	C: 56573 0	C: 00044 1	C: 06533 1
27,2600	I: 67300 0	C: 56577 1	C: 00001 0	C: 02401 0	C: 02411 1	C: 02421 1	I: 77735 0	C: 00002 0
27,2610	C: 02511 0	C: 02521 0	C: 02531 1	I: 77616 0	05546 0	C: 00023 0	06006 1	I: 77745 1
27,2620	C: 15335 0	C: 03703 0	I: 43145 0	C: 10413 0	C: 00700 0	C: 50106 0	I: 52015 1	C: 10413 0
27,2630	C: 50106 0	I: 70545 1	C: 00043 0	I: 41215 1	C: 15333 0	C: 00041 1	I: 55205 0	C: 00021 1
27,2640	C: 00045 0	I: 44246 1	C: 15333 0	C: 00017 1	I: 57516 1	I: 75415 0	C: 15325 1	I: 43565 0
27,2650	C: 00045 0	I: 77620 0	C: 03373 0	I: 45205 1	C: 15003 0	C: 03733 0	C: 37606 0	C: 46225 0
27,2660	I: 77624 1	C: 56664 0	I: 77650 1	C: 03373 0	I: 50375 0	C: 03542 1	C: 03474 0	I: 65512 1
27,2670	I: 77616 0	00003 1	00006 1	22330 1	06006 1	I: 53135 0	C: 01502 1	C: 56736 0
27,2700	I: 77775 1	C: 01503 0	C: 25535 0	C: 01511 0	I: 77624 1	C: 23436 1	I: 51535 0	C: 01502 1
27,2710	I: 53025 0	C: 16747 1	C: 56717 0	I: 43174 1	C: 00000 1	C: 00223 1	C: 56722 0	I: 43174 1
27,2720	C: 00002 0	C: 00063 1	I: 50135 0	C: 01502 1	C: 56732 1	I: 77624 1	C: 26705 1	I: 52014 0
27,2730	C: 01671 0	C: 56734 1	I: 77624 1	C: 26760 1	I: 77614 1	C: 02676 1	I: 45131 0	C: 01502 1
27,2740	C: 00000 1	C: 27455 0	I: 77776 1	05412 0	C: 04026 1	00330 1	C: 00002 0	C: 00000 1
27,2750	I: 77420 1	C: 03536 1	05412 0	C: 04022 0	06006 1	I: 77650 1	C: 03536 1	C: 00037 0
27,2760	I: 53575 0	C: 02327 0	I: 77725 1	C: 00045 0	C: 00015 0	I: 77701 1	C: 00047 1	C: 24041 1
27,2770	C: 02335 0	I: 77761 1	C: 00037 0	C: 02372 0	I: 47361 0	C: 00041 1	I: 47572 1	C: 14035 1

OCTAL LISTING FOR PARAGRAPH # 156. WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD. "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

27,3000	C: 15325 1	I: 63271 0	C: 00041 1	C: 02372 0	I: 57436 1	C: 00025 0	I: 43257 0	C: 20573 1
27,3010	I: 77626 0	C: 77744 0	I: 41457 1	C: 20173 0	I: 75446 0	I: 77701 1	C: 00050 1	C: 00031 0
27,3020	I: 75316 1	I: 55254 1	C: 57024 0	C: 15325 1	C: 00027 1	I: 77616 0	I: 41345 0	C: 00033 1
27,3030	C: 00035 1	I: 57457 0	C: 20571 0	I: 51415 0	C: 17366 1	I: 43366 0	C: 15325 1	I: 55206 0
27,3040	C: 00035 1	I: 53657 0	C: 20601 1	C: 20572 0	C: 14017 1	I: 41005 1	C: 00027 1	C: 57352 1
27,3050	I: 53654 0	C: 57060 0	C: 57603 0	I: 40057 1	C: 57576 1	C: 57060 0	I: 77644 1	C: 57062 1
27,3060	I: 77745 1	C: 17372 1	C: 00021 1	I: 77616 0	I: 77614 1	C: 03436 0	C: 57071 0	I: 77614 1
27,3070	C: 03676 0	C: 00023 0	I: 77657 0	C: 20201 0	C: 00021 1	I: 44205 0	C: 00033 1	C: 15325 1
27,3100	I: 41206 0	C: 00021 1	I: 53725 1	C: 00035 1	C: 20573 1	I: 43276 0	I: 77657 0	C: 20601 1
27,3110	I: 71214 0	C: 03756 0	C: 57114 1	C: 15335 0	I: 75440 0	C: 57247 1	I: 41076 0	C: 57352 1
27,3120	C: 24045 0	C: 02372 0	I: 52441 1	C: 02327 0	C: 00017 1	I: 44240 1	C: 57147 1	C: 00045 0
27,3130	C: 14043 0	C: 00033 1	I: 44205 0	C: 00041 1	I: 51406 1	I: 40015 1	C: 17360 1	C: 57160 1
27,3140	I: 65345 0	C: 15335 0	I: 57545 1	C: 00033 1	I: 71240 1	C: 57254 0	I: 77616 0	I: 77745 1
27,3150	I: 45345 1	C: 00023 0	C: 00015 0	C: 14043 0	C: 00045 0	I: 52015 1	C: 00017 1	C: 57134 0
27,3160	I: 65215 1	C: 17362 0	C: 00043 0	I: 53605 1	C: 00031 0	C: 57201 0	I: 77671 1	I: 40145 0
27,3170	C: 00043 0	C: 57252 0	I: 45471 1	C: 77732 1	I: 63406 0	I: 41206 0	C: 00035 1	I: 75261 0
27,3200	C: 20206 1	C: 00045 0	C: 14045 0	I: 41206 0	C: 00033 1	I: 77657 0	C: 20201 0	C: 00043 0
27,3210	I: 41234 1	C: 57334 1	I: 44302 0	C: 00023 0	I: 41215 1	C: 00015 0	I: 51042 0	C: 57240 0
27,3220	I: 75206 1	C: 00017 1	I: 71244 0	C: 57244 1	C: 00027 1	I: 51076 1	C: 57244 1	I: 77676 0
27,3230	I: 56205 0	C: 17356 1	C: 00031 0	I: 53657 0	C: 57602 1	C: 57602 1	I: 43257 0	C: 57576 1
27,3240	I: 40005 0	C: 00037 0	C: 57250 1	I: 77616 0	I: 77745 1	I: 77650 1	C: 57240 0	I: 77745 1
27,3250	I: 43545 1	C: 17372 1	I: 77712 0	I: 41465 0	I: 45345 1	C: 00045 0	C: 00017 1	C: 14013 0
27,3260	I: 77626 0	C: 77732 1	I: 53605 1	C: 00027 1	C: 57576 1	I: 41206 0	C: 00045 0	I: 41057 0
27,3270	C: 57576 1	C: 45712 1	C: 00043 0	I: 41234 1	C: 57334 1	C: 00043 0	I: 45242 1	C: 17364 0
27,3300	I: 41405 0	I: 41345 0	C: 00045 0	C: 00015 0	I: 43312 0	C: 00017 1	C: 14045 0	C: 00035 1
27,3310	I: 53605 1	C: 00027 1	C: 57575 1	I: 53765 0	C: 00045 0	C: 57576 1	C: 14045 0	C: 00027 1
27,3320	I: 41366 1	C: 17356 1	I: 77615 0	I: 45257 0	C: 57577 0	C: 00013 0	I: 53605 1	C: 00027 1
27,3330	C: 57601 1	I: 52057 1	C: 57602 1	C: 57240 0	07171 1	C: 00004 0	C: 12525 0	C: 12525 0
27,3340	C: 71463 0	C: 57703 1	C: 04423 0	C: 17645 0	C: 74604 0	C: 43667 1	C: 01626 1	C: 37256 1
27,3350	C: 77404 1	C: 52071 0	06030 1	C: 24775 1	C: 30424 0	C: 06220 1	C: 37553 0	C: 37777 1
27,3360	C: 37700 1	C: 00000 1	C: 00100 0	C: 04000 0	C: 00000 1	C: 02000 0	C: 00000 1	C: 00305 1
27,3370	C: 11205 0	C: 37777 1	C: 37777 1	05412 0	C: 07026 1	C: 30000 1	C: 03704 1	C: 56060 1

OCTAL LISTING FOR PARAGRAPH # 157, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD. "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

27,3400	35017 1	54332 1	05354 0	C: 00033 1	50302 0	13406 1	13411 1	13414 1
27,3410	13414 1	35016 0	54300 0	13437 0	33507 0	54156 1	33510 0	04662 1
27,3420	C: 20561 1	13704 0	13416 0	03500 1	45016 1	60304 0	00006 1	63416 1
27,3430	40304 1	64376 1	00006 1	63416 1	30304 0	54300 0	24303 1	33654 0
27,3440	60303 1	54156 1	33510 0	04662 1	C: 20561 1	13704 0	13442 1	03500 1
27,3450	40303 0	60300 1	00006 1	63455 0	13436 1	33506 1	54156 1	33511 1
27,3460	04662 1	C: 20561 1	13704 0	13512 0	03500 1	30330 1	00006 1	63455 0
27,3470	40330 0	60300 1	65017 1	00006 1	63455 0	33654 0	60330 1	13441 1
27,3500	40154 0	75012 0	10000 0	00002 0	50002 0	77771 0	C: 00330 1	C: 00304 0
27,3510	C: 05201 1	C: 05202 1	00004 0	30103 0	56001 0	35015 0	00006 1	06001 0
27,3520	54103 1	05412 0	C: 04026 1	00004 0	45016 1	60302 0	00006 1	63536 1
27,3530	00006 1	30305 1	52315 1	03561 0	04400 1	03704 1	34371 0	05147 0
27,3540	C: 03543 0	C: 56063 1	05217 0	06006 1	I: 77624 1	C: 27442 0	I: 77776 1	05412 0
27,3550	C: 04026 1	05546 0	C: 00236 0	00004 0	50302 0	13556 0	13715 0	13624 0
27,3560	13656 0	00006 1	22330 1	35021 1	22007 0	52025 1	52327 0	35022 1
27,3570	54001 1	40000 0	52765 1	00004 0	35021 1	22007 0	54156 1	52315 1
27,3600	52155 1	00006 1	30327 1	20155 1	00006 1	13614 0	35021 1	52327 0
27,3610	20025 1	05412 0	C: 04026 1	00330 1	07226 0	52155 1	20025 1	05412 0
27,3620	C: 04026 1	00004 0	50330 1	00001 0	30305 1	54003 0	74373 0	54330 0
27,3630	67714 1	60300 1	00006 1	13641 0	75007 1	10000 0	13752 0	37714 1
27,3640	60300 1	54154 0	50000 1	30306 1	54001 1	30154 1	60330 1	50000 1
27,3650	23400 1	10154 0	13641 0	13703 1	C: 00303 1	13703 1	35017 1	70300 0
27,3660	10000 0	13663 0	13752 0	45016 1	60300 1	54154 0	50000 1	30305 1
27,3670	22000 1	10154 0	54154 0	50000 1	30305 1	54003 0	74373 0	50000 1
27,3700	23400 1	10154 0	13665 0	02671 0	30301 0	05357 0	35021 1	54332 1
27,3710	03757 1	00006 1	35021 1	52765 1	05534 0	00006 1	40305 0	52315 1
27,3720	03561 0	03752 1	00006 1	40305 0	52317 0	00006 1	40305 0	52321 0
27,3730	05412 0	C: 04026 1	35021 1	22007 0	52317 0	21571 1	35021 1	22007 0
27,3740	52321 0	21643 0	35021 1	22007 0	52305 0	21710 1	27706 0	05412 0
27,3750	C: 04026 1	03703 0	04400 1	13703 1	04400 1	03757 1	05534 0	45015 1
27,3760	00006 1	03011 1	00002 0	C: 03763 0	C: 03764 1	CKSM 63767 1	@	@
27,3770	@	@	@	@	@	@	@	@

OCTAL LISTING FOR PARAGRAPH # 160. WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

30,2000	05560 1	C: 00010 0	04662 1	C: 17653 1	06006 1	I: 77634 0	C: 45510 1	C: 34041 0
30,2010	C: 27114 0	I: 47375 0	C: 00007 0	C: 00001 0	I: 50256 0	C: 01744 1	I: 77646 0	I: 65552 0
30,2020	C: 03626 0	I: 77414 0	C: 02676 1	32114 1	04662 1	C: 21057 0	04106 1	02034 1
30,2030	02023 1	36214 0	05526 0	05217 0	45063 0	71751 1	55751 1	06006 1
30,2040	I: 77614 1	C: 01664 1	I: 43014 0	C: 00462 1	C: 04343 1	C: 60055 1	I: 77614 1	C: 01463 1
30,2050	I: 45145 0	C: 20116 0	C: 60175 1	I: 77650 1	C: 60062 0	I: 43014 0	C: 01663 0	C: 03067 0
30,2060	I: 77624 1	C: 60143 1	I: 77776 1	05372 1	C: 00004 0	C: 05022 1	C: 13000 0	35022 1
30,2070	54301 1	05546 0	C: 00025 0	05560 1	C: 00024 1	06006 1	I: 77624 1	C: 30011 1
30,2100	I: 45135 1	C: 20117 1	C: 60175 1	I: 66744 0	C: 01330 0	C: 77724 0	C: 36750 0	C: 60312 1
30,2110	I: 77776 1	05412 0	C: 04022 0	02034 1	C: 01455 1	C: 01306 0	C: 01307 1	I: 77634 0
30,2120	C: 45510 1	C: 24007 0	C: 02026 1	C: 14001 0	C: 15333 0	I: 77624 1	C: 55344 1	I: 77742 0
30,2130	C: 02152 0	I: 77634 0	C: 45510 1	I: 77624 1	C: 26370 1	I: 77650 1	C: 03667 0	I: 77624 1
30,2140	C: 60143 1	I: 77650 1	C: 03667 0	I: 77420 1	C: 03670 0	33644 1	04662 1	C: 20720 0
30,2150	04106 1	02153 1	02145 0	06006 1	I: 51545 1	C: 01104 0	I: 50021 1	C: 15325 1
30,2160	C: 60166 0	I: 51545 1	C: 02360 0	I: 51021 0	C: 15325 1	C: 60171 0	I: 77776 1	04400 1
30,2170	02145 0	I: 77624 1	C: 62374 0	I: 77650 1	C: 03670 0	C: 02747 1	I: 77420 1	C: 03667 0
30,2200	31746 0	04662 1	C: 21057 0	04106 1	02211 1	02200 1	35022 1	05526 0
30,2210	05217 0	31751 0	75063 0	55745 1	45061 1	61745 0	00006 1	62221 1
30,2220	02233 1	05560 1	C: 00141 0	31751 0	77707 1	00006 1	62233 1	55744 0
30,2230	45002 1	61744 1	10000 0	04400 1	02200 1	02237 0	02263 1	05546 0
30,2240	C: 00141 0	47713 1	71751 1	55744 0	45017 0	61744 1	00006 1	62263 1
30,2250	31747 1	00006 1	12233 0	35013 0	65033 1	71744 0	40000 0	65033 1
30,2260	00006 1	12273 1	02233 1	06006 1	I: 67214 1	C: 03347 1	C: 03667 0	C: 02745 0
30,2270	I: 52030 0	C: 60137 1	C: 60117 0	05372 1	C: 00004 0	C: 05022 1	C: 13000 0	35022 1
30,2300	54301 1	05546 0	C: 00025 0	05560 1	C: 00024 1	06006 1	I: 77624 1	C: 30215 1
30,2310	I: 77650 1	C: 60100 0	I: 66220 1	C: 03703 0	C: 00051 0	C: 00006 1	I: 66331 0	C: 02747 1
30,2320	C: 00001 0	C: 02751 0	C: 03537 0	I: 76144 1	C: 01330 0	C: 00044 1	I: 77773 1	C: 77776 1
30,2330	C: 07604 1	I: 60114 0	C: 77771 0	C: 60326 0	I: 77414 0	C: 01464 0	04662 1	C: 16063 0
30,2340	05372 1	C: 00004 0	C: 05022 1	C: 13000 0	06006 1	I: 43170 0	C: 00000 1	C: 04343 1
30,2350	C: 60353 1	I: 77710 1	C: 77775 1	I: 40330 0	C: 03673 0	C: 00001 0	I: 77624 1	C: 27442 0
30,2360	I: 77624 1	C: 62355 0	I: 43014 0	C: 01751 0	C: 60367 0	C: 01635 0	C: 60414 0	I: 77614 1
30,2370	C: 01676 1	I: 66370 0	C: 00154 1	C: 00051 0	C: 00006 1	I: 77214 0	C: 02676 1	C: 15335 0

OCTAL LISTING FOR PARAGRAPH # 161. WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD. "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

30,2400	C: 06555 1	I: 67300 0	C: 60400 0	C: 02005 0	C: 02401 0	C: 02411 1	C: 02421 1	I: 77735 0
30,2410	C: 02006 0	C: 02511 0	C: 02521 0	C: 02531 1	I: 77614 1	C: 02666 0	I: 77624 1	C: 62351 1
30,2420	C: 34041 0	C: 27162 1	I: 77624 1	C: 61332 1	I: 66150 0	C: 02750 1	C: 01242 1	I: 77624 1
30,2430	C: 47104 1	C: 01235 1	I: 41535 1	C: 02747 1	I: 50535 1	C: 02746 0	I: 50442 0	I: 77625 0
30,2440	I: 43030 0	C: 60755 0	C: 02706 1	C: 60763 0	I: 77624 1	C: 56750 0	I: 77614 1	C: 01471 1
30,2450	I: 43014 0	C: 02466 1	C: 01062 1	I: 43014 0	C: 00462 1	C: 03307 0	C: 61123 0	I: 53575 0
30,2460	C: 01207 0	C: 02152 0	I: 43014 0	C: 01663 0	C: 04343 1	C: 60470 1	I: 77614 1	C: 01463 1
30,2470	I: 77624 1	C: 26601 1	I: 77624 1	C: 61277 1	I: 70414 1	C: 04343 1	C: 60477 0	C: 02635 0
30,2500	I: 72441 0	C: 01235 1	C: 24037 0	C: 15335 0	I: 41401 1	C: 00001 0	I: 65206 0	C: 15333 0
30,2510	I: 77702 1	C: 00005 1	C: 00011 1	C: 24015 0	C: 01235 1	C: 24023 0	C: 02635 0	I: 77624 1
30,2520	C: 62332 1	I: 66370 0	C: 00022 1	C: 00051 0	C: 00006 1	I: 70573 1	C: 03524 1	I: 77741 0
30,2530	C: 00037 0	I: 45445 0	C: 70253 1	I: 76100 1	C: 60525 0	C: 00044 1	I: 64373 1	C: 02445 0
30,2540	C: 03502 0	I: 77732 1	C: 06621 1	I: 71300 1	C: 60536 1	C: 00041 1	I: 60414 0	C: 04343 1
30,2550	C: 60551 0	I: 57101 0	C: 00050 1	C: 00047 1	I: 41316 0	C: 21636 1	I: 77742 0	C: 00041 1
30,2560	I: 77770 1	C: 00022 1	I: 64373 1	C: 03524 1	C: 03502 0	I: 53761 1	C: 00041 1	C: 57212 1
30,2570	C: 05301 0	I: 77300 1	C: 60562 0	C: 01235 1	C: 34023 1	C: 62332 1	I: 50545 0	C: 02241 1
30,2600	I: 63471 0	C: 00037 0	I: 77605 1	C: 02010 1	C: 00041 1	I: 77770 1	C: 00022 1	I: 74373 0
30,2610	C: 03524 1	C: 00041 1	I: 77653 1	C: 01301 1	C: 05301 0	I: 77775 1	C: 15335 0	C: 06643 0
30,2620	I: 40100 1	C: 60607 0	C: 60623 0	I: 50145 1	C: 01277 1	C: 60644 1	I: 53166 0	C: 60644 1
30,2630	C: 16625 1	C: 01275 0	I: 40071 0	C: 02625 1	C: 60636 1	C: 02623 1	I: 56345 0	C: 01273 0
30,2640	C: 02625 1	I: 77600 1	C: 60644 1	C: 02621 0	I: 63545 0	C: 02623 1	I: 50021 1	C: 01267 0
30,2650	C: 60664 0	I: 53166 0	C: 60664 0	C: 16631 1	C: 02621 0	I: 44205 0	C: 02623 1	C: 01265 1
30,2660	I: 40071 0	C: 02631 1	C: 60664 0	C: 02627 0	I: 63545 0	C: 02627 0	I: 63525 0	C: 02621 0
30,2670	I: 77615 0	I: 50021 1	C: 01257 0	C: 60676 0	I: 77766 0	C: 02635 0	I: 74575 0	C: 02621 0
30,2700	C: 26621 0	C: 02627 0	I: 77762 1	C: 26627 0	C: 02635 0	I: 77762 1	C: 02635 0	I: 77624 1
30,2710	C: 62351 1	C: 03672 1	I: 77776 1	05412 0	C: 04022 0	41746 1	61747 1	00006 1
30,2720	63161 1	31746 0	65017 1	55300 1	31750 1	65023 0	55301 0	05412 0
30,2730	C: 04022 0	31300 0	55746 1	31301 1	55750 0	06006 1	I: 77624 1	C: 27442 0
30,2740	I: 77624 1	C: 62355 0	I: 43014 0	C: 02706 1	C: 60416 1	C: 01676 1	I: 43014 0	C: 01751 0
30,2750	C: 60416 1	C: 01476 0	I: 77614 1	C: 01635 0	C: 60416 1	I: 77624 1	C: 62351 1	C: 27670 0
30,2760	C: 01235 1	C: 35215 1	C: 60712 0	I: 77775 1	C: 01701 0	C: 14001 0	C: 03672 1	C: 00007 0
30,2770	I: 45135 1	C: 03674 1	C: 55371 1	I: 45006 0	C: 62351 1	C: 00007 0	I: 45135 1	C: 03674 1

OCTAL LISTING FOR PARAGRAPH # 162, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

30,3000	C: 55344 1	C: 01701 0	I: 40014 0	C: 02464 0	C: 61005 0	I: 77651 0	C: 01207 0	C: 03531 0
30,3010	I: 47256 0	C: 01235 1	I: 40056 0	C: 60707 1	C: 01245 0	I: 43014 0	C: 02466 1	C: 00467 1
30,3020	I: 43345 1	C: 21636 1	C: 21640 0	C: 27526 0	C: 03531 0	I: 60246 1	C: 00047 1	I: 41316 0
30,3030	C: 03526 0	I: 56070 0	C: 00046 0	C: 03673 0	I: 53670 0	C: 03673 0	C: 20601 1	I: 77751 1
30,3040	C: 00155 0	C: 37526 1	C: 47043 0	I: 57575 1	C: 03502 0	C: 37516 1	C: 75254 0	I: 77624 1
30,3050	C: 56750 0	I: 43014 0	C: 01342 0	C: 61104 0	C: 01262 0	I: 77624 1	C: 56750 0	I: 51575 1
30,3060	C: 01257 0	I: 53750 0	C: 03673 0	C: 20601 1	C: 27502 0	C: 01265 1	I: 53646 0	C: 20601 1
30,3070	C: 03504 0	I: 77776 1	33643 0	04662 1	C: 21057 0	04106 1	03103 0	03267 1
30,3100	35015 0	05526 0	05217 0	06006 1	I: 77624 1	C: 75466 1	I: 77624 1	C: 61332 1
30,3110	I: 45014 0	C: 02744 1	C: 60707 1	C: 56750 0	I: 77214 0	C: 02664 1	C: 01701 0	I: 77651 0
30,3120	C: 01207 0	C: 37531 1	C: 61015 1	I: 66370 0	C: 00066 1	C: 00051 0	C: 00006 1	I: 77775 1
30,3130	C: 15335 0	C: 06643 0	I: 67300 0	C: 61131 0	C: 02007 1	C: 02621 0	C: 02631 1	C: 02641 0
30,3140	I: 43014 0	C: 01663 0	C: 04343 1	C: 61146 0	I: 77614 1	C: 01463 1	I: 77624 1	C: 62351 1
30,3150	I: 77624 1	C: 26441 1	I: 43175 0	C: 02152 0	C: 04343 1	C: 61157 0	I: 77752 1	I: 77650 1
30,3160	C: 61001 1	06006 1	I: 46135 1	C: 02746 0	C: 61220 0	I: 77661 0	C: 20612 0	C: 02152 0
30,3170	I: 45335 0	C: 02750 1	C: 02152 0	I: 45040 1	C: 61220 0	C: 56750 0	I: 77745 1	C: 03670 0
30,3200	C: 34041 0	C: 27071 1	I: 77775 1	C: 00017 1	C: 25207 0	C: 01215 0	C: 25235 1	C: 01701 0
30,3210	I: 43046 1	C: 04343 1	C: 61214 1	I: 77702 1	C: 36241 0	C: 61277 1	I: 77650 1	C: 61223 0
30,3220	I: 77624 1	C: 62351 1	C: 03670 0	I: 77214 0	C: 01663 0	C: 01701 0	I: 43014 0	C: 04343 1
30,3230	C: 61233 1	C: 01463 1	I: 77742 0	C: 16152 0	C: 03670 0	I: 77624 1	C: 26370 1	I: 77624 1
30,3240	C: 62365 0	I: 77776 1	33644 1	04662 1	C: 20720 0	03272 0	03250 0	03263 0
30,3250	06006 1	I: 77745 1	C: 03670 0	C: 24007 0	C: 01701 0	C: 00001 0	I: 45135 1	C: 15333 0
30,3260	C: 55371 1	C: 02026 1	I: 77776 1	06006 1	I: 77624 1	C: 61342 0	I: 77776 1	06006 1
30,3270	I: 77650 1	C: 03703 0	06006 1	I: 77624 1	C: 61342 0	I: 77776 1	04106 1	I: 77201 1
30,3300	C: 00001 0	C: 01207 0	I: 50256 0	C: 01235 1	I: 57552 1	I: 77606 1	I: 44316 0	C: 21642 1
30,3310	I: 43125 0	C: 02241 1	C: 04343 1	C: 61315 1	I: 77712 0	I: 56362 0	C: 00045 0	I: 45316 1
30,3320	I: 44366 1	I: 77605 1	C: 00045 0	C: 00041 1	I: 77761 1	C: 01235 1	I: 53352 0	C: 01207 0
30,3330	C: 01701 0	I: 77616 0	I: 77350 1	C: 03673 0	C: 01573 1	I: 53257 1	C: 20610 1	C: 01607 1
30,3340	C: 01207 0	I: 77616 0	I: 40220 0	C: 01214 1	C: 00001 0	I: 41575 0	C: 15335 0	I: 41406 0
30,3350	I: 77731 1	C: 00017 1	C: 00072 1	I: 66150 0	C: 00016 0	C: 00012 1	I: 77624 1	C: 61574 0
30,3360	I: 77750 0	C: 00010 0	C: 06641 1	I: 66110 1	C: 00002 0	C: 00010 0	I: 46135 1	C: 00013 0
30,3370	C: 61405 1	I: 77625 0	C: 21634 0	C: 00013 0	I: 46025 1	C: 21632 0	C: 61401 0	I: 77650 1

OCTAL LISTING FOR PARAGRAPH # 163. WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

30,3400	C: 61356 0	I: 52131 0	C: 00013 0	C: 00004 0	C: 61356 0	I: 46135 1	C: 00017 1	C: 61424 1
30,3410	I: 77625 0	C: 21634 0	C: 00017 1	I: 46025 1	C: 21632 0	C: 61420 0	I: 77650 1	C: 61353 0
30,3420	I: 52131 0	C: 00017 1	C: 00004 0	C: 61353 0	I: 77624 1	C: 56750 0	I: 77331 0	C: 00017 1
30,3430	C: 00072 1	C: 15335 0	C: 00011 1	I: 66370 0	C: 00154 1	C: 00051 0	C: 00006 1	C: 06555 1
30,3440	I: 77700 0	C: 61437 0	I: 66150 0	C: 00016 0	C: 00012 1	I: 77624 1	C: 61574 0	I: 43750 1
30,3450	C: 00010 0	C: 02641 0	I: 66110 1	C: 00002 0	C: 00010 0	I: 54140 0	C: 00012 1	C: 00014 1
30,3460	I: 71244 0	C: 61465 1	C: 15335 0	I: 77650 1	C: 61466 1	I: 77766 0	C: 06401 1	C: 14001 0
30,3470	C: 00017 1	I: 77630 1	C: 61560 0	I: 46135 1	C: 00013 0	C: 61536 0	I: 77625 0	C: 21634 0
30,3500	C: 00013 0	I: 46025 1	C: 21632 0	C: 61506 0	I: 77650 1	C: 61511 0	I: 77731 1	C: 00013 0
30,3510	C: 00004 0	I: 77624 1	C: 61574 0	I: 43750 1	C: 00010 0	C: 02641 0	I: 62071 0	C: 00001 0
30,3520	C: 00002 0	I: 70130 1	C: 00010 0	C: 00012 1	I: 40060 0	C: 00014 1	C: 61531 1	I: 77650 1
30,3530	C: 61533 0	I: 77745 1	C: 15335 0	C: 06401 1	I: 77650 1	C: 61473 0	I: 62150 1	C: 00014 1
30,3540	C: 00006 1	I: 67330 0	C: 00014 1	C: 00017 1	I: 77625 0	C: 21634 0	C: 00017 1	I: 46025 1
30,3550	C: 21632 0	C: 61554 1	I: 77650 1	C: 61442 1	I: 52131 0	C: 00017 1	C: 00004 0	C: 61442 1
30,3560	I: 77624 1	C: 56750 0	I: 66370 0	C: 00066 1	C: 00051 0	C: 00006 1	I: 77775 1	C: 15335 0
30,3570	C: 06643 0	I: 52100 1	C: 61570 1	C: 01214 1	I: 40131 0	C: 00007 0	C: 00377 1	C: 61600 0
30,3600	I: 71140 1	C: 00012 1	C: 00016 0	I: 41545 0	C: 15335 0	I: 56743 1	C: 02401 0	C: 75376 1
30,3610	I: 41415 1	I: 62000 0	C: 61626 1	C: 77771 0	I: 67314 0	C: 77771 0	C: 00007 0	I: 70430 1
30,3620	C: 61624 0	C: 00007 0	I: 77650 1	C: 61605 0	I: 77745 1	I: 77616 0	I: 77614 1	C: 01631 1
30,3630	C: 61624 0	C: 00064 0	C: 00000 1	C: 00002 0	C: 00000 1	C: 10306 0	C: 36750 0	C: 00253 0
30,3640	C: 31436 1	C: 10000 0	C: 00000 1	C: 01461 0	C: 01531 1	C: 04000 0	C: 00000 1	C: 00707 1
30,3650	C: 03434 1	I: 45020 1	C: 03730 0	C: 27071 1	I: 66134 1	C: 03746 1	C: 03745 1	I: 77775 1
30,3660	C: 00001 0	C: 03632 0	C: 27570 0	C: 00007 0	C: 03640 0	C: 03576 0	I: 67201 0	C: 00001 0
30,3670	C: 15335 0	I: 43125 0	C: 21646 0	C: 03705 0	C: 61677 0	I: 77745 1	C: 21650 1	I: 45006 0
30,3700	C: 22000 1	I: 52001 1	C: 00001 0	C: 03730 0	I: 45175 0	C: 03632 0	C: 77353 1	I: 70372 0
30,3710	C: 21747 0	I: 52315 1	C: 03612 1	C: 03713 1	I: 52341 0	C: 21747 0	I: 72561 0	C: 03703 0
30,3720	C: 24015 0	C: 03721 0	I: 41456 0	I: 74241 0	C: 00015 0	C: 00001 0	I: 51352 1	C: 00015 0
30,3730	C: 14015 0	C: 03727 0	I: 56261 1	C: 21605 1	C: 03076 0	I: 63316 0	C: 00015 0	I: 77636 1
30,3740	I: 75421 1	I: 76561 1	I: 53455 0	C: 00015 0	C: 37713 0	C: 03657 0	C: 01440 0	C: 00000 1
30,3750	C: 03750 0	C: 03751 1	CKSM 40077 0	@	@	@	@	@
30,3760	@	@	@	@	@	@	@	@
30,3770	@	@	@	@	@	@	@	@

OCTAL LISTING FOR PARAGRAPH # 164. WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD. "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

31,2000	35057 0	05147 0	C: 02032 1	C: 62064 1	35041 1	04662 1	C: 01732 0	31044 0
31,2010	75004 1	00006 1	12004 0	30105 0	75014 0	00006 1	12021 1	32136 1
31,2020	02022 0	32137 0	04662 1	C: 20561 1	05625 0	05625 0	12013 0	06006 1
31,2030	I: 77650 1	C: 62171 1	06006 1	I: 77650 1	C: 62140 0	I: 52375 1	C: 00001 0	C: 02327 0
31,2040	I: 51406 1	C: 02321 0	I: 77301 0	C: 00047 1	I: 77762 1	I: 53457 1	C: 20201 0	I: 52315 1
31,2050	C: 00007 0	C: 02335 0	I: 77641 1	I: 77752 1	C: 36323 0	C: 47477 0	I: 77624 1	C: 62311 0
31,2060	I: 53575 0	C: 02327 0	I: 77715 1	C: 15333 0	I: 77214 0	C: 04713 0	C: 62070 1	C: 00015 0
31,2070	I: 77624 1	C: 47646 0	I: 41505 1	C: 01736 1	I: 72431 1	C: 00001 0	I: 53445 1	C: 00007 0
31,2100	I: 47315 0	C: 02327 0	C: 02335 0	I: 47256 0	C: 02327 0	I: 63241 0	C: 00015 0	I: 50372 1
31,2110	C: 00007 0	I: 72565 1	C: 00015 0	I: 77726 1	C: 26325 1	C: 02327 0	I: 51041 0	C: 00007 0
31,2120	C: 62125 0	I: 44345 0	C: 02325 1	C: 15343 1	C: 02325 1	I: 77776 1	35013 0	71044 1
31,2130	00006 1	15534 1	41044 1	75004 1	27044 1	12027 1	C: 04066 0	C: 04065 0
31,2140	I: 43034 1	C: 45510 1	C: 03751 1	C: 62146 0	I: 77624 1	C: 62273 0	C: 02343 1	C: 34041 0
31,2150	C: 27105 0	I: 77775 1	C: 00017 1	C: 26225 0	C: 00025 0	C: 02241 1	I: 71214 0	C: 03711 0
31,2160	C: 62035 0	C: 00015 0	C: 34041 0	C: 27071 1	I: 77775 1	C: 00017 1	C: 26255 1	C: 00025 0
31,2170	C: 02263 1	I: 47014 1	C: 03711 0	C: 62256 1	C: 45510 1	C: 34041 0	C: 27442 0	I: 43175 0
31,2200	C: 02255 1	C: 00263 0	C: 25535 0	C: 02263 1	C: 15543 1	C: 02343 1	I: 43014 0	C: 04343 1
31,2210	C: 62212 1	C: 00063 1	I: 77614 1	C: 01673 1	I: 43014 0	C: 04307 1	C: 62220 0	C: 01473 0
31,2220	C: 35517 1	C: 27135 0	I: 77775 1	C: 00001 0	C: 26327 0	C: 00007 0	C: 16335 0	C: 00015 0
31,2230	I: 45014 0	C: 04307 1	C: 62267 0	C: 27442 0	I: 77614 1	C: 01473 0	C: 00041 1	I: 43175 0
31,2240	C: 02225 0	C: 00263 0	C: 25535 0	C: 02241 1	C: 15543 1	C: 02343 1	I: 43014 0	C: 04343 1
31,2250	C: 62252 0	C: 00063 1	C: 35517 1	C: 27135 0	I: 77650 1	C: 62035 0	I: 77624 1	C: 62273 0
31,2260	I: 45014 0	C: 04307 1	C: 62267 0	C: 27442 0	I: 52014 0	C: 01673 1	C: 62236 1	C: 34041 0
31,2270	C: 27105 0	I: 77650 1	C: 62035 0	I: 77620 0	C: 00000 1	I: 52175 0	C: 01171 1	C: 62300 0
31,2300	C: 36327 1	C: 62302 1	I: 52175 0	C: 01177 1	C: 62305 0	C: 16335 0	C: 01205 1	I: 77650 1
31,2310	C: 00000 1	I: 77776 1	30036 1	50120 1	54011 0	30035 1	50120 1	54013 1
31,2320	30120 1	66211 0	40000 0	50120 1	54046 1	06006 1	I: 77624 1	C: 46000 0
31,2330	C: 34015 1	C: 62060 0	C: 00031 0	I: 77131 1	C: 00052 0	C: 00002 0	C: 00006 1	I: 77770 1
31,2340	C: 00022 1	I: 73775 0	C: 00031 0	C: 77746 1	C: 07524 0	I: 61110 0	C: 77771 0	C: 62341 0
31,2350	I: 77616 0	I: 70740 0	C: 02750 1	C: 00001 0	I: 77616 0	I: 43014 0	C: 01476 0	C: 01475 0
31,2360	I: 43014 0	C: 01474 1	C: 01472 1	I: 43414 1	C: 01673 1	I: 77745 1	C: 01110 0	C: 16362 1
31,2370	C: 01106 1	I: 77742 0	C: 02360 0	I: 77616 0	I: 77745 1	C: 02362 1	C: 15110 0	C: 02360 0

OCTAL LISTING FOR PARAGRAPH # 165, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

31,2400	I: 77752 1	C: 01106 1	I: 77616 0	05560 1	C: 00010 0	05372 1	C: 00004 0	C: 00012 1
31,2410	35065 1	55056 1	06006 1	I: 43131 0	C: 00302 0	C: 00001 0	C: 00666 1	I: 66214 0
31,2420	C: 00665 1	C: 00305 1	C: 00000 1	I: 43131 0	C: 00303 1	C: 00000 1	C: 03267 1	I: 77414 0
31,2430	C: 04664 1	06006 1	I: 45014 0	C: 01702 0	C: 62442 1	C: 76401 0	I: 77624 1	C: 31300 0
31,2440	I: 77650 1	C: 62641 0	I: 77414 0	C: 04665 0	33456 0	04662 1	C: 20720 0	04106 1
31,2450	02452 0	02444 1	31751 0	00006 1	12463 0	31752 0	00006 1	12461 1
31,2460	03134 1	31751 0	02466 1	31752 0	00006 1	13134 0	73473 0	65234 1
31,2470	00006 1	12501 0	65234 1	00006 1	12476 1	03134 1	05546 0	C: 00060 1
31,2500	12503 1	05560 1	C: 00060 1	30735 0	00006 1	12532 0	00006 1	63134 1
31,2510	63472 0	00006 1	62514 0	03134 1	06006 1	I: 53135 0	C: 00736 0	C: 62531 1
31,2520	I: 77606 1	I: 41335 1	C: 23463 1	I: 66150 0	C: 00155 0	C: 00302 0	I: 77624 1	C: 30000 1
31,2530	C: 02617 0	I: 77776 1	31752 0	00006 1	12553 1	73474 1	66171 0	00006 1
31,2540	12550 1	66171 0	00006 1	12545 0	03134 1	05546 0	C: 00004 0	02557 1
31,2550	05560 1	C: 00004 0	02557 1	06006 1	I: 77624 1	C: 60143 1	I: 77776 1	06006 1
31,2560	I: 53135 0	C: 00736 0	C: 34000 0	I: 77414 0	C: 04705 1	C: 62700 1	33461 1	04662 1
31,2570	C: 21045 0	04106 1	02576 1	06006 1	I: 77650 1	C: 62627 0	06006 1	I: 77634 0
31,2600	C: 45510 1	C: 35225 1	C: 62705 1	I: 53521 1	C: 01736 1	C: 27357 0	C: 23464 0	C: 03351 0
31,2610	I: 77776 1	05560 1	C: 00124 0	33471 0	54374 0	05412 0	C: 00012 1	04662 1
31,2620	C: 56000 1	05412 0	C: 04022 0	06006 1	I: 77614 1	C: 03307 0	C: 62631 1	I: 77624 1
31,2630	C: 76401 0	I: 43014 0	C: 04464 0	C: 03067 0	I: 77624 1	C: 30011 1	I: 43014 0	C: 04664 1
31,2640	C: 03267 1	I: 77776 1	00004 0	31330 0	75054 1	55242 0	00006 1	51242 1
31,2650	30001 0	53225 1	51242 1	30005 1	57754 0	00003 1	06006 1	I: 76740 0
31,2660	C: 01242 1	C: 00002 0	C: 23676 1	C: 00001 0	C: 03675 0	I: 77776 1	33457 1	04662 1
31,2670	C: 20720 0	04106 1	02674 0	02666 0	06006 1	I: 77414 0	C: 04465 1	02452 0
31,2700	I: 45014 0	C: 02676 1	C: 62705 1	I: 77650 1	C: 62771 1	I: 77620 0	C: 01150 1	I: 71214 0
31,2710	C: 01711 1	C: 62715 0	C: 03001 0	C: 34001 1	C: 56565 1	I: 77624 1	C: 56343 0	I: 43014 0
31,2720	C: 01751 0	C: 62723 0	C: 01476 0	I: 45014 0	C: 01471 1	C: 27162 1	I: 77776 1	05412 0
31,2730	C: 04022 0	06006 1	I: 77624 1	C: 63376 0	I: 77614 1	C: 00345 0	C: 62750 1	I: 45145 0
31,2740	C: 01225 0	C: 54115 0	I: 57414 1	C: 04303 0	C: 62745 0	I: 77655 1	C: 03627 1	C: 03627 1
31,2750	I: 46135 1	C: 02752 0	C: 62762 0	I: 77614 1	C: 00462 1	I: 45145 0	C: 01225 0	C: 26441 1
31,2760	I: 77650 1	C: 62764 0	I: 77624 1	C: 63136 0	I: 40251 0	C: 03627 1	C: 00001 0	I: 77650 1
31,2770	C: 01150 1	I: 41456 0	I: 77775 1	C: 00043 0	C: 24037 0	C: 03635 1	I: 54361 1	C: 23437 0

OCTAL LISTING FOR PARAGRAPH # 166. WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

31,3000	C: 20620 1	I: 77655 1	I: 77656 1	C: 27643 0	C: 03635 1	I: 52342 0	C: 02141 1	I: 54361 1
31,3010	C: 23437 0	C: 20616 1	I: 53455 0	C: 02617 0	C: 03651 0	I: 72441 0	C: 03643 0	I: 77206 0
31,3020	C: 03643 0	I: 57561 1	I: 53372 1	C: 03651 0	I: 77656 1	C: 27502 0	C: 15335 0	C: 03510 0
31,3030	C: 17516 0	C: 00001 0	I: 57526 1	I: 71206 0	C: 15335 0	I: 77776 1	33450 0	54001 1
31,3040	31754 0	00006 1	20001 1	54154 0	06006 1	I: 67206 1	C: 01343 1	I: 77621 1
31,3050	I: 43242 1	I: 41215 1	C: 23445 0	C: 00041 1	I: 52405 1	C: 07103 1	I: 62414 1	C: 04343 1
31,3060	C: 63061 0	C: 17524 1	C: 00037 0	I: 47005 1	C: 23454 0	C: 45565 0	I: 77771 0	C: 23451 0
31,3070	C: 03526 0	I: 45014 0	C: 02666 0	C: 75254 0	I: 77624 1	C: 56750 0	I: 51575 1	C: 01265 1
31,3100	I: 60414 0	C: 04343 1	C: 63103 0	C: 27504 0	C: 01257 0	I: 77646 0	I: 60414 0	C: 04343 1
31,3110	C: 63111 0	C: 03502 0	I: 77776 1	33455 0	04662 1	C: 21057 0	04106 1	03126 1
31,3120	04106 1	35015 0	05526 0	05412 0	C: 00012 1	05217 0	06006 1	I: 45014 0
31,3130	C: 00467 1	C: 75466 1	I: 77776 1	04106 1	04400 1	02444 1	I: 40220 0	C: 03656 1
31,3140	C: 00001 0	I: 65345 0	C: 01714 1	C: 01716 0	I: 63325 0	C: 15343 1	C: 02617 0	I: 53435 0
31,3150	C: 03627 1	C: 27621 1	I: 53435 0	C: 03621 1	C: 27605 1	C: 03621 1	I: 53435 0	C: 03605 1
31,3160	C: 03613 0	I: 50214 0	C: 01703 1	C: 63361 0	C: 00001 0	C: 36156 0	C: 26505 0	I: 65215 1
31,3170	C: 01355 0	C: 23441 1	I: 41415 1	C: 01355 0	I: 64375 1	C: 03627 1	C: 03605 1	I: 63372 1
31,3200	C: 02617 0	I: 76521 0	C: 03605 1	I: 77725 1	C: 00003 1	C: 14043 0	C: 00005 1	I: 77624 1
31,3210	C: 63365 1	I: 41257 1	C: 20611 0	C: 00155 0	C: 14037 0	C: 00001 0	C: 14043 0	C: 00007 0
31,3220	I: 77624 1	C: 63365 1	I: 41257 1	C: 20611 0	C: 00155 0	I: 41415 1	C: 00037 0	I: 75425 0
31,3230	C: 23447 1	I: 77725 1	C: 00021 1	C: 14043 0	C: 00005 1	I: 77624 1	C: 63365 1	I: 65257 1
31,3240	C: 20622 0	C: 00007 0	I: 77624 1	C: 63365 1	I: 65257 1	C: 20622 0	C: 00021 1	C: 14043 0
31,3250	C: 00023 0	I: 77624 1	C: 63365 1	I: 77657 0	C: 20611 0	C: 14035 1	C: 00001 0	C: 14043 0
31,3260	C: 00003 1	I: 77624 1	C: 63365 1	I: 41257 1	C: 20601 1	C: 00035 1	I: 72405 0	C: 00007 0
31,3270	I: 77725 1	C: 00003 1	C: 14043 0	C: 00001 0	I: 77624 1	C: 63365 1	I: 41257 1	C: 20601 1
31,3300	C: 00035 1	I: 72405 0	C: 00005 1	I: 43325 1	C: 00025 0	C: 00031 0	I: 45325 1	C: 00027 1
31,3310	C: 00033 1	I: 40206 1	C: 00021 1	I: 45345 1	C: 00025 0	C: 00031 0	I: 43325 1	C: 00027 1
31,3320	C: 00033 1	I: 41525 0	C: 15335 0	C: 24041 1	C: 00035 1	I: 53451 1	C: 00005 1	I: 63241 0
31,3330	C: 00013 0	C: 00021 1	I: 53451 1	C: 00005 1	I: 41441 0	C: 00013 0	I: 50021 1	C: 00027 1
31,3340	C: 63347 1	I: 77614 1	C: 00304 0	C: 63353 1	I: 52175 0	C: 00035 1	C: 63355 1	I: 52014 0
31,3350	C: 00304 0	C: 63344 1	C: 63353 1	I: 77775 1	C: 00021 1	I: 76505 0	C: 03605 1	I: 77650 1
31,3360	C: 03656 1	I: 41545 0	C: 23443 0	I: 52006 0	C: 63174 0	I: 70501 1	C: 00047 1	C: 14045 0
31,3370	C: 00043 0	I: 55301 0	C: 00051 0	C: 00045 0	I: 43460 1	C: 00050 1	I: 77014 1	C: 04343 1

OCTAL LISTING FOR PARAGRAPH # 167. WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD. "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

31,3400	C: 63410 1	C: 77775 1	I: 77614 1	C: 01743 0	C: 63414 0	I: 52014 0	C: 00265 0	C: 63416 1
31,3410	I: 43174 1	C: 00000 1	C: 01743 0	C: 63405 0	I: 77614 1	C: 00065 1	I: 44575 0	C: 01573 1
31,3420	I: 53257 1	C: 57176 0	C: 01607 1	I: 77657 0	C: 57176 0	C: 27627 1	C: 01601 1	I: 53702 1
31,3430	C: 57176 0	I: 53655 1	C: 01615 1	C: 57176 0	C: 03635 1	I: 77616 0	C: 26305 0	C: 05432 1
31,3440	C: 00302 0	C: 24533 1	C: 00065 1	C: 01265 1	C: 01604 1	C: 00000 1	C: 00000 1	C: 02000 0
31,3450	C: 00000 1	C: 01505 0	C: 14100 0	C: 00012 1	C: 27462 1	C: 01461 0	C: 01306 0	C: 01307 1
31,3460	C: 00077 1	C: 00202 1	C: 00006 1	C: 10464 0	C: 12467 1	C: 00000 1	C: 00000 1	C: 15373 1
31,3470	C: 11346 0	C: 62622 0	C: 77732 1	C: 00700 0	C: 00070 0	I: 71220 1	C: 03657 0	C: 03413 1
31,3500	C: 34041 0	C: 27071 1	I: 67175 0	C: 00007 0	C: 03746 1	C: 27640 0	C: 00001 0	C: 03632 0
31,3510	C: 03540 0	I: 53435 0	C: 03640 0	C: 36617 1	C: 72666 1	I: 61375 1	C: 03405 0	C: 00001 0
31,3520	I: 66172 0	C: 03745 1	C: 03646 0	I: 77646 0	C: 27773 1	C: 03632 0	I: 53315 0	C: 03646 0
31,3530	C: 03640 0	I: 77624 1	C: 45153 1	I: 77624 1	C: 45263 1	I: 77624 1	C: 46754 0	C: 16366 0
31,3540	C: 00005 1	I: 77624 1	C: 45263 1	I: 77624 1	C: 46754 0	C: 36364 0	C: 03657 0	I: 71220 1
31,3550	C: 03657 0	C: 03413 1	C: 34041 0	C: 61651 1	I: 63375 0	C: 03632 0	C: 03612 1	I: 77624 1
31,3560	C: 45153 1	I: 77624 1	C: 45263 1	I: 77624 1	C: 46754 0	C: 16366 0	C: 00005 1	I: 77624 1
31,3570	C: 45263 1	I: 77624 1	C: 46754 0	C: 26364 1	C: 03646 0	C: 00001 0	I: 45014 0	C: 01072 0
31,3600	C: 10647 0	I: 77646 0	C: 17773 1	C: 03423 1	I: 77615 0	C: 03413 1	C: 37656 0	C: 03657 0
31,3610	I: 50023 0	C: 33444 0	C: 63642 1	I: 71374 1	C: 00003 1	C: 03472 0	I: 50023 0	C: 33444 0
31,3620	C: 63642 1	I: 45345 1	C: 02635 0	C: 02637 1	C: 02547 0	I: 45374 0	C: 00004 0	C: 36146 1
31,3630	I: 77040 0	C: 63642 1	C: 00005 1	I: 45345 1	C: 03663 1	C: 02635 0	C: 03656 1	I: 51025 1
31,3640	C: 36146 1	C: 11400 0	I: 43014 0	C: 05702 1	C: 11316 0	C: 05743 1	C: 11316 0	I: 71334 0
31,3650	C: 03664 0	C: 15335 0	I: 43014 0	C: 05660 1	C: 05461 1	I: 43014 0	C: 05662 0	C: 05663 1
31,3660	C: 37764 0	C: 15716 0	I: 65325 0	C: 02637 1	C: 02635 0	I: 41525 0	C: 33107 1	I: 77650 1
31,3670	C: 72705 0	I: 65325 0	C: 02635 0	C: 03663 1	I: 41525 0	C: 15335 0	I: 77650 1	C: 72705 0
31,3700	I: 45020 1	C: 03733 0	C: 27442 0	I: 43175 0	C: 03640 0	C: 01473 0	I: 77650 1	C: 63734 1
31,3710	I: 45020 1	C: 03733 0	C: 27442 0	I: 77214 0	C: 01673 1	C: 03656 1	C: 25535 0	C: 03710 1
31,3720	C: 15543 1	C: 03736 0	C: 01517 0	I: 77615 0	I: 77650 1	C: 63742 0	I: 45020 1	C: 03733 0
31,3730	C: 27442 0	I: 43175 0	C: 03640 0	C: 01673 1	C: 25535 0	C: 03700 0	C: 15543 1	C: 03716 1
31,3740	C: 15517 0	C: 03736 0	C: 00041 1	I: 45014 0	C: 00263 0	C: 27135 0	I: 77775 1	C: 00001 0
31,3750	C: 03656 1	I: 70125 0	C: 00015 0	C: 03734 1	C: 27736 0	C: 00007 0	C: 03710 1	I: 77650 1
31,3760	C: 03733 0	C: 03761 1	C: 03762 1	CKSM 66412 0	@	@	@	@
31,3770	@	@	@	@	@	@	@	@

OCTAL LISTING FOR PARAGRAPH # 170, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

32,2000	I: 65345 0	C: 27111 0	C: 02403 1	I: 57546 1	I: 73525 1	C: 02403 1	I: 74266 0	C: 26450 1
32,2010	C: 02405 1	I: 77634 0	C: 45510 1	C: 26443 0	C: 27111 0	C: 02650 0	I: 77616 0	C: 00011 1
32,2020	I: 45244 1	C: 64067 1	C: 16326 1	I: 45000 0	C: 64067 1	C: 55051 0	I: 45006 0	C: 56631 0
32,2030	I: 77624 1	C: 64075 1	I: 65525 0	C: 00017 1	I: 77615 0	C: 00005 1	C: 26350 0	C: 03401 1
32,2040	C: 15104 0	C: 15335 0	C: 15110 0	C: 01205 1	I: 71214 0	C: 03711 0	C: 64050 0	C: 02325 1
32,2050	I: 43225 0	C: 00011 1	I: 45014 0	C: 00662 0	C: 26441 1	I: 63256 0	C: 02327 0	I: 50256 0
32,2060	I: 65552 0	I: 77621 1	C: 02350 0	C: 36356 1	C: 27455 0	I: 77624 1	C: 46653 0	I: 65345 0
32,2070	C: 15333 0	C: 15335 0	I: 77606 1	C: 34011 0	C: 64036 0	I: 77775 1	C: 24256 0	C: 14045 0
32,2100	C: 00001 0	I: 50025 0	C: 24250 0	C: 64130 1	I: 65060 1	C: 00050 1	C: 00046 0	I: 45324 0
32,2110	C: 00050 1	C: 24236 0	I: 65040 0	C: 64130 1	C: 00050 1	I: 50025 0	C: 24246 1	C: 64130 1
32,2120	I: 65124 0	C: 00050 1	C: 00046 0	I: 50025 0	C: 24232 1	C: 64130 1	I: 77730 0	C: 00050 1
32,2130	I: 52110 0	C: 00001 0	C: 64135 1	I: 77730 0	C: 00050 1	I: 44745 1	C: 00001 0	C: 24245 1
32,2140	I: 42603 1	C: 24231 1	C: 24215 1	I: 60125 1	C: 00003 1	C: 64133 1	I: 55225 1	I: 40006 0
32,2150	C: 64173 0	I: 45240 0	C: 64173 0	C: 24200 0	I: 77644 1	C: 64173 0	I: 45345 1	C: 00001 0
32,2160	C: 24256 0	I: 71244 0	C: 64170 0	C: 24252 1	I: 77671 1	C: 00001 0	I: 43405 1	C: 00005 1
32,2170	I: 52145 0	C: 24254 1	C: 64166 1	I: 65345 0	C: 24200 0	I: 77650 1	C: 64156 1	C: 02755 1
32,2200	C: 01307 1	C: 00013 0	C: 22652 0	C: 00005 1	C: 01642 0	C: 00005 1	C: 01642 0	C: 77556 1
32,2210	C: 53522 1	C: 00055 1	C: 20266 1	C: 00155 0	C: 07202 0	C: 00000 1	C: 00000 1	C: 77730 0
32,2220	C: 71525 0	C: 00000 1	C: 00000 1	C: 04445 0	C: 10102 0	C: 03726 1	C: 31201 0	C: 01040 1
32,2230	C: 26313 1	C: 00234 1	C: 01660 0	C: 25254 0	C: 01014 0	C: 02222 1	C: 15646 1	C: 22223 1
32,2240	C: 16457 0	C: 25254 0	C: 01014 0	C: 30304 0	C: 23351 1	C: 03030 1	C: 22335 1	C: 20000 0
32,2250	C: 00000 1	C: 00033 1	C: 05763 0	C: 00053 1	C: 36200 0	C: 23637 1	C: 27636 1	C: 00012 1
32,2260	C: 00010 0	C: 00006 1	I: 77420 1	C: 03762 1	30154 1	05764 1	32276 0	04662 1
32,2270	C: 20720 0	14106 0	12266 0	06006 1	I: 77650 1	C: 03762 1	C: 01211 1	I: 43020 1
32,2300	C: 03733 0	C: 03666 1	I: 67164 0	C: 20000 0	C: 02756 1	I: 45140 0	C: 03734 1	C: 25556 0
32,2310	C: 27710 1	I: 77626 0	C: 60121 0	C: 00037 0	C: 37724 1	C: 03733 0	I: 77220 1	C: 03762 1
32,2320	C: 03710 1	I: 65256 0	C: 00045 0	C: 17767 1	C: 03736 0	I: 77625 0	C: 03413 1	C: 26641 0
32,2330	C: 03656 1	I: 50256 0	I: 77752 1	I: 44326 0	C: 33502 0	C: 27771 0	C: 03700 0	I: 41451 1
32,2340	C: 03672 1	I: 57441 1	C: 03740 1	I: 41515 0	I: 63345 0	C: 33524 1	I: 55441 0	C: 03746 1
32,2350	I: 77772 0	C: 17405 0	C: 03405 0	I: 57414 1	C: 02741 1	C: 64357 1	C: 03405 0	I: 51575 1
32,2360	C: 03405 0	C: 27773 1	C: 03656 1	C: 02657 1	I: 45246 0	C: 33550 1	C: 26760 1	C: 03710 1
32,2370	C: 36746 1	C: 64277 1	I: 53575 0	C: 03656 1	I: 53515 0	C: 03710 1	I: 72441 0	I: 65336 1

OCTAL LISTING FOR PARAGRAPH # 171. WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD. "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

32,2400	C: 00045 0	I: 51525 1	I: 45006 0	C: 64075 1	I: 43215 0	C: 03724 0	C: 03736 0	C: 00003 1
32,2410	I: 53135 0	C: 03377 1	C: 64414 1	C: 00005 1	I: 73545 1	C: 00005 1	C: 17403 0	I: 77746 1
32,2420	C: 03401 1	I: 53575 0	C: 03656 1	I: 41406 0	I: 53515 0	C: 03710 1	I: 47315 0	I: 53435 0
32,2430	I: 63361 0	C: 03403 0	I: 53361 0	C: 03401 1	I: 43014 0	C: 00662 0	C: 01663 0	C: 16152 0
32,2440	I: 77624 1	C: 26370 1	I: 77745 1	C: 01104 0	C: 17401 1	C: 01106 1	C: 37403 1	C: 03762 1
32,2450	I: 71220 1	C: 03762 1	C: 03413 1	C: 34041 0	C: 27071 1	I: 67175 0	C: 00001 0	C: 03755 0
32,2460	C: 27640 0	C: 00007 0	C: 17672 1	C: 00015 0	C: 03716 1	I: 53135 0	C: 03756 0	C: 64473 0
32,2470	I: 52135 1	C: 33563 1	C: 74776 1	I: 53575 0	C: 03640 0	C: 17740 1	C: 00045 0	C: 27646 0
32,2500	C: 03672 1	I: 77656 1	C: 03746 1	I: 72441 0	C: 03740 1	C: 03757 1	I: 45246 0	C: 33576 0
32,2510	I: 71240 1	C: 64520 1	C: 33502 0	I: 41525 0	C: 33524 1	I: 41466 0	I: 77650 1	C: 64524 0
32,2520	I: 47375 0	C: 03740 1	C: 03746 1	I: 77606 1	I: 71214 0	C: 02661 1	I: 51006 0	C: 64533 0
32,2530	I: 57575 1	I: 43006 0	C: 02461 0	I: 77775 1	I: 53435 0	C: 03740 1	C: 03746 1	I: 77650 1
32,2540	C: 03762 1	I: 71220 1	C: 03762 1	C: 33532 0	C: 17730 0	C: 03636 1	C: 03664 0	I: 77745 1
32,2550	C: 33542 1	C: 17650 1	C: 33530 1	C: 37732 0	C: 63726 1	I: 77624 1	C: 11637 0	I: 77745 1
32,2560	C: 02742 1	C: 14033 1	C: 02744 1	C: 14035 1	C: 00041 1	C: 14031 0	C: 03775 1	I: 77661 0
32,2570	C: 20206 1	C: 03724 0	I: 43276 0	C: 03726 1	I: 45246 0	C: 33604 0	I: 50000 1	C: 64601 1
32,2600	C: 64770 0	I: 50145 1	C: 03732 1	C: 64607 1	I: 52135 1	C: 33562 0	C: 65073 0	I: 53145 1
32,2610	C: 03730 0	C: 64647 0	I: 62545 1	C: 00033 1	I: 72405 0	C: 03754 1	I: 71206 0	C: 00035 1
32,2620	I: 41212 0	C: 00001 0	I: 50021 1	C: 33506 1	C: 64637 1	I: 75512 0	I: 44205 0	C: 03761 1
32,2630	C: 33504 0	I: 65301 0	C: 00047 1	I: 56342 1	I: 52057 1	C: 20200 1	C: 64655 0	I: 60345 0
32,2640	C: 00035 1	C: 00047 1	I: 53665 1	C: 33500 1	C: 20173 0	I: 77650 1	C: 64655 0	I: 60345 0
32,2650	C: 00031 0	C: 00047 1	I: 53665 1	C: 03664 0	C: 20200 1	I: 41401 1	C: 00001 0	I: 57425 0
32,2660	C: 33500 1	C: 03765 0	I: 71240 1	C: 64674 0	C: 03724 0	I: 71240 1	C: 64672 0	C: 03765 0
32,2670	I: 77676 0	C: 03765 0	I: 77745 1	C: 03765 0	I: 45246 0	C: 33610 0	I: 71240 1	C: 64770 0
32,2700	I: 72405 0	C: 00031 0	I: 77606 1	I: 43345 1	C: 03732 1	C: 33522 1	C: 03732 1	I: 43175 0
32,2710	C: 03656 1	C: 03466 0	C: 26657 1	C: 03710 1	I: 77765 0	C: 03765 0	C: 16746 0	C: 33500 1
32,2720	I: 57565 0	C: 03765 0	I: 71354 0	C: 00154 1	I: 67140 0	C: 03734 1	C: 02756 1	C: 36760 0
32,2730	C: 25556 0	I: 75345 1	C: 00037 0	C: 03765 0	I: 60325 0	C: 03650 1	C: 00047 1	I: 53665 1
32,2740	C: 00001 0	C: 20176 0	I: 50006 1	C: 64750 1	I: 65345 0	C: 33542 1	I: 77650 1	C: 64752 0
32,2750	I: 65345 0	C: 33534 0	I: 45271 1	C: 00003 1	C: 33504 0	I: 71240 1	C: 64762 0	I: 77605 1
32,2760	C: 03650 1	C: 00001 0	I: 41545 0	C: 00001 0	C: 37650 0	C: 63710 1	I: 77650 1	C: 64555 0
32,2770	I: 45345 1	C: 00031 0	C: 03664 0	I: 51406 1	I: 50025 0	C: 33612 1	C: 34703 1	I: 53145 1

OCTAL LISTING FOR PARAGRAPH # 172, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

32,3000	C: 03730 0	C: 64604 1	I: 53025 0	C: 33532 0	C: 65037 0	I: 45345 1	C: 03670 0	C: 00031 0
32,3010	I: 55301 0	C: 00050 1	C: 03666 1	I: 41457 1	C: 57600 0	I: 40015 1	C: 33500 1	C: 65024 1
32,3020	I: 45246 0	C: 33500 1	I: 77640 0	C: 65027 1	I: 57545 1	C: 33542 1	I: 77725 1	I: 41345 0
32,3030	I: 77712 0	C: 03666 1	I: 77615 0	C: 03636 1	C: 03636 1	I: 77650 1	C: 65056 1	I: 63545 0
32,3040	C: 03664 0	I: 70501 1	C: 00047 1	I: 60325 0	C: 00031 0	C: 00050 1	I: 55260 0	C: 00047 1
32,3050	I: 77657 0	C: 20600 0	C: 03636 1	I: 77625 0	C: 03664 0	C: 03666 1	I: 77745 1	C: 00031 0
32,3060	C: 17670 0	C: 03730 0	I: 77625 0	C: 33522 1	C: 37730 1	C: 65075 0	I: 52030 0	C: 64547 0
32,3070	C: 65073 0	I: 77745 1	C: 33524 1	I: 77650 1	C: 03762 1	I: 71220 1	C: 00041 1	C: 03636 1
32,3100	I: 45240 0	C: 65105 0	C: 03646 0	I: 77640 0	C: 65110 1	I: 77776 1	05721 0	C: 00610 0
32,3110	I: 43001 1	C: 00001 0	C: 00272 0	I: 60345 0	C: 03636 1	C: 00047 1	I: 60325 0	C: 03646 0
32,3120	C: 00051 0	C: 00013 0	I: 56342 1	I: 65260 0	C: 00050 1	C: 03726 1	I: 77716 1	I: 43342 0
32,3130	C: 33500 1	C: 03754 1	I: 77605 1	C: 00001 0	C: 00035 1	I: 53605 1	C: 00001 0	C: 20172 1
32,3140	I: 45257 0	C: 20172 1	C: 33516 0	I: 65234 1	C: 45565 0	C: 33500 1	I: 57457 0	C: 20601 1
32,3150	I: 41215 1	C: 00001 0	C: 03646 0	I: 47057 0	C: 20172 1	C: 45565 0	I: 77725 1	C: 33632 0
32,3160	I: 70501 1	C: 00050 1	I: 56264 1	C: 00050 1	C: 00013 0	I: 65257 1	C: 57170 0	C: 03652 0
32,3170	I: 41406 0	I: 77624 1	C: 65734 1	I: 41476 1	I: 40476 0	I: 41525 0	C: 03654 0	I: 45006 0
32,3200	C: 65734 1	I: 50125 1	C: 03730 0	C: 65206 0	I: 77650 1	C: 65220 1	I: 77745 1	C: 03632 0
32,3210	I: 52054 1	C: 65213 1	C: 65314 1	I: 50145 1	C: 03757 1	C: 65314 1	I: 77650 1	C: 65322 1
32,3220	I: 47145 1	C: 33516 0	C: 45565 0	I: 65276 1	C: 33542 1	I: 45257 0	C: 20601 1	C: 00001 0
32,3230	I: 53605 1	C: 00035 1	C: 20172 1	I: 76257 0	C: 20172 1	I: 65234 1	C: 45565 0	C: 03722 0
32,3240	C: 00001 0	I: 77751 1	I: 53040 0	C: 65250 0	C: 65250 0	I: 52061 1	C: 20210 0	C: 65261 1
32,3250	I: 50145 1	C: 03761 1	C: 65272 0	I: 77676 0	C: 17761 1	C: 33532 0	C: 03730 0	I: 77650 1
32,3260	C: 65272 0	I: 47166 0	C: 45716 0	I: 50125 1	C: 03761 1	C: 65300 1	I: 45545 1	C: 77760 0
32,3270	I: 77676 0	C: 00013 0	I: 53145 1	C: 03722 0	C: 65314 1	I: 52040 1	C: 65314 1	C: 65322 1
32,3300	I: 53145 1	C: 03722 0	C: 65311 1	I: 71240 1	C: 65311 1	I: 77626 0	C: 77764 1	I: 77650 1
32,3310	C: 65322 1	I: 57545 1	I: 77626 0	C: 77760 0	I: 77745 1	C: 00013 0	C: 17722 0	C: 00015 0
32,3320	I: 52006 0	C: 65327 1	I: 77745 1	C: 00017 1	C: 17722 0	C: 00015 0	I: 41476 1	I: 77624 1
32,3330	C: 65457 1	I: 53145 1	C: 03632 0	C: 65455 0	I: 50025 0	C: 03706 0	C: 65341 1	I: 77650 1
32,3340	C: 65374 1	I: 50145 1	C: 03730 0	C: 65346 0	I: 77650 1	C: 65416 1	I: 53145 1	C: 03722 0
32,3350	C: 65354 0	I: 52040 1	C: 65354 0	C: 65453 0	I: 53145 1	C: 03757 1	C: 65453 0	I: 71240 1
32,3360	C: 65453 0	C: 00017 1	C: 17722 0	C: 00015 0	I: 77676 0	C: 34021 0	C: 65457 1	I: 45345 1
32,3370	C: 03632 0	C: 03706 0	I: 77640 0	C: 65453 0	I: 71214 0	C: 00072 1	C: 03722 0	I: 77614 1

OCTAL LISTING FOR PARAGRAPH # 173, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

32,3400	C: 02742 1	C: 65406 0	C: 14013 0	C: 00015 0	I: 77650 1	C: 65411 0	C: 14017 1	C: 00015 0
32,3410	I: 77676 0	C: 34021 0	C: 65457 1	I: 50145 1	C: 03730 0	C: 65453 0	I: 45345 1	C: 03722 0
32,3420	C: 00001 0	I: 65246 1	C: 00015 0	I: 44352 0	I: 71240 1	C: 65453 0	C: 00001 0	C: 03722 0
32,3430	I: 50025 0	C: 00017 1	C: 65440 1	I: 77745 1	C: 00017 1	C: 03722 0	I: 77650 1	C: 65451 1
32,3440	I: 45345 1	C: 03722 0	C: 00013 0	I: 52040 1	C: 65446 1	C: 65451 1	I: 77745 1	C: 00013 0
32,3450	C: 03722 0	I: 77624 1	C: 65660 1	I: 77745 1	C: 33524 1	I: 77650 1	C: 00041 1	I: 77620 0
32,3460	C: 00037 0	I: 45001 1	C: 00023 0	C: 65660 1	I: 45345 1	C: 00017 1	C: 00013 0	I: 77600 1
32,3470	C: 65510 0	I: 45206 1	C: 33614 1	I: 71240 1	C: 65656 1	C: 00023 0	I: 50025 0	C: 00015 0
32,3500	C: 65504 0	I: 52001 1	C: 00023 0	C: 65510 0	I: 77745 1	I: 70565 0	C: 00021 1	C: 00021 1
32,3510	I: 77745 1	C: 33526 0	C: 03732 1	I: 43345 1	C: 03732 1	C: 33522 1	I: 67240 0	C: 65523 0
32,3520	C: 33562 0	I: 77650 1	C: 65455 0	C: 03732 1	I: 65345 0	C: 03722 0	C: 03706 0	I: 43325 1
32,3530	C: 03722 0	C: 00021 1	C: 37722 1	C: 65660 1	I: 71214 0	C: 00312 1	C: 65552 0	C: 03706 0
32,3540	I: 50025 0	C: 00025 0	C: 65547 1	I: 57545 1	C: 00021 1	I: 77742 0	C: 00021 1	I: 52001 1
32,3550	C: 00023 0	C: 65615 0	I: 45345 1	C: 03632 0	C: 03706 0	I: 41525 0	I: 51545 1	C: 00025 0
32,3560	I: 50025 0	C: 33616 0	C: 65656 1	I: 71204 1	C: 57352 1	I: 60221 0	C: 03706 0	C: 00050 1
32,3570	I: 77725 1	I: 70501 1	C: 00047 1	I: 65271 0	I: 41221 0	C: 03722 0	I: 77660 1	C: 00047 1
32,3600	C: 00021 1	I: 40057 1	C: 20600 0	C: 65611 1	C: 00021 1	I: 45246 0	C: 00015 0	I: 77640 0
32,3610	C: 65615 0	I: 75345 1	C: 00015 0	C: 00021 1	C: 00021 1	I: 41345 0	C: 00021 1	C: 33536 1
32,3620	I: 43352 1	C: 03722 0	C: 00031 0	I: 50025 0	C: 00017 1	C: 65634 0	I: 45345 1	C: 00017 1
32,3630	C: 03722 0	I: 77742 0	C: 34021 0	C: 65647 1	I: 45345 1	C: 00031 0	C: 00013 0	I: 52040 1
32,3640	C: 65642 1	C: 65647 1	I: 45345 1	C: 00013 0	C: 03722 0	I: 77742 0	C: 00021 1	I: 51545 1
32,3650	C: 00021 1	I: 50025 0	C: 33614 1	C: 65656 1	I: 77650 1	C: 65513 0	I: 77650 1	C: 00037 0
32,3660	I: 71220 1	C: 00040 0	C: 03722 0	I: 54316 1	C: 20610 1	I: 76276 0	C: 00003 1	I: 41501 0
32,3670	C: 00047 1	I: 60351 0	C: 00006 1	C: 00050 1	I: 70434 0	C: 45716 0	I: 56264 1	C: 00046 0
32,3700	I: 77657 0	C: 57170 0	C: 03720 1	I: 41366 1	C: 00011 1	I: 77701 1	C: 00047 1	C: 14035 1
32,3710	C: 03722 0	I: 74301 0	C: 00050 1	C: 03740 1	I: 74274 0	C: 00046 0	C: 00035 1	I: 63257 1
32,3720	C: 57207 0	C: 03746 1	I: 53761 1	C: 00035 1	C: 20575 1	I: 45455 1	C: 74077 1	I: 51451 0
32,3730	C: 03672 1	C: 03706 0	I: 77650 1	C: 00040 0	I: 71220 1	C: 00024 1	C: 03636 1	I: 44342 1
32,3740	I: 65301 0	C: 00050 1	I: 70525 1	C: 03646 0	I: 56221 0	I: 41257 1	C: 57601 1	C: 00035 1
32,3750	I: 45257 0	C: 20173 0	C: 33521 1	I: 40152 0	C: 65760 0	I: 52040 1	C: 65764 1	C: 65762 1
32,3760	I: 77745 1	C: 33542 1	I: 52166 1	C: 65766 0	I: 77745 1	C: 33524 1	I: 77650 1	C: 00024 1
32,3770	C: 03770 1	C: 03771 0	CKSM 66036 1	@	@	@	@	@

OCTAL LISTING FOR PARAGRAPH # 174. WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

33,2000	03436 0	03131 1	05354 0	C: 00007 0	35021 1	55452 1	55643 0	32443 0
33,2010	55412 0	02302 1	35041 1	55644 1	32441 1	55074 1	06006 1	I: 77624 1
33,2020	C: 10613 1	I: 57546 1	I: 77752 1	C: 16447 1	C: 02403 1	I: 72556 1	C: 02445 0	I: 77776 1
33,2030	04662 1	C: 16577 0	02316 1	35021 1	55421 0	55450 0	55451 1	34375 1
33,2040	55655 1	32445 0	02356 0	35002 0	55713 1	06006 1	I: 73545 1	C: 02401 0
33,2050	C: 02724 1	C: 16734 0	C: 02401 0	I: 77746 1	C: 02726 0	I: 77676 0	C: 02732 0	I: 77776 1
33,2060	05364 0	C: 00003 1	12064 0	13443 0	06006 1	I: 77624 1	C: 47311 1	I: 77776 1
33,2070	04662 1	C: 16663 0	35002 0	70077 0	00006 1	12077 1	25421 1	05560 1
33,2100	C: 00056 1	02316 1	11421 0	02131 0	04662 1	C: 17073 0	02316 1	00006 1
33,2110	31657 1	05342 1	C: 02116 0	C: 66065 1	32121 1	05175 1	32121 1	05201 1
33,2120	05324 1	C: 66453 0	35021 1	55050 1	31514 0	55051 0	51423 0	55430 0
33,2130	02427 1	51421 1	02133 1	02417 1	34374 0	55412 0	35017 1	55547 1
33,2140	35021 1	51422 1	54037 1	55502 0	55506 1	02321 0	00004 0	35016 0
33,2150	05235 0	C: 02153 1	05217 0	00006 1	27412 0	31412 1	00006 1	62163 1
33,2160	35006 1	05235 0	C: 02153 1	35002 0	05147 0	C: 02170 0	C: 66065 1	05324 1
33,2170	51421 1	02172 1	02417 1	31412 1	00006 1	62177 1	05217 0	35022 1
33,2200	55547 1	02321 0	00006 1	41503 1	21507 0	06006 1	I: 45345 1	C: 02511 0
33,2210	C: 02505 0	I: 45044 0	C: 66214 0	C: 66276 1	I: 56325 0	C: 02507 1	I: 57212 1	C: 27110 1
33,2220	I: 77634 0	C: 45544 0	C: 01051 1	I: 77776 1	11421 0	02302 1	02427 1	32447 1
33,2230	55412 0	51423 0	41427 0	55452 1	31675 1	00006 1	12244 0	45013 1
33,2240	27651 0	35013 0	27647 1	12250 0	45013 1	27651 0	35013 0	27653 1
33,2250	02417 1	35021 1	55404 1	55405 0	34777 1	55450 0	55451 1	30032 0
33,2260	55413 1	02453 1	31512 0	55051 0	35021 1	55050 1	02427 1	05560 1
33,2270	C: 00007 0	45021 0	05357 0	04662 1	C: 16063 0	05534 0	I: 43215 0	C: 15343 1
33,2300	C: 27116 1	I: 77616 0	00006 1	23425 0	35021 1	55155 0	55156 0	55157 1
33,2310	04662 1	C: 16663 0	04662 1	C: 17577 1	03102 1	01425 0	00006 1	23425 0
33,2320	02312 0	00006 1	23425 0	02331 1	00003 1	30067 0	00006 1	62335 0
33,2330	05164 1	00004 0	51422 1	40037 1	55655 1	00004 0	51422 1	30037 0
33,2340	61655 0	00006 1	12324 1	51422 1	30037 0	51547 0	55502 0	04553 0
33,2350	51547 0	55503 1	51547 0	23504 1	00003 1	01425 0	54001 1	12361 0
33,2360	55655 1	35021 1	50001 0	54000 0	24001 0	11655 1	12360 1	00002 0
33,2370	I: 47020 0	C: 00051 0	C: 45510 1	C: 02441 1	I: 51025 1	C: 02443 0	C: 66401 1	I: 77624 1

OCTAL LISTING FOR PARAGRAPH # 175, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD. "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

33,2400	C: 66276 1	I: 74261 1	C: 20212 1	C: 02405 1	I: 53321 1	C: 02672 0	C: 02650 0	C: 16650 0
33,2410	C: 02441 1	C: 02443 0	I: 47170 1	C: 02647 0	C: 45653 0	I: 77650 1	C: 00051 0	00006 1
33,2420	23426 0	06006 1	I: 77624 1	C: 66370 0	I: 77776 1	02316 1	01426 0	00006 1
33,2430	23425 0	31423 0	55052 0	32442 1	04662 1	C: 20720 0	02267 0	01425 0
33,2440	12431 1	C: 14400 0	C: 01542 0	C: 01602 1	C: 02757 0	C: 01713 0	C: 01671 0	C: 07623 1
33,2450	C: 26552 1	04662 1	C: 70117 1	05372 1	C: 00075 0	C: 00004 0	00004 0	30025 0
33,2460	55645 0	35021 1	54037 1	54040 1	54041 0	00003 1	33127 0	55655 1
33,2470	33130 0	02356 0	06006 1	I: 77735 0	C: 27111 0	C: 25477 1	C: 27122 0	C: 26455 1
33,2500	C: 27111 0	C: 01472 1	C: 01163 1	I: 77776 1	11643 0	02507 1	02523 1	06006 1
33,2510	I: 77624 1	C: 64000 0	I: 77776 1	31412 1	55646 0	05354 0	C: 00002 0	04662 1
33,2520	C: 17156 0	03403 0	55412 0	05412 0	C: 00135 0	11450 0	02417 1	03406 0
33,2530	02532 1	05217 0	00006 1	22154 1	00004 0	40025 1	61645 1	00006 1
33,2540	62542 0	65001 0	61644 0	00006 1	62550 0	05235 0	C: 02574 0	00154 1
33,2550	35015 0	02545 1	34113 0	54154 0	50154 1	31460 1	50154 1	55577 1
33,2560	10154 0	12553 1	00002 0	34113 0	54154 0	50154 1	31577 0	50154 1
33,2570	55460 0	10154 0	12564 0	00002 0	30025 0	55645 0	31540 1	55631 0
33,2600	05412 0	C: 00115 1	31631 1	55540 0	10000 0	30000 1	55541 1	40000 0
33,2610	55540 0	35021 1	56037 0	55162 1	35021 1	56040 0	55164 1	35021 1
33,2620	56041 1	55166 0	34374 0	04114 1	C: 00005 1	37657 1	05147 0	C: 02632 1
33,2630	C: 66065 1	05324 1	02552 1	05412 0	C: 00215 1	12637 0	02563 0	11643 0
33,2640	02642 0	02645 1	03406 0	04662 1	C: 15262 0	06006 1	I: 77745 1	C: 27120 1
33,2650	C: 24051 0	C: 01163 1	I: 76505 0	C: 02672 0	I: 57545 1	C: 00160 0	C: 16533 0	C: 00162 1
33,2660	C: 02537 1	I: 76001 1	C: 00001 0	C: 00010 0	I: 57535 0	C: 02644 0	I: 77640 0	C: 67210 0
33,2670	I: 50135 0	C: 02542 0	C: 66705 0	I: 72174 0	C: 00014 1	C: 02454 0	I: 62143 0	C: 02243 0
33,2700	C: 77775 1	C: 12555 1	I: 66104 1	C: 66676 0	C: 02454 0	I: 77770 1	C: 00010 0	I: 41343 0
33,2710	C: 02543 1	C: 27705 0	I: 43661 1	C: 21212 0	C: 02511 0	C: 06511 1	I: 40725 0	C: 27707 1
33,2720	C: 02531 1	I: 77732 1	I: 45425 0	C: 71206 0	C: 06573 0	I: 77100 0	C: 66707 1	C: 00004 0
33,2730	I: 56743 1	C: 75314 0	C: 75230 1	C: 12463 0	I: 77104 1	C: 66730 0	C: 00010 0	I: 66140 1
33,2740	C: 02455 1	C: 02455 1	I: 56743 1	C: 02460 1	C: 75206 1	I: 77613 0	C: 75266 1	C: 12511 1
33,2750	I: 42743 1	C: 75304 1	C: 75220 0	C: 12473 1	I: 42673 0	C: 75206 1	C: 75256 1	C: 12521 1
33,2760	I: 40743 0	C: 27712 0	C: 75206 1	I: 42772 0	C: 75246 0	C: 12531 0	I: 76104 0	C: 66737 1
33,2770	C: 00010 0	I: 64743 0	C: 02533 0	C: 02531 1	I: 55523 0	C: 02541 0	I: 76521 0	C: 02001 1

OCTAL LISTING FOR PARAGRAPH # 176, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

33,3000	I: 77745 1	C: 00155 0	C: 06541 1	I: 77745 1	C: 00160 0	C: 06531 0	I: 77745 1	C: 00162 1
33,3010	C: 06533 1	I: 77700 0	C: 66771 0	I: 76174 1	C: 00006 1	C: 00002 0	I: 57343 1	C: 02513 1
33,3020	C: 27715 1	I: 77722 0	I: 73406 1	I: 56072 1	C: 00046 0	C: 10021 0	I: 77745 1	I: 77746 1
33,3030	C: 10027 0	I: 77704 1	C: 67016 1	I: 77776 1	35060 1	54003 0	01400 1	11412 0
33,3040	02522 0	11450 0	13044 0	03046 0	30032 0	55414 0	06006 1	I: 65345 0
33,3050	C: 02503 0	C: 02507 1	I: 55525 0	C: 02511 0	I: 74276 1	C: 27715 1	I: 74521 1	C: 02672 0
33,3060	C: 02760 1	I: 77776 1	05412 0	C: 00005 1	32444 1	04662 1	C: 17206 0	02316 1
33,3070	11450 0	02262 0	06006 1	I: 77624 1	C: 64000 0	I: 77776 1	02122 1	05650 1
33,3100	C: 01600 0	03104 1	05650 1	C: 01601 1	05412 0	C: 00005 1	02267 0	C: 02222 1
33,3110	C: 00000 1	C: 00000 1	C: 00000 1	C: 00000 1	C: 00000 1	C: 00000 1	C: 00001 0	C: 00004 0
33,3120	C: 00002 0	C: 00220 1	C: 77776 1	C: 35730 0	C: 00035 1	C: 10317 0	C: 17550 1	C: 00115 1
33,3130	C: 01453 1	30075 0	75004 1	00006 1	13137 0	05721 0	C: 01521 0	35017 1
33,3140	55643 0	33435 0	55074 1	35010 0	55412 0	35036 1	55644 1	35017 1
33,3150	55632 0	55657 0	35021 1	55656 1	00006 1	31634 1	53636 1	00006 1
33,3160	31634 1	53640 0	34375 1	55655 1	32446 0	02356 0	03170 1	02030 0
33,3170	00006 1	23425 0	45002 1	55705 0	06006 1	I: 41545 0	C: 02636 0	I: 77756 0
33,3200	C: 02676 1	C: 16702 0	I: 77746 1	C: 02704 0	I: 77676 0	C: 02674 0	I: 77776 1	01425 0
33,3210	I: 44743 1	C: 02543 1	C: 02505 0	I: 42675 0	C: 27717 0	C: 02505 0	C: 06505 1	I: 77613 0
33,3220	C: 02507 1	C: 06507 0	I: 42675 0	C: 27721 0	C: 02505 0	I: 41475 1	C: 15333 0	I: 67300 0
33,3230	C: 67210 0	C: 02647 0	I: 71254 1	C: 67244 1	C: 02471 1	I: 45425 0	C: 61306 0	I: 77621 1
33,3240	C: 02473 0	C: 02473 0	I: 77650 1	C: 67266 1	I: 43345 1	C: 02467 0	C: 02475 0	C: 16467 0
33,3250	C: 02475 0	I: 44275 1	C: 27723 1	C: 02473 0	C: 16473 0	C: 02501 1	I: 44275 1	C: 27723 1
33,3260	C: 02471 1	I: 57325 1	C: 02503 0	C: 27725 1	I: 45421 1	C: 75306 0	I: 77776 1	11412 0
33,3270	02522 0	03406 0	11304 0	12523 0	06006 1	I: 77775 1	C: 02650 0	C: 16461 0
33,3300	C: 02443 0	C: 02457 0	I: 77776 1	05412 0	C: 00275 1	06006 1	I: 64375 1	C: 02467 0
33,3310	C: 02672 0	I: 53372 1	C: 02461 0	C: 16650 0	C: 02457 0	C: 02443 0	I: 77776 1	02417 1
33,3320	31646 1	55631 0	05412 0	C: 00155 0	06006 1	I: 77775 1	C: 27111 0	C: 02467 0
33,3330	I: 77776 1	11632 0	03401 1	05412 0	C: 00255 0	06006 1	I: 77745 1	C: 02634 1
33,3340	I: 53025 0	C: 02640 1	C: 67376 1	C: 00001 0	I: 43335 0	C: 27117 0	C: 02633 0	C: 16633 0
33,3350	C: 02634 1	C: 16636 0	C: 00001 0	C: 02654 1	I: 77776 1	03170 1	05412 0	C: 00335 1
33,3360	00006 1	31636 0	53640 0	35011 1	55412 0	05412 0	C: 00075 0	33434 1
33,3370	04662 1	C: 17206 0	04662 1	C: 17577 1	03102 1	02453 1	I: 77776 1	35017 1

OCTAL LISTING FOR PARAGRAPH # 177. WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD. "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

33,3400	55632 0	11631 0	55646 0	34334 1	55412 0	02523 1	00004 0	41011 1
33,3410	65023 0	00006 1	13426 0	45021 0	00006 1	06030 1	75013 1	10000 0
33,3420	13427 1	35013 0	70101 0	10000 0	13427 1	00003 1	00002 0	37657 1
33,3430	05210 1	00004 0	04701 0	C: 70002 1	C: 02647 0	C: 06200 0	05412 0	C: 00154 1
33,3440	05354 0	C: 00003 1	02037 1	04662 1	C: 16063 0	35017 1	22007 0	23427 1
33,3450	55047 1	00006 1	51427 1	31433 1	53046 0	33500 1	04662 1	C: 20673 1
33,3460	33466 0	04662 1	C: 20720 0	03620 0	03467 1	03455 0	C: 01451 0	53046 0
33,3470	51427 1	53433 0	11427 0	13477 1	35016 0	54001 1	13447 1	03541 1
33,3500	C: 01236 1	06005 1	I: 77170 1	C: 00002 0	C: 00014 1	I: 40331 1	C: 00052 0	C: 00006 1
33,3510	C: 00001 0	I: 60533 1	C: 02436 1	C: 00001 0	I: 77756 0	C: 10023 1	I: 77745 1	C: 00001 0
33,3520	I: 41546 0	I: 47133 0	C: 02435 1	C: 45513 1	C: 00003 1	I: 41356 1	C: 00001 0	I: 77752 1
33,3530	C: 10027 0	I: 71545 0	C: 00003 1	I: 72405 0	I: 76076 1	C: 00000 1	C: 10025 1	I: 43504 1
33,3540	C: 67511 0	35017 1	54735 1	35021 1	03635 1	06006 1	I: 77624 1	C: 67502 1
33,3550	I: 64375 1	C: 00007 0	C: 02672 0	I: 77772 0	C: 26736 1	C: 00015 0	I: 76521 0	C: 02672 0
33,3560	C: 36744 0	C: 67726 0	C: 02414 1	I: 77776 1	04662 1	C: 16063 0	35016 0	54735 1
33,3570	36211 0	03635 1	06006 1	I: 77624 1	C: 67726 0	C: 24015 0	C: 02414 1	C: 34007 1
33,3600	C: 47401 1	I: 77624 1	C: 47205 0	I: 77776 1	33631 0	04662 1	C: 20720 0	03620 0
33,3610	13612 0	13604 1	06006 1	I: 53375 0	C: 02760 1	C: 02650 0	C: 02650 0	I: 77776 1
33,3620	04662 1	C: 16063 0	05560 1	C: 00032 0	05354 0	C: 00002 0	05412 0	C: 00004 0
33,3630	05217 0	C: 01535 0	05650 1	C: 01602 1	03620 0	00006 1	23424 1	55431 1
33,3640	06006 1	I: 77624 1	C: 67502 1	I: 76740 0	C: 02431 0	C: 00007 0	C: 36766 0	C: 46053 0
33,3650	I: 77776 1	31773 0	55161 1	31775 0	55160 0	35021 1	55303 1	35017 1
33,3660	04662 1	C: 16002 1	04662 1	C: 17573 0	03632 0	30075 0	75014 0	10000 0
33,3670	03620 0	51330 0	30052 0	00006 1	13676 1	01424 1	35021 1	57330 0
33,3700	10000 0	50000 1	54000 0	13655 0	C: 30341 1	C: 22444 0	C: 57223 0	C: 66451 1
33,3710	C: 05427 0	C: 12577 1	C: 77567 0	C: 44202 1	C: 24276 1	C: 14066 1	C: 03146 1	C: 14632 0
33,3720	C: 00121 0	C: 35341 1	C: 01767 0	C: 31666 0	C: 00004 0	C: 35223 1	I: 77620 0	C: 02424 1
33,3730	I: 76740 0	C: 01330 0	C: 00003 1	C: 34767 0	C: 46000 0	I: 77624 1	C: 47637 0	I: 77650 1
33,3740	C: 02424 1	I: 77776 1	06006 1	I: 47145 1	C: 02636 0	C: 45546 1	I: 77776 1	56154 1
33,3750	55045 0	04662 1	C: 20703 1	33775 1	04662 1	C: 20720 0	13760 1	13761 0
33,3760	13753 1	06006 1	I: 47135 0	C: 01046 1	C: 45513 1	C: 02634 1	I: 77776 1	35021 1
33,3770	55632 0	05412 0	C: 00004 0	04701 0	C: 21272 0	C: 01435 1	C: 03776 1	CKSM 54404 0

OCTAL LISTING FOR PARAGRAPH # 200, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

34,2000	C: 03431 1	C: 02426 0	35051 0	54003 0	00006 1	32277 1	52757 0	45021 0
34,2010	22007 0	55265 0	52763 1	00006 1	32301 1	53337 0	00006 1	30025 0
34,2020	53266 0	35021 1	22007 0	52025 1	53337 0	52757 0	00004 0	00006 1
34,2030	31710 0	53271 0	31706 1	57267 0	00006 1	31337 1	21271 0	27267 1
34,2040	05412 0	C: 05023 0	C: 22000 1	00004 0	00006 1	31270 0	53707 1	31271 1
34,2050	57710 0	32000 0	54003 0	04740 0	C: 76722 1	05412 0	C: 05023 0	C: 22000 1
34,2060	35036 1	05245 1	C: 02320 1	C: 70066 0	05354 0	C: 00013 0	05546 0	C: 00022 1
34,2070	36214 0	54332 1	04662 1	C: 20703 1	05372 1	C: 40514 0	C: 00073 0	32001 1
34,2100	54003 0	32302 1	55426 1	06006 1	I: 64375 1	C: 02467 0	C: 02672 0	I: 53372 1
34,2110	C: 02650 0	C: 16650 0	C: 01337 1	I: 52131 0	C: 00052 0	C: 66424 0	C: 66373 0	22007 0
34,2120	30032 0	53760 0	22007 0	30033 1	53762 1	22007 0	30034 0	53764 1
34,2130	06006 1	I: 74575 0	C: 02760 1	C: 02760 1	I: 77731 1	C: 03747 0	C: 00000 1	I: 65345 0
34,2140	C: 01273 0	C: 01264 0	I: 55525 0	C: 02403 1	C: 15104 0	C: 15335 0	I: 45014 0	C: 00662 0
34,2150	C: 26441 1	C: 35232 1	C: 70334 1	I: 53476 1	C: 25752 0	C: 01232 0	I: 74235 0	C: 01714 1
34,2160	C: 30304 0	I: 77712 0	C: 25240 0	C: 01752 0	I: 53435 0	C: 01714 1	I: 47206 0	C: 01752 0
34,2170	I: 65256 0	C: 02634 1	I: 74346 0	I: 77626 0	C: 62041 0	C: 02634 1	I: 74356 1	I: 53455 0
34,2200	C: 01736 1	C: 01736 1	I: 53435 0	C: 01752 0	I: 77676 0	C: 01744 1	I: 45345 1	C: 15333 0
34,2210	C: 02634 1	I: 65215 1	C: 02401 0	C: 03301 0	I: 45565 0	C: 74476 1	I: 77414 0	C: 01462 0
34,2220	05412 0	C: 04023 1	00006 1	32306 0	53223 1	37665 0	55074 1	35057 0
34,2230	54003 0	00004 0	45021 0	55063 1	40025 1	65042 1	10000 0	12242 0
34,2240	12242 0	35021 1	65017 1	05245 1	C: 02744 1	C: 76066 0	05372 1	C: 00003 1
34,2250	C: 00025 0	04701 0	C: 77236 0	00004 0	10763 1	05217 0	11265 0	12263 0
34,2260	12263 0	12263 0	12013 0	41336 1	00006 1	62273 0	10024 0	12021 1
34,2270	00006 1	31266 1	12024 1	00006 1	32301 1	12025 0	C: 77766 0	C: 00011 1
34,2300	C: 77764 1	C: 00013 0	C: 02451 0	C: 71704 1	C: 41735 0	C: 02307 1	C: 70066 0	06006 1
34,2310	I: 77624 1	C: 70542 0	I: 77776 1	05412 0	C: 00035 1	32622 0	04662 1	C: 20707 0
34,2320	35006 1	05147 0	C: 02345 1	C: 70066 0	41501 0	75015 1	27501 0	04740 0
34,2330	C: 42420 1	35017 1	55725 1	05324 1	I: 40220 0	C: 02242 1	C: 00001 0	I: 77745 1
34,2340	C: 15335 0	C: 14007 0	C: 15333 0	C: 34011 0	C: 26446 0	30102 1	74105 0	00006 1
34,2350	12352 0	05217 0	35006 1	00006 1	02030 0	00006 1	12510 0	11725 1
34,2360	02363 0	02513 1	02513 1	41702 1	60025 0	00006 1	62615 1	54154 0
34,2370	55707 1	61703 1	00006 1	62375 1	02615 1	30024 1	00006 1	62401 0

OCTAL LISTING FOR PARAGRAPH # 201, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

34,2400	02615 1	31661 1	54001 1	32621 0	07164 0	35021 1	54163 1	06006 1
34,2410	I: 54201 0	C: 00001 0	C: 20206 1	I: 77606 1	I: 77650 1	C: 76155 1	C: 14021 1	C: 00747 0
34,2420	I: 41405 0	C: 00001 0	I: 72405 0	C: 00751 1	I: 41325 0	C: 00743 1	C: 00003 1	I: 72415 1
34,2430	I: 77626 0	C: 63755 0	I: 72405 0	C: 00743 1	I: 41325 0	C: 00751 1	C: 00003 1	I: 72425 1
34,2440	I: 77626 0	C: 77754 1	I: 77751 1	C: 00021 1	C: 03077 1	I: 77776 1	31725 0	10000 0
34,2450	02471 1	02477 1	06006 1	I: 76351 1	C: 03327 1	C: 03077 1	C: 03077 1	I: 77776 1
34,2460	31476 0	02623 1	55476 1	31477 1	02623 1	55477 0	31500 0	02623 1
34,2470	55500 1	04662 1	C: 42420 1	34113 0	04662 1	C: 01732 0	02345 1	41476 1
34,2500	55726 1	41477 0	55727 0	41500 1	55730 0	45017 0	55725 1	02452 0
34,2510	31725 0	00006 1	62363 0	41501 0	75015 1	27501 0	04662 1	C: 42420 1
34,2520	36211 0	04662 1	C: 01732 0	11725 1	02534 1	02526 1	35017 1	55725 1
34,2530	45007 1	00006 1	03012 1	02471 1	35007 0	00006 1	05012 1	35021 1
34,2540	55725 1	02471 1	I: 51575 1	C: 01177 1	C: 27723 1	C: 01171 1	I: 50256 0	C: 01177 1
34,2550	I: 77752 1	C: 17737 1	C: 05152 1	I: 77214 0	C: 00355 1	C: 70560 0	C: 02026 1	I: 60446 1
34,2560	I: 77621 1	C: 00045 0	C: 03735 0	I: 77616 0	31716 0	00006 1	20154 0	50120 1
34,2570	54000 0	31717 1	00006 1	20155 1	50120 1	54002 1	31720 0	00006 1
34,2600	20156 1	50120 1	54004 1	16030 0	30154 1	00006 1	71701 1	00006 1
34,2610	66030 1	00006 1	33672 1	52155 1	06030 1	06006 1	I: 52001 1	C: 00001 0
34,2620	C: 76233 1	C: 01673 1	C: 01476 0	00006 1	71731 1	20001 1	20001 1	00002 0
34,2630	37663 0	55056 1	05210 1	37714 1	55734 1	06006 1	I: 77634 0	C: 45510 1
34,2640	C: 01152 0	I: 77624 1	C: 56750 0	I: 77624 1	C: 56404 1	I: 77776 1	31734 0	00006 1
34,2650	12653 1	00006 1	62672 0	36211 0	05606 1	C: 01734 0	C: 01224 1	37714 1
34,2660	55734 1	00003 1	06006 1	I: 45014 0	C: 04667 1	C: 56750 0	I: 52131 0	C: 01243 0
34,2670	C: 01224 1	C: 70715 0	06006 1	I: 77624 1	C: 56750 0	I: 77624 1	C: 56404 1	I: 77614 1
34,2700	C: 04746 0	C: 70645 1	I: 77634 0	C: 45510 1	I: 45225 0	C: 14650 1	C: 01152 0	I: 45040 1
34,2710	C: 70645 1	C: 56415 1	I: 77745 1	C: 01225 0	C: 01152 0	I: 77624 1	C: 56343 0	I: 45014 0
34,2720	C: 00707 1	C: 71152 1	C: 27162 1	I: 77624 1	C: 56750 0	I: 77624 1	C: 56343 0	I: 77614 1
34,2730	C: 01674 0	I: 43014 0	C: 02756 1	C: 70735 1	C: 01476 0	I: 77624 1	C: 27162 1	I: 77624 1
34,2740	C: 56547 1	I: 77624 1	C: 71241 0	I: 45014 0	C: 02464 0	C: 71250 0	I: 43014 0	C: 01671 0
34,2750	C: 02716 0	C: 70761 0	I: 77745 1	C: 02001 1	C: 34001 1	C: 56565 1	I: 77745 1	C: 15335 0
34,2760	C: 01126 0	I: 77614 1	C: 02476 0	I: 52375 1	C: 01215 0	C: 01207 0	C: 03531 0	I: 43056 0
34,2770	C: 04707 0	C: 71163 0	C: 01273 0	I: 45014 0	C: 02744 1	C: 71007 0	C: 47104 1	C: 25235 1

OCTAL LISTING FOR PARAGRAPH # 202. WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD. "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

34,3000	C: 01273 0	I: 40035 0	C: 01235 1	C: 71004 0	I: 40056 0	C: 70673 1	C: 01245 0	I: 77624 1
34,3010	C: 47043 0	I: 77214 0	C: 00707 1	C: 71017 1	C: 03502 0	I: 77676 0	C: 03502 0	I: 77624 1
34,3020	C: 56750 0	I: 77614 1	C: 00706 0	C: 71214 0	I: 43345 1	C: 31336 0	C: 31340 1	C: 27526 0
34,3030	C: 03531 0	I: 60246 1	C: 00047 1	I: 41316 0	C: 03526 0	I: 45070 1	C: 00046 0	C: 56547 1
34,3040	I: 56070 0	C: 00047 1	C: 00047 1	I: 72257 1	C: 20577 0	C: 00155 0	C: 03526 0	I: 54335 0
34,3050	C: 02400 1	C: 20632 1	I: 47171 0	C: 03526 0	C: 45565 0	C: 03526 0	I: 76214 1	C: 04747 1
34,3060	C: 71067 0	C: 03005 1	I: 72244 0	C: 71067 0	C: 03005 1	I: 77646 0	C: 03526 0	I: 45014 0
34,3070	C: 02666 0	C: 75254 0	I: 77624 1	C: 56750 0	I: 45014 0	C: 02744 1	C: 71124 0	C: 56547 1
34,3100	I: 51575 1	C: 01265 1	I: 77657 0	C: 57176 0	C: 27504 0	C: 01257 0	I: 53646 0	C: 57176 0
34,3110	C: 03502 0	I: 77735 0	C: 02003 0	I: 45261 0	C: 20613 1	C: 03502 0	I: 67240 0	C: 71257 1
34,3120	C: 02004 1	I: 50025 0	C: 03504 0	C: 71257 1	I: 77624 1	C: 75466 1	I: 43014 0	C: 04707 0
34,3130	C: 71221 0	C: 02744 1	C: 71227 0	I: 77624 1	C: 56547 1	I: 45014 0	C: 00707 1	C: 71235 0
34,3140	C: 71250 0	I: 77624 1	C: 56750 0	I: 52375 1	C: 01215 0	C: 01207 0	C: 03531 0	I: 77614 1
34,3150	C: 02624 0	C: 70767 0	I: 45014 0	C: 01674 0	C: 27162 1	I: 77624 1	C: 56750 0	I: 77624 1
34,3160	C: 56343 0	I: 77650 1	C: 70731 0	C: 27502 0	C: 15335 0	C: 03510 0	C: 27516 0	C: 03531 0
34,3170	I: 71256 0	C: 01257 0	I: 60414 0	C: 04303 0	C: 71175 1	I: 43025 1	C: 00045 0	C: 02464 0
34,3200	C: 03524 1	I: 77214 0	C: 00747 0	C: 71207 1	C: 03502 0	I: 77676 0	C: 03502 0	I: 77624 1
34,3210	C: 56750 0	I: 52145 0	C: 03003 1	C: 71027 1	I: 43335 0	C: 01357 1	C: 31340 1	I: 77650 1
34,3220	C: 71027 1	I: 62150 1	C: 01125 0	C: 00001 0	I: 52130 1	C: 01125 0	C: 70641 0	I: 62150 1
34,3230	C: 01126 0	C: 00001 0	I: 52130 1	C: 01126 0	C: 70673 1	I: 77624 1	C: 71241 0	I: 77650 1
34,3240	C: 71141 0	I: 53775 1	C: 01573 1	C: 57167 0	I: 77655 1	C: 01607 1	C: 01207 0	I: 77616 0
34,3250	I: 53775 1	C: 01645 1	C: 57167 0	I: 77655 1	C: 01661 1	C: 01215 0	I: 77616 0	I: 77776 1
34,3260	30105 0	75010 1	00006 1	13266 1	35016 0	03267 1	35017 1	55505 1
34,3270	35021 1	55300 1	05412 0	C: 04022 0	37664 1	05134 1	C: 03310 0	C: 70067 1
34,3300	06006 1	C: 00155 0	I: 53135 0	C: 01301 1	C: 71301 0	I: 52040 1	C: 71124 0	C: 71317 1
34,3310	33341 1	04662 1	C: 20731 0	04622 0	45017 0	55300 1	05217 0	I: 77614 1
34,3320	C: 04707 0	C: 70641 0	I: 77776 1	00004 0	33342 1	54006 0	37716 0	55725 1
34,3330	55734 1	00003 1	06006 1	I: 77650 1	C: 70673 1	C: 00052 0	C: 36307 0	C: 00052 0
34,3340	C: 36307 0	C: 01461 0	C: 70067 1	I: 40220 0	C: 03704 1	C: 00001 0	I: 77634 0	C: 45510 1
34,3350	C: 36316 0	C: 71572 1	I: 77751 1	C: 01156 1	C: 03373 0	I: 77776 1	03377 1	34371 0
34,3360	00006 1	06031 0	77707 1	00006 1	13366 0	03372 1	40075 1	75002 1
34,3370	10000 0	03432 1	35021 1	54154 0	06006 1	I: 77650 1	C: 03704 1	04662 1

OCTAL LISTING FOR PARAGRAPH # 203, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD. "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

34,3400	C: 57757 0	35016 0	55611 1	51611 0	30032 0	00006 1	51611 0	21155 0
34,3410	54154 0	06006 1	I: 45246 0	C: 31661 1	I: 77444 0	C: 71421 0	11611 1	03402 1
34,3420	03357 0	I: 77776 1	40075 1	75002 1	10000 0	03563 1	35015 0	00006 1
34,3430	05011 1	03372 1	06006 1	I: 77601 0	C: 00001 0	I: 52375 1	C: 03204 1	C: 03715 1
34,3440	I: 57456 1	I: 74235 0	C: 03707 1	C: 31662 1	I: 77606 1	I: 60345 0	C: 02316 1	C: 00047 1
34,3450	I: 77606 1	I: 60345 0	C: 00045 0	C: 00051 0	I: 70460 1	C: 00050 1	I: 74271 0	I: 77730 0
34,3460	C: 03705 0	I: 76521 0	C: 01736 1	C: 00025 0	I: 77761 1	C: 31664 1	C: 03212 0	I: 77624 1
34,3470	C: 47477 0	I: 45001 1	C: 00001 0	C: 47742 0	I: 77750 0	C: 03705 0	I: 53775 1	C: 03204 1
34,3500	C: 20160 1	C: 00017 1	I: 77624 1	C: 47477 0	I: 45175 0	C: 00025 0	C: 47644 1	I: 77721 0
34,3510	C: 31670 1	I: 77761 1	C: 15271 1	I: 53750 0	C: 03705 0	C: 20163 1	I: 77776 1	00004 0
34,3520	35021 1	55647 1	55651 0	55653 1	31772 1	55646 0	31773 0	55650 1
34,3530	31774 1	55652 0	00006 1	30155 0	53526 0	00006 1	30160 0	53530 1
34,3540	00006 1	30162 1	53532 0	00006 1	50120 1	30017 1	53576 0	00006 1
34,3550	50120 1	30021 1	53600 1	00006 1	50120 1	30023 0	53602 0	45017 0
34,3560	55332 0	00003 1	03372 1	06006 1	I: 77751 1	C: 03373 0	C: 01156 1	I: 52135 1
34,3570	C: 31712 1	C: 03704 1	I: 71220 1	C: 03705 0	C: 02316 1	C: 34041 0	C: 27114 0	I: 77775 1
34,3600	C: 00001 0	C: 27707 1	C: 00007 0	C: 03715 1	I: 77745 1	C: 02316 1	C: 34041 0	C: 27126 1
34,3610	I: 77775 1	C: 00007 0	C: 27204 1	C: 00001 0	I: 53451 1	C: 03707 1	C: 03707 1	I: 76521 0
34,3620	C: 01736 1	C: 17357 0	C: 00045 0	C: 02316 1	I: 77775 1	C: 15333 0	C: 37351 1	C: 56126 1
34,3630	C: 01334 1	I: 77775 1	C: 31653 0	C: 37351 1	C: 56126 1	C: 03723 1	I: 77614 1	C: 02745 0
34,3640	C: 71644 1	C: 01156 1	I: 77650 1	C: 03705 0	I: 77775 1	C: 15333 0	C: 03351 0	I: 52151 0
34,3650	C: 01334 1	C: 71641 1	C: 15066 0	C: 17626 0	C: 00000 1	C: 00000 1	C: 11132 1	C: 27477 0
34,3660	C: 01616 1	C: 37651 1	C: 16721 1	C: 31463 1	C: 06315 0	C: 20000 0	C: 00000 1	C: 20000 0
34,3670	C: 00000 1	C: 00000 1	C: 00000 1	C: 00000 1	C: 00000 1	C: 00000 1	C: 00000 1	C: 17676 0
34,3700	C: 20113 0	C: 75766 1	C: 45544 0	C: 00000 1	C: 00000 1	C: 02011 0	C: 32233 1	C: 17676 0
34,3710	C: 20113 0	C: 00001 0	04662 1	C: 17653 1	36214 0	55131 1	35017 1	55132 1
34,3720	33761 1	04662 1	C: 20720 0	05534 0	03726 1	03720 1	41132 1	65017 1
34,3730	00006 1	13756 1	05560 1	C: 00120 1	06006 1	I: 43234 0	C: 45510 1	C: 07133 1
34,3740	C: 36316 0	C: 71572 1	I: 77776 1	33762 1	04662 1	C: 20720 0	05534 0	03751 1
34,3750	03734 1	05560 1	C: 00124 0	04662 1	C: 56000 1	15534 1	05546 0	C: 00120 1
34,3760	03734 1	C: 01006 0	C: 01422 1	C: 03763 0	C: 03764 1	CKSM 52350 0	@	@
34,3770	@	@	@	@	@	@	@	@

OCTAL LISTING FOR PARAGRAPH # 204. WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

35,2000	04627 0	02003 0	04642 0	04647 0	34614 0	04575 1	06006 1	I: 77531 0
35,2010	C: 03766 0	C: 00000 1	03070 0	06006 1	I: 71214 0	C: 01270 0	C: 03663 1	C: 17413 1
35,2020	C: 03744 0	I: 43054 1	C: 72024 1	C: 01070 1	I: 77624 1	C: 10712 1	I: 43145 0	C: 15335 0
35,2030	C: 03461 1	I: 43014 0	C: 01310 1	C: 72035 1	C: 03661 0	C: 02364 1	I: 43345 1	C: 03663 1
35,2040	C: 02364 1	C: 34041 0	C: 45215 0	I: 77624 1	C: 72216 1	I: 77454 1	C: 72057 0	05650 1
35,2050	C: 00611 1	35050 1	04662 1	C: 20720 0	04106 1	02003 0	02047 0	I: 43014 0
35,2060	C: 03601 0	C: 72036 1	C: 01310 1	C: 72067 0	I: 77776 1	03070 0	02072 0	I: 77776 1
35,2070	34614 0	04575 1	06006 1	I: 71201 1	C: 00001 0	C: 03746 1	C: 14047 1	C: 03754 1
35,2100	I: 71406 0	C: 16734 0	I: 77756 0	C: 26732 0	C: 03554 0	I: 77657 0	C: 57176 0	C: 26657 1
35,2110	C: 03562 0	I: 43057 1	C: 57176 0	C: 03466 0	C: 36746 1	C: 24744 0	I: 77745 1	C: 03663 1
35,2120	C: 03503 1	I: 77615 0	C: 00037 0	C: 37656 0	C: 72526 0	I: 51575 1	C: 03646 0	C: 26635 0
35,2130	C: 03640 0	I: 51451 0	C: 03620 0	C: 26637 1	C: 03540 0	I: 45115 0	C: 03612 1	C: 45153 1
35,2140	I: 77624 1	C: 45263 1	C: 16641 0	C: 03663 1	C: 03413 1	I: 77776 1	34616 1	04575 1
35,2150	06006 1	I: 77624 1	C: 72741 0	I: 77624 1	C: 73002 1	I: 77650 1	C: 72026 0	04627 0
35,2160	00006 1	31422 1	02166 1	04642 0	00006 1	31424 1	53764 1	04647 0
35,2170	06006 1	I: 77624 1	C: 10712 1	I: 77634 0	C: 45510 1	C: 03665 1	I: 77615 0	C: 02364 1
35,2200	C: 03413 1	C: 03503 1	C: 34041 0	C: 45215 0	I: 77624 1	C: 74000 1	I: 77624 1	C: 72526 0
35,2210	I: 77624 1	C: 72741 0	I: 77624 1	C: 73002 1	I: 77650 1	C: 72173 1	I: 66220 1	C: 01340 1
35,2220	C: 03665 1	C: 40000 0	I: 40345 1	C: 33111 0	C: 00001 0	C: 27454 1	C: 03540 0	C: 27576 0
35,2230	C: 03546 0	C: 27570 0	C: 03554 0	C: 27620 0	C: 03562 0	C: 03612 1	I: 77624 1	C: 74000 1
35,2240	I: 63235 0	C: 03540 0	I: 53515 0	C: 03540 0	I: 46315 1	I: 51352 1	C: 02625 1	I: 63256 0
35,2250	I: 63241 0	C: 00001 0	I: 75241 1	C: 02625 1	I: 65552 0	I: 50315 0	C: 02625 1	C: 03540 0
35,2260	I: 71244 0	C: 72264 1	C: 15343 1	I: 41425 1	I: 71214 0	C: 03741 0	C: 72513 0	C: 03452 1
35,2270	C: 14033 1	I: 77625 0	C: 03744 0	C: 03452 1	I: 45246 0	C: 33115 1	I: 77640 0	C: 72523 0
35,2300	I: 70535 0	C: 03665 1	I: 72030 1	C: 01340 1	C: 00154 1	I: 77330 1	C: 03664 0	C: 03554 0
35,2310	I: 65256 0	C: 00045 0	I: 53515 0	C: 03540 0	I: 77725 1	I: 41525 0	C: 00045 0	I: 77621 1
35,2320	C: 00015 0	C: 14037 0	C: 15333 0	I: 41425 1	C: 03744 0	I: 50165 0	C: 00037 0	C: 01340 1
35,2330	I: 71545 0	I: 56205 0	C: 00017 1	C: 00015 0	I: 77676 0	C: 00035 1	I: 44246 1	C: 15333 0
35,2340	I: 77240 1	C: 01340 1	C: 02617 0	I: 53435 0	C: 00007 0	I: 41241 0	C: 03546 0	C: 00015 0
35,2350	I: 47315 0	C: 00001 0	C: 03562 0	I: 53435 0	C: 00001 0	I: 41241 0	C: 03562 0	C: 00017 1
35,2360	I: 77621 1	I: 63301 0	C: 00047 1	C: 00007 0	I: 50235 0	C: 00001 0	C: 02617 0	I: 50315 0
35,2370	C: 00001 0	C: 00007 0	I: 65552 0	I: 77765 0	I: 43225 0	C: 15333 0	C: 03744 0	I: 65525 0

OCTAL LISTING FOR PARAGRAPH # 205. WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD. "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

35,2400	C: 00035 1	I: 75221 1	C: 15333 0	C: 00037 0	I: 77615 0	I: 56205 0	C: 33107 1	I: 77605 1
35,2410	I: 41257 1	C: 20176 0	I: 51406 1	I: 50025 0	C: 03454 1	C: 72421 0	I: 75345 1	C: 03454 1
35,2420	I: 77606 1	I: 51135 1	C: 03665 1	C: 72431 1	I: 71331 0	C: 03665 1	C: 37777 1	I: 77650 1
35,2430	C: 72467 1	I: 41345 0	C: 03452 1	C: 00033 1	I: 71244 0	C: 72445 1	C: 03454 1	I: 77605 1
35,2440	C: 33113 1	C: 17454 1	I: 70446 0	I: 52076 1	C: 72455 0	I: 51545 1	C: 03452 1	I: 51525 1
35,2450	C: 00033 1	I: 77625 0	I: 71240 1	C: 72460 0	I: 77646 0	I: 52165 1	C: 03450 0	C: 72467 1
35,2460	I: 57545 1	C: 03450 0	I: 70406 1	C: 03450 0	I: 77615 0	I: 77650 1	C: 72470 1	C: 03450 0
35,2470	I: 77615 0	C: 02364 1	C: 02364 1	I: 63375 0	C: 03570 0	C: 03576 0	I: 77624 1	C: 72701 1
35,2500	I: 77624 1	C: 45237 0	I: 63375 0	C: 03612 1	C: 03620 0	I: 77624 1	C: 72701 1	I: 77624 1
35,2510	C: 45247 1	I: 77650 1	C: 72236 0	I: 43345 1	C: 03663 1	C: 02364 1	C: 17663 1	I: 77614 1
35,2520	C: 01310 1	C: 72523 0	C: 03744 0	I: 52145 0	C: 15335 0	C: 01340 1	I: 77220 1	C: 02370 1
35,2530	C: 03562 0	I: 65315 0	C: 03554 0	C: 03503 1	I: 65325 0	C: 03656 1	C: 33107 1	I: 46125 0
35,2540	C: 03766 0	C: 72544 1	I: 65345 0	C: 15335 0	I: 77624 1	C: 72705 0	C: 27415 1	C: 00007 0
35,2550	C: 27640 0	C: 03415 1	I: 63256 0	C: 03540 0	I: 41456 0	I: 50235 0	C: 00001 0	C: 02617 0
35,2560	I: 77715 1	I: 72441 0	C: 00001 0	I: 75326 1	I: 43244 1	C: 72567 0	C: 15343 1	C: 16633 0
35,2570	C: 03656 1	I: 77625 0	C: 03503 1	C: 03423 1	I: 40335 0	C: 03766 0	C: 00001 0	I: 63325 0
35,2600	C: 33122 0	C: 03540 0	C: 27570 0	C: 03546 0	C: 37576 1	C: 22000 1	I: 77624 1	C: 72666 1
35,2610	I: 64375 1	C: 03646 0	C: 00001 0	I: 77772 0	C: 37405 1	C: 02370 1	I: 45020 1	C: 01340 1
35,2620	C: 72666 1	I: 61375 1	C: 03405 0	C: 00001 0	I: 77772 0	C: 03646 0	I: 63255 0	C: 03546 0
35,2630	C: 03540 0	I: 65325 0	C: 03413 1	C: 03656 1	I: 41525 0	C: 15343 1	I: 77624 1	C: 72705 0
35,2640	I: 77775 1	C: 00001 0	C: 03415 1	I: 41575 0	C: 02625 1	I: 57435 1	C: 02617 0	I: 41456 0
35,2650	I: 76435 1	C: 02625 1	I: 77715 1	I: 64315 1	C: 03646 0	C: 00001 0	I: 77772 0	C: 36611 1
35,2660	C: 01340 1	I: 40220 0	C: 01340 1	C: 00001 0	I: 77650 1	C: 72643 0	I: 57575 1	C: 02617 0
35,2670	C: 24007 0	C: 03540 0	I: 57456 1	C: 00015 0	I: 76435 1	C: 02617 0	C: 00001 0	I: 43401 0
35,2700	C: 00023 0	I: 65325 0	C: 15335 0	C: 02364 1	I: 41406 0	I: 45020 1	C: 02367 1	C: 27442 0
35,2710	I: 71214 0	C: 01673 1	I: 43054 1	C: 72715 1	C: 01473 0	I: 45545 1	C: 63736 0	I: 73014 0
35,2720	C: 00063 1	C: 03746 1	I: 43014 0	C: 04303 0	C: 72726 1	C: 00263 0	C: 25517 0	I: 77657 0
35,2730	C: 57176 0	C: 25535 0	I: 77657 0	C: 57176 0	C: 35543 0	C: 27135 0	I: 52175 0	C: 00001 0
35,2740	C: 02367 1	I: 43020 1	C: 02370 1	C: 01311 0	C: 72750 0	I: 52014 0	C: 00470 1	C: 72772 0
35,2750	I: 77775 1	C: 03405 0	C: 02611 0	I: 77776 1	34620 1	04575 1	06006 1	I: 52375 1
35,2760	C: 03405 0	C: 02611 0	I: 53046 0	C: 72766 0	I: 77624 1	C: 72616 0	I: 77214 0	C: 01267 0
35,2770	C: 03646 0	C: 03646 0	I: 77624 1	C: 72661 0	I: 77776 1	34617 0	04575 1	06006 1

OCTAL LISTING FOR PARAGRAPH # 206, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

35,3000	I: 77650 1	C: 02370 1	I: 71220 1	C: 02370 1	C: 33120 1	C: 03626 0	I: 71214 0	C: 01351 1
35,3010	C: 73030 0	C: 33120 1	I: 77615 0	C: 33120 1	C: 03626 0	I: 77414 0	C: 01742 1	C: 73030 0
35,3020	03100 0	03023 0	03031 0	06006 1	I: 41575 0	C: 03646 0	I: 77624 1	C: 10654 1
35,3030	I: 77776 1	03304 0	31770 0	55766 0	35041 1	04662 1	C: 01732 0	34621 0
35,3040	04662 1	C: 20720 0	03045 0	03050 1	03060 1	30005 1	54000 0	04106 1
35,3050	40076 1	75012 0	00006 1	13045 1	05412 0	C: 04024 0	05546 0	C: 00047 1
35,3060	30005 1	54000 0	05412 0	C: 04024 0	06006 1	I: 52014 0	C: 00670 0	C: 02366 0
35,3070	00006 1	23340 1	34615 1	04662 1	C: 20720 0	14106 0	01340 1	13072 0
35,3100	37713 0	71011 1	00006 1	13105 1	24002 0	00002 0	C: 14441 0	C: 37325 1
35,3110	C: 00001 0	C: 20650 0	C: 12525 0	C: 12525 0	C: 00004 0	C: 21505 1	C: 00002 0	C: 77777 0
35,3120	C: 61337 1	C: 01252 0	C: 25253 1	C: 00004 0	C: 31566 0	C: 00000 1	C: 12326 0	C: 00002 0
35,3130	C: 16100 1	C: 00000 1	C: 35230 0	C: 12137 1	C: 06033 1	C: 06161 1	C: 30707 1	C: 35252 1
35,3140	C: 25253 1	C: 67777 1	C: 77777 0	C: 00000 1	C: 30760 0	C: 00000 1	C: 00114 0	C: 00040 0
35,3150	C: 30447 0	04627 0	03154 1	04642 0	04647 0	34614 0	04575 1	06006 1
35,3160	I: 45014 0	C: 00670 0	C: 74012 1	I: 76014 0	C: 00470 1	C: 00002 0	I: 76014 0	C: 00356 1
35,3170	C: 73172 1	C: 00001 0	I: 77530 1	C: 01132 0	33263 0	03237 1	06006 1	I: 43014 0
35,3200	C: 00670 0	C: 00076 0	I: 45335 0	C: 01133 1	C: 36150 0	I: 43030 0	C: 73210 0	C: 00276 1
35,3210	I: 46135 1	C: 03747 0	C: 73216 0	I: 52145 0	C: 33126 1	C: 73220 0	I: 77745 1	C: 33124 0
35,3220	C: 36321 1	C: 74070 0	I: 77414 0	C: 00470 1	34616 1	03237 1	34615 1	04662 1
35,3230	C: 21057 0	04106 1	04106 1	03154 1	35016 0	05526 0	15217 1	00006 1
35,3240	23766 1	55765 0	31765 1	04662 1	C: 20720 0	03242 0	01766 1	40154 0
35,3250	65012 1	00006 1	13154 0	03242 0	I: 77414 0	C: 00470 1	05650 1	C: 00124 0
35,3260	35050 1	03237 1	04106 1	C: 01510 1	I: 77420 1	C: 02370 1	03304 0	34621 0
35,3270	04662 1	C: 21057 0	04106 1	03300 1	03267 1	05412 0	C: 00014 1	05217 0
35,3300	06006 1	I: 52014 0	C: 03664 0	C: 02370 1	00006 1	23066 0	05546 0	C: 00155 0
35,3310	35021 1	55145 1	35017 1	05245 1	C: 03260 0	C: 50067 0	05372 1	C: 40036 0
35,3320	C: 05024 1	C: 13000 0	01066 0	03355 1	03374 1	05560 1	C: 00027 1	06006 1
35,3330	I: 77624 1	C: 63475 1	I: 77776 1	03404 1	05546 0	C: 00045 0	14106 0	03355 1
35,3340	05560 1	C: 00027 1	05560 1	C: 00156 0	06006 1	I: 77624 1	C: 63547 1	I: 77776 1
35,3350	03374 1	03404 1	05560 1	C: 00045 0	14106 0	56002 0	55664 0	05546 0
35,3360	C: 00027 1	05546 0	C: 00031 0	33441 0	04662 1	C: 21057 0	14106 0	01664 1
35,3370	13361 1	05412 0	C: 00014 1	05217 0	56002 0	55127 0	34620 1	04662 1

OCTAL LISTING FOR PARAGRAPH # 207. WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

35,3400	C: 20720 0	14106 0	01127 1	13376 1	56002 0	55664 0	33442 0	04662 1
35,3410	C: 20720 0	04106 1	13414 1	13406 1	35003 1	70077 0	00006 1	13427 1
35,3420	06006 1	I: 41575 0	C: 03646 0	I: 77624 1	C: 10654 1	I: 77650 1	C: 73433 1	00006 1
35,3430	43440 0	53626 0	06006 1	I: 77624 1	C: 73264 0	I: 77776 1	01664 1	C: 00000 1
35,3440	C: 35100 0	C: 01441 1	C: 01452 0	C: 04043 1	C: 01455 1	C: 00004 0	C: 31566 0	C: 00002 0
35,3450	C: 27311 1	C: 00003 1	C: 34661 1	C: 00000 1	C: 06433 0	C: 00000 1	C: 12326 0	I: 76020 1
35,3460	C: 02370 1	C: 01521 0	I: 77624 1	C: 76625 1	I: 77624 1	C: 26231 0	I: 61375 1	C: 03405 0
35,3470	C: 00001 0	I: 77772 0	C: 03646 0	I: 51406 1	C: 27654 0	I: 77650 1	C: 02370 1	C: 20000 0
35,3500	C: 00000 1	C: 10000 0	C: 00000 1	C: 04000 0	C: 00000 1	C: 02000 0	C: 00000 1	C: 00020 0
35,3510	C: 00000 1	C: 00004 0	C: 00000 1	C: 00002 0	C: 00000 1	C: 00000 1	C: 04000 0	C: 00000 1
35,3520	C: 00010 0	C: 00000 1	C: 00001 0	C: 00000 1	C: 00000 1	C: 77777 0	C: 77557 0	C: 77777 0
35,3530	C: 77760 0	C: 00000 1	C: 00012 1	C: 54631 1	C: 63145 1	C: 21463 0	C: 06315 0	C: 77777 0
35,3540	C: 77771 0	C: 37777 1	C: 37777 1	C: 77777 0	C: 77766 0	C: 77777 0	C: 77767 1	C: 00000 1
35,3550	C: 35610 0	C: 37405 1	C: 12250 0	C: 33041 1	C: 37714 1	C: 00003 1	C: 13241 1	C: 20000 0
35,3560	C: 00000 1	C: 00605 1	C: 00612 1	C: 40214 1	C: 45266 1	C: 73645 1	C: 56536 1	C: 70467 0
35,3570	C: 71205 0	C: 16525 1	C: 12525 0	C: 22525 0	C: 12525 0	C: 17775 1	C: 06676 0	C: 00000 1
35,3600	C: 00062 0	C: 00020 0	C: 14223 1	C: 00000 1	C: 05174 0	C: 00002 0	C: 21727 0	C: 00000 1
35,3610	C: 01654 1	C: 00000 1	C: 00764 1	C: 00000 1	C: 00010 0	C: 00000 1	C: 00322 1	C: 75725 0
35,3620	C: 75417 1	C: 00325 0	C: 23740 0	C: 00306 1	C: 06614 1	C: 76027 0	C: 70156 1	C: 74517 1
35,3630	C: 54131 0	C: 30276 1	C: 05001 0	C: 00003 1	C: 27040 0	I: 66145 1	C: 00045 0	C: 00044 1
35,3640	I: 62101 0	C: 00047 1	C: 00002 0	I: 53775 1	C: 02723 0	C: 20201 0	C: 26723 0	C: 02731 0
35,3650	I: 77657 0	C: 20201 0	C: 26731 0	C: 02737 0	I: 66057 0	C: 20201 0	C: 00045 0	C: 02737 0
35,3660	I: 54150 1	C: 02215 0	C: 00045 0	I: 77660 1	C: 00045 0	I: 70130 1	C: 02215 0	C: 00045 0
35,3670	I: 40270 0	C: 00044 1	C: 00003 1	I: 77650 1	C: 75412 1	I: 43020 1	C: 02317 0	C: 02716 0
35,3700	C: 73753 1	I: 77614 1	C: 01711 1	C: 73753 1	I: 45174 1	C: 00002 0	C: 27442 0	I: 77014 1
35,3710	C: 00315 0	C: 73713 0	C: 00000 1	I: 53775 1	C: 01171 1	C: 57176 0	C: 01503 0	C: 15535 0
35,3720	C: 01205 1	C: 25517 0	C: 01177 1	I: 45057 1	C: 57176 0	C: 23435 1	I: 66234 1	C: 26720 0
35,3730	C: 01127 1	C: 00000 1	I: 43014 0	C: 04063 0	C: 00315 0	C: 73740 0	I: 77614 1	C: 04263 1
35,3740	I: 71214 0	C: 04307 1	C: 75751 0	C: 01205 1	C: 34041 0	C: 26670 1	I: 45014 0	C: 01674 0
35,3750	C: 27162 1	I: 77650 1	C: 02317 0	I: 45145 0	C: 01205 1	C: 27442 0	I: 43014 0	C: 01476 0
35,3760	C: 04476 0	I: 43014 0	C: 01675 1	C: 01474 1	C: 34041 0	C: 27162 1	I: 77650 1	C: 73704 0
35,3770	C: 03770 1	C: 03771 0	CKSM 72661 0	@	@	@	@	@

OCTAL LISTING FOR PARAGRAPH # 210, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

36,2000	I: 52375 1	C: 03554 0	C: 03540 0	I: 41456 0	C: 26625 1	C: 03540 0	I: 53435 0	C: 03546 0
36,2010	C: 02617 0	I: 77616 0	I: 71220 1	C: 01340 1	C: 03663 1	C: 34041 0	C: 27126 1	I: 77624 1
36,2020	C: 45233 1	I: 77745 1	C: 03663 1	C: 34041 0	C: 27114 0	I: 77624 1	C: 45243 0	I: 77775 1
36,2030	C: 03540 0	I: 63246 1	C: 03554 0	I: 65256 0	I: 43021 0	C: 00045 0	C: 00076 0	I: 43040 1
36,2040	C: 74042 1	C: 00276 1	C: 27754 1	C: 00001 0	I: 53435 0	C: 03562 0	C: 27646 0	C: 03540 0
36,2050	I: 46206 1	C: 03646 0	I: 51352 1	I: 50256 0	C: 00001 0	I: 65552 0	I: 77715 1	I: 50235 0
36,2060	C: 03540 0	C: 03646 0	I: 75325 1	I: 77626 0	C: 61160 1	C: 00047 1	C: 37746 0	C: 01340 1
36,2070	I: 77220 1	C: 03657 0	C: 03540 0	I: 50256 0	C: 03646 0	I: 75446 0	I: 43352 1	C: 33150 0
36,2100	I: 57414 1	C: 00316 0	C: 74103 0	I: 40205 1	C: 33134 1	C: 00001 0	I: 45206 1	C: 02617 0
36,2110	C: 02611 0	I: 41525 0	I: 43342 0	I: 41415 1	I: 43156 1	C: 03466 0	C: 16732 0	I: 50146 1
36,2120	C: 74122 0	I: 77676 0	C: 16734 0	C: 03746 1	C: 24047 1	C: 03554 0	I: 77657 0	C: 57176 0
36,2130	C: 26657 1	C: 03562 0	I: 77657 0	C: 57176 0	C: 36746 1	C: 24744 0	I: 77745 1	C: 00037 0
36,2140	C: 03752 1	C: 16627 0	C: 02611 0	I: 73406 1	C: 16732 0	I: 50146 1	C: 74150 0	I: 77676 0
36,2150	C: 02734 0	I: 45150 1	C: 03745 1	C: 24744 0	I: 43145 0	C: 00037 0	C: 03661 0	C: 16621 0
36,2160	C: 15343 1	C: 16623 1	C: 33142 0	C: 16625 1	C: 33136 0	I: 71214 0	C: 00316 0	C: 74171 0
36,2170	C: 33140 1	C: 37750 1	C: 74214 0	I: 70545 1	C: 02734 0	C: 14021 1	C: 02732 0	I: 77742 0
36,2200	C: 34023 1	C: 47256 0	I: 43244 1	C: 74205 0	C: 15343 1	I: 65221 0	C: 03750 0	C: 03752 1
36,2210	I: 75225 0	C: 02621 0	I: 77640 0	C: 74416 1	I: 77745 1	C: 03663 1	I: 43015 1	C: 03752 1
36,2220	C: 01312 0	C: 74226 1	C: 34041 0	C: 27126 1	I: 77650 1	C: 74230 0	C: 34041 0	C: 27114 0
36,2230	I: 77775 1	C: 00007 0	C: 27640 0	C: 00001 0	C: 03632 0	C: 17415 1	C: 03752 1	C: 17423 1
36,2240	C: 02625 1	C: 16631 1	C: 02623 1	C: 16633 0	C: 03663 1	C: 17503 1	C: 03746 1	C: 17746 1
36,2250	C: 15335 0	I: 65201 1	C: 00001 0	C: 33122 0	I: 77715 1	C: 03540 0	C: 27570 0	C: 03546 0
36,2260	C: 37576 1	C: 22000 1	I: 52375 1	C: 03620 0	C: 03640 0	I: 41446 1	C: 26637 1	C: 03646 0
36,2270	I: 77646 0	C: 02635 0	I: 45415 0	C: 61154 0	C: 03746 1	C: 24047 1	C: 03612 1	I: 77657 0
36,2300	C: 57176 0	C: 26746 0	C: 03540 0	I: 77657 0	C: 57176 0	C: 36657 0	C: 45163 1	I: 71354 0
36,2310	C: 03746 1	I: 77657 0	C: 57576 1	C: 02625 1	I: 71214 0	C: 03701 1	C: 74427 0	C: 02321 0
36,2320	I: 50025 0	C: 02625 1	C: 74365 1	I: 45325 1	C: 02321 0	C: 02631 1	I: 45240 0	C: 74344 1
36,2330	I: 71240 1	C: 73254 0	C: 33130 0	I: 57414 1	C: 00356 1	C: 74336 1	C: 03744 0	I: 43345 1
36,2340	C: 03744 0	C: 03752 1	C: 37752 0	C: 74173 1	I: 45214 1	C: 03461 1	I: 65301 0	C: 00047 1
36,2350	C: 33146 1	I: 45215 0	C: 02321 0	C: 02625 1	I: 70501 1	C: 00050 1	I: 56264 1	C: 00046 0
36,2360	I: 53605 1	C: 03744 0	C: 57177 1	C: 37744 1	C: 74337 0	I: 45325 1	C: 02623 1	C: 02633 0
36,2370	I: 51406 1	I: 50025 0	C: 33144 0	C: 74427 0	I: 45345 1	C: 02321 0	C: 02631 1	I: 77725 1

OCTAL LISTING FOR PARAGRAPH # 211, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

36,2400	I: 71240 1	C: 74410 1	I: 71244 0	C: 74344 1	C: 03744 0	I: 57542 0	C: 37744 1	C: 74337 0
36,2410	I: 77745 1	I: 71240 1	C: 74337 0	C: 33132 1	I: 77650 1	C: 74333 1	I: 45345 1	C: 02625 1
36,2420	C: 02321 0	I: 71240 1	C: 73254 0	C: 03752 1	I: 77625 0	C: 03744 0	C: 03752 1	I: 77775 1
36,2430	C: 03620 0	I: 65241 0	C: 03632 0	C: 02637 1	I: 45565 0	C: 41140 1	C: 16441 1	I: 50375 0
36,2440	C: 03540 0	C: 03612 1	I: 51165 1	C: 02637 1	C: 74454 1	I: 57535 0	C: 33117 0	I: 51165 1
36,2450	C: 02637 1	C: 74462 1	I: 52076 1	C: 74460 0	I: 43135 1	C: 33117 0	C: 00316 0	C: 74462 1
36,2460	I: 77625 0	C: 36150 0	C: 17766 0	C: 02625 1	C: 36641 1	C: 03657 0	05412 0	C: 00004 0
36,2470	06006 1	I: 66170 1	C: 04000 0	C: 03424 0	I: 77745 1	C: 15335 0	C: 03767 1	C: 03771 0
36,2500	I: 77776 1	33246 1	03235 0	12501 0	33252 1	03211 0	12504 0	06006 1
36,2510	I: 71331 0	C: 00122 0	C: 00000 1	C: 03767 1	C: 17632 0	C: 03771 0	C: 17634 0	C: 33514 1
36,2520	C: 17735 0	C: 33620 0	C: 37652 1	C: 64450 1	I: 71214 0	C: 02662 1	C: 03632 0	I: 51444 1
36,2530	C: 74540 0	C: 03632 0	I: 45345 1	C: 03646 0	C: 33622 1	I: 43040 1	C: 74540 0	C: 02462 0
36,2540	I: 77545 0	C: 03646 0	07171 1	C: 00002 0	C: 02544 0	C: 35436 0	C: 14040 0	C: 05066 1
36,2550	C: 44052 0	C: 60030 1	C: 26415 0	C: 25057 1	06006 1	I: 77752 1	C: 17654 0	C: 33544 1
36,2560	C: 17730 0	C: 33624 1	C: 17636 1	C: 03634 0	I: 44254 1	C: 74574 1	C: 33502 0	I: 71406 0
36,2570	I: 73525 1	I: 45465 1	C: 40051 1	C: 74607 0	I: 45345 1	C: 03646 0	C: 33622 1	I: 71240 1
36,2600	C: 74604 0	C: 33630 1	C: 37726 0	C: 74607 0	I: 77745 1	C: 33626 0	C: 03726 1	I: 77624 1
36,2610	C: 65075 0	I: 52054 1	C: 74614 1	C: 74776 1	I: 77775 1	C: 03640 0	C: 16657 1	C: 03636 1
36,2620	C: 26760 1	C: 03700 0	C: 36746 1	C: 64277 1	I: 77615 0	C: 03716 1	C: 17736 0	C: 03634 0
36,2630	I: 52054 1	C: 74633 1	C: 74655 1	I: 51575 1	C: 03710 1	I: 77776 1	07171 1	C: 00002 0
36,2640	C: 00000 1	C: 00000 1	C: 47021 1	C: 65002 0	C: 35610 0	C: 07722 1	C: 63772 0	C: 63276 1
36,2650	06006 1	I: 77615 0	C: 01352 1	I: 52052 1	C: 74657 0	I: 77745 1	C: 03726 1	I: 41425 1
36,2660	C: 03726 1	I: 53575 0	C: 03656 1	C: 36152 1	C: 26505 0	I: 77615 0	C: 33634 0	I: 45206 1
36,2670	C: 03636 1	I: 45246 0	C: 33600 1	I: 52040 1	C: 74676 0	C: 74703 0	I: 51545 1	C: 00001 0
36,2700	I: 50025 0	C: 33602 0	C: 74753 0	I: 43345 1	C: 03730 0	C: 33522 1	I: 67240 0	C: 74713 1
36,2710	C: 33562 0	I: 77650 1	C: 74776 1	C: 03730 0	I: 53025 0	C: 33546 0	C: 74734 1	I: 45345 1
36,2720	C: 00001 0	C: 03666 1	I: 65301 0	C: 00047 1	C: 03670 0	I: 56225 1	C: 03726 1	I: 53605 1
36,2730	C: 00001 0	C: 20201 0	I: 77650 1	C: 74736 0	I: 77745 1	C: 00001 0	C: 14021 1	I: 77626 0
36,2740	C: 60141 0	I: 77600 1	C: 74607 0	C: 17666 1	C: 03726 1	C: 17670 0	C: 00021 1	I: 77615 0
36,2750	C: 03726 1	C: 37726 0	C: 74607 0	I: 77624 1	C: 75002 1	I: 41345 0	C: 03720 1	C: 03754 1
36,2760	I: 53021 1	C: 03636 1	C: 74770 1	I: 71240 1	C: 74770 1	C: 33502 0	I: 77650 1	C: 74772 0
36,2770	I: 57545 1	C: 33502 0	C: 37761 0	C: 64541 0	I: 77654 0	C: 75030 0	I: 77624 1	C: 64262 0

OCTAL LISTING FOR PARAGRAPH # 212. WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD. "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

36,3000	I: 77776 1	12466 0	I: 45020 1	C: 03763 0	C: 64316 1	I: 77776 1	33250 0	03221 0
36,3010	35015 0	03215 1	13017 0	12466 0	33251 1	03235 0	12466 0	33252 1
36,3020	03211 0	12466 0	33253 0	03235 0	12466 0	06006 1	I: 77650 1	C: 03763 0
36,3030	I: 77624 1	C: 75002 1	I: 77776 1	35023 0	55131 1	35017 1	55132 1	33247 0
36,3040	03235 0	13037 1	06006 1	I: 67201 0	C: 00001 0	C: 01133 1	I: 53025 0	C: 33514 1
36,3050	C: 75057 1	I: 60335 1	C: 00111 0	C: 00047 1	I: 52125 0	C: 33552 0	C: 75070 1	I: 43145 0
36,3060	C: 33556 1	C: 00700 0	C: 75064 1	I: 77752 1	I: 77752 1	I: 65301 0	C: 00047 1	C: 33554 0
36,3070	I: 56325 0	C: 03706 0	I: 77776 1	07171 1	C: 00001 0	C: 00001 0	C: 05070 0	C: 17527 1
36,3100	C: 36700 0	C: 47114 0	C: 70670 1	06006 1	I: 67206 1	C: 03076 0	I: 56205 0	I: 41257 1
36,3110	C: 20165 1	C: 33560 1	I: 77621 1	C: 03716 1	C: 03413 1	I: 77776 1	33246 1	03235 0
36,3120	13116 0	35021 1	55125 1	55126 1	06006 1	I: 77624 1	C: 63700 0	I: 53575 0
36,3130	C: 03656 1	I: 74315 0	C: 03740 1	C: 33564 0	I: 74315 0	C: 03746 1	C: 33566 1	I: 50255 0
36,3140	I: 50015 0	C: 33570 0	C: 75167 0	I: 50375 0	C: 03746 1	C: 03656 1	I: 71240 1	C: 75153 1
36,3150	C: 33572 1	I: 52006 0	C: 75155 1	I: 41545 0	C: 33574 1	I: 77756 0	C: 16732 0	I: 43146 0
36,3160	C: 03666 1	C: 26734 0	C: 03640 0	C: 26657 1	C: 03700 0	C: 36746 1	C: 24744 0	I: 43014 0
36,3170	C: 01267 0	C: 03665 1	I: 77214 0	C: 01071 0	I: 77626 0	C: 60362 0	C: 00037 0	I: 77615 0
36,3200	C: 03716 1	C: 27656 1	C: 03700 0	I: 77651 0	C: 03672 1	C: 37646 1	C: 73002 1	I: 77650 1
36,3210	C: 75167 0	00006 1	23762 0	03221 0	35017 1	05526 0	15217 1	01762 0
36,3220	13244 1	00006 1	23733 1	04662 1	C: 21057 0	14106 0	13231 0	13233 1
36,3230	01733 1	51733 1	10004 1	51733 1	10003 0	00006 1	23762 0	04662 1
36,3240	C: 20720 0	14106 0	13244 1	01762 0	51762 0	10001 1	C: 01441 1	C: 01006 0
36,3250	C: 01475 0	C: 01447 1	C: 01474 1	C: 01521 0	I: 77620 0	C: 02317 0	I: 66370 0	C: 00066 1
36,3260	C: 00051 0	C: 00022 1	I: 66374 1	C: 00022 1	C: 00052 0	C: 00006 1	I: 63775 1	C: 03502 0
36,3270	C: 02467 0	C: 12745 1	I: 77775 1	C: 03510 0	I: 52717 1	C: 02555 0	C: 75032 1	C: 12745 1
36,3300	I: 77775 1	C: 03516 0	I: 52717 1	C: 02643 1	C: 75032 1	C: 12745 1	I: 77700 0	C: 75310 1
36,3310	I: 43104 0	C: 75266 1	C: 02706 1	C: 75317 0	I: 77775 1	C: 15335 0	C: 02737 0	I: 77201 1
36,3320	C: 00001 0	C: 02723 0	I: 47036 1	C: 45565 0	I: 47515 0	C: 02731 0	I: 76234 0	C: 45565 0
36,3330	I: 47515 0	C: 02737 0	I: 76234 0	C: 45565 0	I: 77171 0	C: 03526 0	C: 00000 1	C: 01257 0
36,3340	I: 40151 0	C: 03526 0	C: 75343 1	C: 01262 0	I: 77654 0	C: 75354 1	I: 40112 1	C: 75354 1
36,3350	C: 01262 0	I: 52114 1	C: 00001 0	C: 75346 1	I: 61551 1	C: 01257 0	I: 75405 1	C: 01262 0
36,3360	I: 76257 0	C: 57576 1	C: 01257 0	I: 63101 1	C: 00050 1	C: 77775 1	I: 77134 1	C: 02215 0
36,3370	C: 00242 0	I: 40265 1	C: 15325 1	C: 00001 0	C: 03456 0	I: 60351 0	C: 01257 0	C: 00047 1

OCIAL LISTING FOR PARAGRAPH # 213, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD. "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

36,3400	I: 65345 0	C: 00155 0	C: 03524 1	I: 77701 1	C: 00051 0	I: 70460 1	C: 00050 1	I: 41471 0
36,3410	I: 77650 1	C: 31377 0	I: 77731 1	C: 00052 0	C: 00066 1	I: 60775 1	C: 02723 0	C: 75134 0
36,3420	I: 77206 0	C: 02731 0	I: 53303 1	C: 75112 1	I: 77206 0	C: 02737 0	I: 53303 1	C: 75070 1
36,3430	I: 61006 0	C: 75415 0	I: 45575 1	C: 74303 1	I: 45575 1	C: 74311 1	I: 45575 1	C: 74317 1
36,3440	I: 77214 0	C: 02706 1	C: 75445 0	C: 15335 0	C: 03474 0	I: 66374 1	C: 00022 1	C: 00052 0
36,3450	C: 00006 1	I: 77773 1	C: 74275 1	I: 53761 1	C: 00001 0	C: 20201 0	C: 11301 0	I: 77304 0
36,3460	C: 75451 0	C: 01265 1	I: 77732 1	C: 01265 1	I: 77650 1	C: 02317 0	I: 45020 1	C: 02317 0
36,3470	C: 27442 0	I: 74375 0	C: 03460 0	C: 03456 0	C: 26643 1	C: 03466 0	I: 77761 1	C: 03456 0
36,3500	C: 26651 1	C: 03474 0	I: 77761 1	C: 03456 0	C: 02657 1	I: 77776 1	33767 1	55252 1
36,3510	55253 0	35021 1	55254 1	55255 0	05412 0	C: 04022 0	05546 0	C: 00236 0
36,3520	31253 1	55252 1	31255 1	55254 1	06006 1	I: 73150 1	C: 01252 0	C: 01254 0
36,3530	I: 70731 0	C: 00051 0	C: 00006 1	C: 75054 1	I: 60276 1	C: 00052 0	I: 65161 1	C: 02643 1
36,3540	C: 00051 0	I: 57144 1	C: 00047 1	C: 02215 0	I: 65057 0	C: 57576 1	C: 00051 0	I: 77653 1
36,3550	C: 02467 0	C: 02665 0	I: 57543 1	C: 75054 1	I: 74301 0	C: 00052 0	C: 02651 1	I: 71124 0
36,3560	C: 00051 0	C: 00047 1	I: 53674 1	C: 02215 0	C: 57576 1	I: 52724 1	C: 00051 0	C: 02555 0
36,3570	C: 02673 1	I: 77514 1	C: 02746 0	C: 75613 1	I: 57543 1	C: 75054 1	I: 74301 0	C: 00052 0
36,3600	C: 02657 1	I: 71124 0	C: 00051 0	C: 00047 1	I: 53674 1	C: 02215 0	C: 57576 1	I: 52724 1
36,3610	C: 00051 0	C: 02643 1	C: 02701 0	I: 77624 1	C: 56750 0	I: 77776 1	31252 0	63770 1
36,3620	55253 0	31254 0	67715 0	55255 0	06006 1	I: 66350 1	C: 01252 0	C: 00051 0
36,3630	C: 00006 1	I: 77775 1	C: 02665 0	C: 06467 1	I: 77775 1	C: 02673 1	C: 06555 1	I: 77214 0
36,3640	C: 02746 0	C: 75651 1	C: 02701 0	C: 06643 0	I: 52100 1	C: 75647 0	C: 75657 1	I: 77634 0
36,3650	C: 75514 0	I: 43335 0	C: 01256 1	C: 35772 0	I: 52030 0	C: 75657 1	C: 75644 0	I: 77624 1
36,3660	C: 56750 0	I: 53375 0	C: 01701 0	C: 01273 0	C: 03450 0	I: 47014 1	C: 00707 1	C: 75757 0
36,3670	C: 27014 1	I: 77004 0	C: 57352 1	C: 00000 1	I: 77014 1	C: 04343 1	C: 75700 1	C: 00002 0
36,3700	I: 53775 1	C: 01257 0	C: 57205 1	I: 40055 0	C: 01521 0	C: 75717 1	C: 25521 0	C: 01265 1
36,3710	I: 53257 1	C: 57202 0	C: 01527 0	I: 77600 1	C: 75723 0	C: 35527 1	C: 75732 0	I: 53375 0
36,3720	C: 01535 0	C: 01257 0	C: 01535 0	I: 53375 0	C: 01543 1	C: 01265 1	C: 01543 1	I: 45134 0
36,3730	C: 02150 1	C: 23421 1	I: 77624 1	C: 56750 0	I: 47014 1	C: 00707 1	C: 75762 0	C: 26773 0
36,3740	I: 77624 1	C: 20263 1	I: 77624 1	C: 56750 0	I: 77214 0	C: 02746 0	C: 75751 0	C: 03450 0
36,3750	C: 01701 0	I: 66150 0	C: 02317 0	C: 00052 0	I: 77776 1	04701 0	C: 27457 1	I: 52034 1
36,3760	C: 26747 1	C: 75671 0	I: 45034 1	C: 26720 0	C: 20237 0	I: 77650 1	C: 75742 1	C: 00066 1
36,3770	C: 77771 0	C: 00014 1	C: 03772 0	C: 03773 1	CKSM 77660 1	@	@	@

OCTAL LISTING FOR PARAGRAPH # 214, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

37,2000	C: 01231 0	35017 1	55132 1	35016 0	04662 1	C: 21055 1	04106 1	02011 0
37,2010	02003 0	32152 0	04662 1	C: 20720 0	04106 1	02017 0	02011 0	06006 1
37,2020	I: 77745 1	C: 01046 1	C: 34041 0	C: 27442 0	I: 43014 0	C: 01303 0	C: 76044 0	C: 01474 1
37,2030	I: 70535 0	C: 01133 1	I: 43030 0	C: 76035 0	C: 01674 0	I: 43014 0	C: 01676 1	C: 01673 1
37,2040	I: 77624 1	C: 27162 1	I: 77650 1	C: 76065 0	I: 77775 1	C: 03605 1	C: 25535 0	C: 03613 0
37,2050	C: 15543 1	C: 02316 1	C: 01517 0	I: 43014 0	C: 01676 1	C: 00263 0	I: 53135 0	C: 03604 0
37,2060	C: 76063 0	I: 77614 1	C: 00063 1	I: 77624 1	C: 27135 0	I: 77745 1	C: 00015 0	C: 26316 1
37,2070	C: 00017 1	C: 27605 1	C: 00025 0	C: 03613 0	I: 53646 0	C: 57576 1	C: 27623 0	C: 00001 0
37,2100	I: 50256 0	C: 00007 0	I: 67471 1	C: 03623 0	C: 03625 0	I: 43134 0	C: 03603 1	C: 01063 0
37,2110	I: 67214 1	C: 01663 0	C: 00050 1	I: 43054 1	C: 76116 0	C: 01463 1	I: 77775 1	C: 00001 0
37,2120	C: 16152 0	C: 00015 0	I: 45014 0	C: 00662 0	C: 26370 1	I: 77605 1	C: 36154 1	C: 03621 1
37,2130	I: 77776 1	32151 0	04662 1	C: 20720 0	04106 1	04106 1	06006 1	I: 43345 1
37,2140	C: 02316 1	C: 36146 1	C: 01046 1	I: 77634 0	C: 76011 0	C: 00003 1	C: 25140 0	C: 00001 0
37,2150	C: 00000 1	C: 01453 1	C: 01442 1	C: 00243 1	C: 32703 1	I: 57546 1	C: 14017 1	I: 77756 0
37,2160	C: 14013 0	C: 15335 0	C: 00015 0	I: 41335 1	C: 03310 0	C: 03301 0	I: 45261 0	C: 20217 1
37,2170	C: 15333 0	I: 45215 0	C: 02634 1	C: 02401 0	I: 77634 0	C: 70604 1	I: 71406 0	I: 77606 1
37,2200	I: 72405 0	C: 00017 1	C: 14027 1	I: 77676 0	C: 00023 0	I: 72405 0	C: 00013 0	C: 14033 1
37,2210	I: 41556 1	C: 00031 0	I: 72405 0	C: 00017 1	C: 14021 1	I: 77676 0	I: 72405 0	C: 00013 0
37,2220	C: 24025 0	C: 00013 0	I: 77656 1	C: 26714 1	C: 00021 1	I: 77656 1	C: 26722 1	C: 00027 1
37,2230	I: 77656 1	C: 36730 0	C: 47205 0	I: 41575 0	C: 02760 1	I: 45006 0	C: 47477 0	I: 47175 1
37,2240	C: 00003 1	C: 45552 1	C: 27317 1	C: 15335 0	C: 24001 0	C: 00767 1	I: 47034 0	C: 45552 1
37,2250	C: 70564 1	C: 14013 0	C: 00741 0	I: 72405 0	C: 00001 0	I: 60415 1	C: 00005 1	I: 77650 1
37,2260	C: 70416 0	04662 1	C: 17653 1	35021 1	55126 1	55125 1	05546 0	C: 00120 1
37,2270	05560 1	C: 00026 0	05546 0	C: 00031 0	05546 0	C: 00027 1	05546 0	C: 00010 0
37,2300	05372 1	C: 00004 0	C: 05022 1	C: 26000 0	06006 1	I: 77634 0	C: 45510 1	C: 35225 1
37,2310	C: 56343 0	I: 43014 0	C: 02756 1	C: 76315 1	C: 01476 0	I: 43014 0	C: 00707 1	C: 76321 0
37,2320	C: 01674 0	I: 77624 1	C: 27162 1	I: 77624 1	C: 56750 0	I: 77624 1	C: 56343 0	I: 43014 0
37,2330	C: 00747 0	C: 76333 0	C: 01674 0	I: 77624 1	C: 27162 1	I: 77776 1	37663 0	05147 0
37,2340	C: 02630 0	C: 70067 1	05372 1	C: 00072 1	C: 00111 0	35066 1	05210 1	35013 0
37,2350	70075 1	00006 1	15217 1	35003 1	70077 0	00006 1	15217 1	35021 1
37,2360	55775 1	04662 1	C: 76557 1	35056 1	54003 0	05546 0	C: 00024 1	06006 1
37,2370	I: 77624 1	C: 30011 1	I: 77776 1	04662 1	C: 16071 0	35017 1	55332 0	05217 0

OCTAL LISTING FOR PARAGRAPH # 215. WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD. "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

37,2400	C: 00203 0	I: 77420 1	C: 02317 0	35060 1	54003 0	36211 0	71044 1	10000 0
37,2410	02460 1	35016 0	27044 1	05546 0	C: 00116 1	32463 1	04662 1	C: 20600 0
37,2420	04106 1	02445 0	02445 0	35023 0	05526 0	05217 0	32462 0	04662 1
37,2430	C: 20600 0	04106 1	02437 0	02413 0	35022 1	05526 0	05217 0	32465 1
37,2440	54001 1	31732 0	00006 1	20001 1	55342 1	05560 1	C: 00116 1	35056 1
37,2450	54003 0	35066 1	05134 1	C: 05534 0	C: 04062 1	06006 1	I: 77650 1	C: 02317 0
37,2460	07755 1	C: 01211 1	C: 01527 0	C: 16600 0	C: 14600 1	C: 61740 0	05546 0	C: 00037 0
37,2470	37716 0	55725 1	55734 1	30075 0	75007 1	00006 1	12531 0	32556 0
37,2500	04662 1	C: 20561 1	02550 0	02505 0	02477 1	32555 0	04662 1	C: 20564 1
37,2510	02550 0	12537 0	36211 0	05606 1	C: 01725 0	C: 01734 0	00006 1	30025 0
37,2520	53726 1	30033 1	55727 0	30034 0	55731 1	30032 0	55733 0	00003 1
37,2530	02505 0	32464 0	04662 1	C: 20564 1	02550 0	12537 0	12531 0	31725 0
37,2540	65017 1	00006 1	12550 1	36211 0	05606 1	C: 01725 0	C: 01734 0	00003 1
37,2550	04662 1	C: 20560 0	05560 1	C: 00037 0	05534 0	C: 15200 1	C: 01536 0	35057 0
37,2560	56003 1	55771 0	04711 1	55770 1	11775 1	02616 1	02570 1	02617 0
37,2570	06006 1	I: 77624 1	C: 71343 0	I: 77776 1	50154 1	02576 1	02615 1	05560 1
37,2600	C: 00124 0	45017 0	55775 1	05546 0	C: 00077 1	04662 1	C: 56000 1	05560 1
37,2610	C: 00077 1	05412 0	C: 00111 0	35021 1	02616 1	36214 0	55775 1	31770 0
37,2620	22000 1	31771 1	56003 1	22000 1	04704 0	C: 03405 0	I: 45020 1	C: 01340 1
37,2630	C: 26231 0	I: 64375 1	C: 03405 0	C: 00001 0	I: 66172 0	C: 02365 0	C: 03405 0	I: 77776 1
37,2640	31765 1	04575 1	06006 1	I: 77650 1	C: 01340 1	I: 71220 1	C: 02370 1	C: 03413 1
37,2650	C: 34041 0	C: 45215 0	I: 77214 0	C: 01067 1	C: 03562 0	C: 02617 0	C: 27512 1	C: 03554 0
37,2660	C: 02625 1	C: 03756 0	I: 47256 0	C: 03512 1	I: 77656 1	C: 26611 0	C: 03540 0	C: 37632 1
37,2670	C: 13220 0	C: 02453 1	C: 26541 0	C: 03546 0	C: 37640 1	C: 13220 0	C: 02533 0	C: 37504 1
37,2700	C: 02370 1	35073 0	05134 1	C: 03636 1	C: 14063 1	02722 1	37667 1	05147 0
37,2710	C: 03236 0	C: 76067 1	35042 1	05245 1	C: 02744 1	C: 76066 0	45016 1	04114 1
37,2720	C: 00005 1	15324 0	00006 1	22070 0	03254 1	35017 1	55230 0	40075 1
37,2730	75017 0	26075 1	34777 1	70076 1	54076 1	40103 1	75012 0	26103 1
37,2740	35021 1	55425 1	55426 1	00070 0	03254 1	35022 1	54001 1	40000 0
37,2750	52763 1	35017 1	55230 0	35016 0	55227 0	40102 0	75016 1	10000 0
37,2760	03033 1	41246 1	55065 1	00006 1	31662 1	53670 0	31663 0	57671 0
37,2770	00006 1	31665 0	53673 0	31666 0	57674 0	30102 1	75004 1	00006 1

OCTAL LISTING FOR PARAGRAPH # 216, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

37,3000	13016 1	33066 1	05245 1	C: 03067 0	C: 76066 0	31162 0	57533 0	55536 1
37,3010	31164 0	57534 1	55537 0	31166 1	57535 0	55540 0	35022 1	55725 1
37,3020	33233 0	05245 1	C: 03207 1	C: 32066 0	46214 1	04114 1	C: 00001 0	34362 1
37,3030	54001 1	40000 0	52763 1	40075 1	75017 0	10000 0	03056 1	35042 1
37,3040	05245 1	C: 02744 1	C: 76066 0	35002 0	05147 0	C: 03104 1	C: 76067 1	45015 1
37,3050	04114 1	C: 00005 1	35007 0	00006 1	05011 1	15324 0	00006 1	33063 1
37,3060	53223 1	13043 1	C: 03165 0	C: 76067 1	55227 0	05267 1	C: 00062 0	35016 0
37,3070	54070 1	50000 1	30037 0	50070 0	57533 0	50070 0	55536 1	10070 1
37,3100	13070 1	11227 0	13064 1	05324 1	35016 0	00004 0	54070 1	60000 1
37,3110	50000 1	11162 1	03114 0	03122 0	63232 1	00006 1	63122 0	05650 1
37,3120	C: 00205 0	03143 1	10070 1	13106 1	05412 0	C: 16035 0	C: 20000 0	C: 03133 0
37,3130	C: 76067 1	04662 1	C: 15262 0	06006 1	I: 51575 1	C: 01163 1	I: 77405 0	C: 37451 0
37,3140	00006 1	30155 0	21426 1	05412 0	C: 10035 0	06006 1	I: 77624 1	C: 77420 1
37,3150	I: 77776 1	05412 0	C: 10035 0	34113 0	05606 1	C: 01231 0	C: 01170 0	00003 1
37,3160	05412 0	C: 10035 0	00006 1	31223 0	52006 0	31205 1	55074 1	05546 0
37,3170	C: 00036 1	05372 1	C: 00005 1	C: 05022 1	C: 20000 0	06006 1	I: 77624 1	C: 73675 1
37,3200	I: 77776 1	35021 1	55125 1	55126 1	04662 1	C: 17173 1	45007 1	55734 1
37,3210	00006 1	03011 1	05560 1	C: 00147 0	05560 1	C: 00162 1	35011 1	70074 0
37,3220	00006 1	13225 0	05372 1	C: 00111 0	C: 00132 1	04701 0	C: 10124 1	05412 0
37,3230	C: 00035 1	15217 1	C: 63401 1	C: 00170 1	C: 00372 1	C: 00044 1	35025 0	05606 1
37,3240	C: 01231 0	C: 01170 0	00003 1	06006 1	I: 45175 0	C: 01171 1	C: 77353 1	C: 25207 0
37,3250	C: 01256 1	C: 01215 0	I: 77776 1	15217 1	00006 1	30025 0	53246 1	45021 0
37,3260	55224 0	55225 1	55226 1	35021 1	55166 0	55164 1	55163 0	55165 0
37,3270	55167 1	55230 0	00006 1	40040 1	53225 1	52040 1	55162 1	23164 0
37,3300	40041 0	57226 0	56041 1	55166 0	00002 0	10763 1	13310 1	15324 0
37,3310	37665 0	55074 1	11230 0	12744 0	33352 0	54002 1	11166 0	00002 0
37,3320	13323 1	00002 0	00002 0	22007 0	11164 1	13330 0	13337 1	13330 0
37,3330	22041 1	11226 1	41226 1	13303 0	13332 1	23166 1	00002 0	11224 0
37,3340	41224 0	13344 0	13340 1	13272 1	55162 1	41225 1	55164 1	45021 0
37,3350	52040 1	13300 0	C: 02745 0	I: 41456 0	C: 01760 1	I: 67340 1	C: 03746 1	C: 00047 1
37,3360	I: 77240 1	C: 77407 1	I: 41441 0	C: 01714 1	I: 44316 0	C: 37461 0	I: 56325 0	C: 37463 1
37,3370	C: 00043 0	C: 00041 1	I: 41205 0	C: 37465 1	I: 65361 0	C: 01760 1	I: 41205 0	C: 37467 0

OCTAL LISTING FOR PARAGRAPH # 217. WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

37,3400	C: 00041 1	I: 53361 0	C: 01714 1	I: 77626 0	C: 76521 0	I: 41455 0	C: 01760 1	I: 60345 0
37,3410	C: 00043 0	C: 00050 1	I: 53663 1	C: 37453 1	C: 56623 0	I: 45561 1	C: 76527 0	I: 77616 0
37,3420	I: 74375 0	C: 01163 1	C: 37451 0	I: 76505 0	C: 01736 1	C: 03433 0	I: 41562 0	I: 41455 0
37,3430	C: 01207 0	I: 74255 0	C: 01177 1	C: 37457 0	I: 44055 1	C: 01171 1	C: 00037 0	C: 35232 1
37,3440	C: 77353 1	I: 53255 0	I: 77655 1	C: 01177 1	C: 35240 1	C: 00037 0	C: 03215 1	C: 27057 0
37,3450	C: 02312 0	C: 32537 1	C: 61377 0	C: 55754 1	C: 77644 1	C: 65556 1	C: 00000 1	C: 31000 0
37,3460	C: 01463 1	C: 06315 0	C: 00001 0	C: 05000 1	C: 02047 0	C: 36332 0	C: 00152 1	C: 14511 1
37,3470	06006 1	I: 77201 1	C: 00001 0	C: 01177 1	I: 63361 0	C: 37767 0	C: 01714 1	I: 74235 0
37,3500	C: 01760 1	C: 15245 0	I: 45455 1	C: 74251 1	I: 72056 1	C: 00044 1	C: 03542 1	I: 57435 1
37,3510	C: 01760 1	I: 66256 0	C: 00051 0	C: 00476 1	I: 77300 1	C: 77517 1	C: 03534 0	C: 03550 1
37,3520	C: 03534 0	I: 57435 1	C: 03542 1	I: 77772 0	C: 03556 1	I: 77751 1	C: 03270 1	C: 14031 0
37,3530	C: 00032 0	I: 41434 1	C: 45513 1	I: 77746 1	C: 17564 0	I: 57556 0	C: 17570 0	C: 00033 1
37,3540	I: 41434 1	C: 45513 1	I: 65356 1	I: 65346 0	C: 00001 0	I: 74276 1	C: 03564 0	I: 77772 0
37,3550	C: 17572 1	C: 00003 1	C: 17574 1	C: 00031 0	I: 41434 1	C: 45513 1	I: 65356 1	I: 74346 0
37,3560	C: 03572 1	C: 17572 1	C: 00005 1	I: 57405 1	C: 03570 0	I: 77615 0	C: 03572 1	C: 17572 1
37,3570	I: 43205 1	C: 03564 0	C: 03576 0	C: 27576 0	C: 03572 1	I: 72505 1	C: 01736 1	C: 17572 1
37,3600	I: 76561 1	C: 03564 0	C: 17564 0	I: 77626 0	C: 50211 0	C: 03564 0	I: 76505 0	C: 01736 1
37,3610	C: 03564 0	I: 76435 1	C: 03572 1	C: 27600 1	C: 03542 1	I: 53435 0	C: 03572 1	I: 50206 0
37,3620	C: 03556 1	C: 24021 1	C: 00001 0	I: 77641 1	C: 03550 1	C: 34023 1	C: 47256 0	C: 24007 0
37,3630	C: 03572 1	I: 72441 0	C: 03542 1	I: 77736 0	C: 24010 0	C: 03564 0	I: 77641 1	C: 00001 0
37,3640	C: 24023 0	I: 77641 1	C: 03600 1	C: 34021 0	C: 47256 0	C: 24011 1	C: 01760 1	I: 72441 0
37,3650	C: 03556 1	I: 77726 1	C: 00013 0	I: 77551 0	C: 00007 0	35057 0	54003 0	50120 1
37,3660	40012 0	57722 1	54001 1	00004 0	40102 0	75005 0	00006 1	13672 0
37,3670	26102 0	03705 0	40001 1	61722 1	00006 1	73770 0	55723 1	00006 1
37,3700	63702 1	40000 0	65022 1	00006 1	63707 1	35021 1	55723 1	40154 0
37,3710	60000 1	03760 0	00006 1	61672 0	61664 1	03760 0	55770 1	40156 1
37,3720	60000 1	03760 0	00006 1	61673 1	61665 0	03760 0	55771 0	40155 1
37,3730	60000 1	00006 1	61674 0	61666 0	57772 1	35051 0	54003 0	00006 1
37,3740	33772 0	53447 0	35057 0	54003 0	00006 1	31771 1	53665 1	31772 1
37,3750	55666 1	00003 1	06006 1	I: 51575 1	C: 01177 1	C: 03723 1	I: 77650 1	C: 03324 1
37,3760	54001 1	00002 0	50000 1	35000 1	26001 1	00002 0	C: 45730 1	C: 53410 1
37,3770	C: 03146 1	C: 03744 0	C: 76066 0	C: 03773 1	C: 03774 0	CKSM 73017 0	@	@

OCTAL LISTING FOR PARAGRAPH # 220, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

40,2000	35017 1	57012 0	54115 0	11042 1	02006 0	02013 1	42057 0	60154 1
40,2010	00006 1	12013 0	04410 0	56154 1	54117 1	50000 1	02017 0	03341 1
40,2020	02076 1	02076 1	02076 1	02076 1	02076 1	02076 1	02076 1	02062 1
40,2030	02062 1	03341 1	03341 1	03341 1	03341 1	03341 1	03341 1	02074 0
40,2040	02255 1	03510 0	03341 1	03341 1	03341 1	03341 1	03341 1	03341 1
40,2050	03366 1	02310 1	02275 0	02060 0	03341 1	02370 1	02271 1	C: 00022 1
40,2060	04701 0	C: 62002 1	10777 1	02067 1	02067 1	05217 0	05217 0	36214 0
40,2070	71000 1	10000 0	02076 1	03341 1	35021 1	54117 1	10777 1	02103 1
40,2100	02103 1	02102 0	05217 0	02225 0	11015 0	35021 1	55015 0	02110 0
40,2110	50117 0	34072 0	74362 0	54124 1	30777 0	54143 0	03227 0	36214 0
40,2120	71000 1	10000 0	02133 1	50137 1	57001 1	54022 0	40022 0	40022 0
40,2130	56022 1	60117 0	02150 1	50137 1	57001 1	54154 0	35021 1	54155 1
40,2140	34377 0	07256 1	56155 0	60117 0	54155 1	02150 1	26154 0	02166 1
40,2150	50137 1	55001 0	40777 1	50137 1	62216 0	00006 1	12160 0	02213 0
40,2160	36214 0	71000 1	10000 0	02166 1	40777 1	02214 1	45017 0	60137 1
40,2170	00006 1	62164 0	07052 1	C: 02223 0	36214 0	71000 1	50000 1	02177 1
40,2200	02204 0	00006 1	40156 1	52156 1	56156 0	50137 1	55004 0	56155 0
40,2210	50137 1	55001 0	02164 0	10777 1	54777 1	05217 0	C: 00022 1	C: 00020 0
40,2220	C: 00012 1	C: 00005 1	C: 00000 1	C: 05174 0	C: 13261 0	50777 0	32231 0	54137 0
40,2230	00002 0	C: 00004 0	C: 00004 0	C: 00004 0	C: 00004 0	C: 00004 0	C: 00003 1	C: 00003 1
40,2240	C: 00003 1	C: 00003 1	C: 00003 1	C: 00002 0	C: 00002 0	C: 00002 0	C: 00002 0	C: 00002 0
40,2250	05747 0	C: 00001 0	C: 00001 0	C: 00000 1	C: 00000 1	35021 1	55001 0	34374 0
40,2260	54777 1	02502 1	35017 1	55000 1	35021 1	55013 0	34233 1	54136 1
40,2270	05217 0	35021 1	55002 0	34375 1	02260 1	02347 0	02334 1	35016 0
40,2300	50137 1	65011 1	27000 1	11015 0	35021 1	55015 0	02307 1	05217 0
40,2310	02347 0	02314 0	35017 1	02300 0	22002 0	02225 0	50137 1	32342 0
40,2320	54123 0	65017 1	54122 1	35021 1	54124 1	56123 1	03311 1	35005 1
40,2330	54124 1	56122 0	03311 1	00001 0	22002 0	02225 0	50137 1	32342 0
40,2340	54122 1	65017 1	54123 0	02323 1	C: 00005 1	C: 00003 1	C: 00000 1	22002 0
40,2350	36214 0	71000 1	10000 0	05217 0	44333 1	02363 0	44334 0	02363 0
40,2360	44335 1	02363 0	05217 0	60777 0	00006 1	12367 0	00002 0	00001 0
40,2370	10777 1	65017 1	02374 0	65017 1	50000 1	32231 0	54137 0	11015 0

OCTAL LISTING FOR PARAGRAPH # 221, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

40,2400	02406 1	02403 1	02403 1	30137 1	02430 1	02423 0	10137 0	54137 0
40,2410	02430 1	32500 0	27013 0	30137 1	54125 0	00006 1	27001 0	04662 1
40,2420	C: 62340 1	30125 1	54137 0	02426 0	25015 1	05217 0	22002 0	02441 1
40,2430	67715 0	10000 0	00002 0	05747 0	05217 0	00002 0	54777 1	22002 0
40,2440	02225 0	35021 1	50137 1	55001 0	50137 1	55004 0	54124 1	50137 1
40,2450	45011 0	71000 1	72501 0	55000 1	50137 1	32471 1	54143 0	03227 0
40,2460	50137 1	32474 1	54777 1	02502 1	45016 1	26777 1	02502 1	50137 1
40,2470	34331 1	54777 1	00001 0	C: 00016 0	C: 00005 1	C: 00004 0	C: 00015 0	C: 00011 1
40,2500	C: 00003 1	C: 77774 0	30777 0	54021 0	42515 0	00004 0	50021 1	57023 1
40,2510	00006 1	62513 1	25016 1	00003 1	00002 0	C: 04000 0	35021 1	54156 1
40,2520	02555 0	02523 1	02550 0	02566 0	10154 0	56154 1	02531 1	02540 1
40,2530	67716 0	62602 1	54154 0	02536 0	35001 0	26154 0	35016 0	02517 0
40,2540	56154 1	62602 1	10000 0	02532 1	05747 0	65017 1	40000 0	02532 1
40,2550	00006 1	50156 0	32577 0	52124 1	00002 0	10154 0	00002 0	00002 0
40,2560	12561 0	45001 1	70154 0	54154 0	50002 0	00001 0	00006 1	50156 0
40,2570	32577 0	52155 1	07256 1	52124 1	20155 1	02606 0	C: 05605 1	C: 03656 1
40,2600	C: 16314 0	C: 31463 1	C: 16040 1	52124 1	52155 1	04431 0	04701 0	C: 62566 0
40,2610	52124 1	52155 1	04431 0	02615 1	02627 0	56156 0	56155 0	54154 0
40,2620	02606 0	02627 0	02606 0	02627 0	36211 0	03060 1	02606 0	56002 0
40,2630	54162 0	02655 0	07226 0	07052 1	C: 00123 1	00162 1	02437 0	02314 0
40,2640	30154 1	03213 1	46214 1	50117 0	64333 0	54777 1	02655 0	30155 0
40,2650	03213 1	04701 0	C: 62570 1	02655 0	02606 0	56002 0	54144 1	50140 1
40,2660	02660 0	02675 1	50117 0	30150 0	74372 1	04327 0	00006 1	50000 1
40,2670	30001 0	52155 1	35021 1	54156 1	00144 0	30145 1	02666 0	50140 1
40,2700	02700 1	02703 1	03325 0	00006 1	50145 1	30001 0	52155 1	34333 0
40,2710	54777 1	35021 1	54156 1	07226 0	03200 0	00136 0	07052 1	C: 02761 0
40,2720	10155 1	35005 1	02724 1	45005 0	60155 0	03072 1	04420 0	04420 0
40,2730	03101 1	04420 0	10154 0	02737 0	02737 0	40000 0	54154 0	10162 0
40,2740	02755 1	02751 0	10154 0	05747 0	02753 1	02746 0	56154 1	74777 0
40,2750	54154 0	04701 0	C: 63155 0	44777 0	02750 1	40154 0	74777 0	40000 0
40,2760	02750 1	C: 26161 0	C: 30707 1	C: 21616 0	C: 07071 0	C: 71527 1	07052 1	C: 00123 1
40,2770	56156 0	56155 0	56154 1	00006 1	12776 1	04161 0	03070 0	03101 1

OCTAL LISTING FOR PARAGRAPH # 222. WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD. "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

40,3000	02751 0	07052 1	C: 00123 1	02776 0	10154 0	03011 1	03011 1	04161 0
40,3010	04161 0	32765 1	26154 0	07052 1	C: 02763 1	35004 0	60155 0	03072 1
40,3020	02727 1	07052 1	C: 00123 1	56156 0	60000 1	54156 1	35021 1	60155 0
40,3030	03072 1	03101 1	50140 1	03033 1	03044 1	30117 0	60145 1	54002 1
40,3040	56155 0	50002 0	54001 1	02751 0	35021 1	03036 1	07052 1	C: 00123 1
40,3050	36211 0	03060 1	03023 0	07052 1	C: 00123 1	35016 0	03060 1	03023 0
40,3060	56002 0	54124 1	56002 0	54123 0	04420 0	10123 0	03063 1	00124 0
40,3070	56155 0	60000 1	54155 1	00002 0	60154 1	54154 0	00002 0	54162 0
40,3100	00002 0	10162 0	04161 0	00002 0	04161 0	56002 0	54144 1	10154 0
40,3110	03120 1	03120 1	65017 1	54154 0	02334 1	40155 1	54155 1	00144 0
40,3120	02314 0	00144 0	00006 1	33166 0	20155 1	00006 1	13132 0	00006 1
40,3130	34777 1	52155 1	00002 0	56002 0	54115 0	03105 0	03122 0	35015 0
40,3140	54137 0	34377 0	07256 1	50154 1	34072 0	74362 0	54124 1	35021 1
40,3150	56156 0	56155 0	54154 0	56777 0	54143 0	10000 0	54777 1	03227 0
40,3160	10137 0	03140 1	44374 1	54777 1	00115 1	C: 00000 1	C: 02476 0	56002 0
40,3170	54115 0	03105 0	03137 1	56002 0	54115 0	03105 0	35017 1	03140 1
40,3200	56002 0	54115 0	35021 1	54124 1	36214 0	03311 1	35015 0	03311 1
40,3210	03105 0	34334 1	03140 1	00006 1	73223 0	22154 1	35021 1	54155 1
40,3220	56002 0	54115 0	03176 1	C: 00244 0	03213 1	04701 0	C: 62347 0	56002 0
40,3230	54114 1	34362 1	70143 0	54021 0	56021 1	54141 1	35017 1	70143 0
40,3240	10000 0	03243 1	03253 0	56124 0	04354 1	54124 1	35002 0	70143 0
40,3250	10000 0	35016 0	65017 1	54143 0	00004 0	50141 0	11023 0	03261 1
40,3260	05747 0	65017 1	54142 1	50143 1	73305 0	00006 1	60124 0	00006 1
40,3270	13303 0	50143 1	43305 0	70142 1	60124 0	40000 0	50141 0	57023 1
40,3300	00006 1	63303 1	25016 1	00003 1	00114 0	C: 00037 0	C: 01740 0	C: 02000 0
40,3310	C: 03740 1	54141 1	35016 0	54143 0	56002 0	54114 1	03254 1	03227 0
40,3320	33322 1	04704 0	C: 63411 0	44374 1	54777 1	43346 1	60136 0	00006 1
40,3330	13343 1	43345 1	60136 0	00006 1	13336 0	03341 1	04220 0	04400 1
40,3340	04140 0	04400 1	05217 0	05721 0	C: 01501 1	C: 04140 0	04216 0	35017 1
40,3350	55014 1	04220 0	04473 0	04447 1	03454 1	45017 0	03350 1	35021 1
40,3360	55013 0	44374 1	54777 1	03347 1	45021 0	03350 1	45015 1	00006 1
40,3370	03011 1	10115 0	35002 0	71021 1	10000 0	03404 1	04473 0	11042 1

OCTAL LISTING FOR PARAGRAPH # 223, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD. "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

40,3400	03402 1	05217 0	04701 0	C: 21272 0	35021 1	55012 1	11042 1	05217 0
40,3410	04516 1	05217 0	30777 0	54132 0	35017 1	03434 1	34333 0	02436 1
40,3420	35016 0	03434 1	34334 1	02436 1	35015 0	03434 1	34335 0	02436 1
40,3430	30132 1	54777 1	52131 0	05230 0	70123 0	10000 0	00002 0	50002 0
40,3440	00002 0	34376 1	56777 0	54140 0	11011 1	65017 1	03213 1	03451 1
40,3450	02502 1	56140 1	54777 1	05217 0	11042 1	03457 1	05217 0	35021 1
40,3460	57042 0	00004 0	05201 1	11014 1	03506 1	05217 0	03504 0	35016 0
40,3470	50064 0	60164 1	50064 0	54164 0	31002 1	54001 1	31001 1	50064 0
40,3500	52155 1	00003 1	04473 0	05217 0	35021 1	03470 1	35017 1	03470 1
40,3510	56115 1	55012 1	00004 0	35006 1	00006 1	05011 1	33576 0	71036 1
40,3520	65001 0	55036 1	45070 1	71321 1	65070 0	55321 1	45006 0	71320 0
40,3530	65006 1	55320 0	41331 0	75011 0	27331 0	45006 0	00006 1	03013 0
40,3540	43574 0	00006 1	03011 1	34377 0	54117 1	00004 0	50117 0	11023 0
40,3550	65017 1	03556 1	65017 1	40000 0	73577 0	03561 0	40000 0	73577 0
40,3560	40000 0	50117 0	55023 0	00003 1	10117 1	03544 1	35021 1	54375 1
40,3570	54376 1	54377 0	55357 0	05217 0	C: 00104 1	C: 00240 1	C: 00050 1	C: 73777 1
40,3600	C: 24001 0	C: 00023 0	I: 74241 0	C: 00015 0	I: 77752 1	I: 53445 1	I: 77656 1	I: 50206 0
40,3610	C: 00001 0	I: 65552 0	C: 26325 1	I: 50235 0	C: 00001 0	I: 71244 0	C: 63751 1	C: 15343 1
40,3620	I: 77625 0	C: 02325 1	C: 36325 0	C: 63751 1	06006 1	I: 77624 1	C: 61701 0	I: 77776 1
40,3630	33763 0	04662 1	C: 20561 1	15534 1	03636 1	03630 1	06006 1	I: 46135 1
40,3640	C: 02325 1	C: 61644 0	I: 77650 1	C: 61646 1	I: 77776 1	15534 1	I: 73150 1	C: 02320 1
40,3650	C: 02322 0	I: 45335 0	C: 02325 1	C: 21767 1	I: 51030 0	C: 61664 1	C: 61671 0	I: 67130 1
40,3660	C: 02000 0	C: 02001 1	I: 77650 1	C: 61674 0	I: 67130 1	C: 02004 1	C: 02005 0	I: 77650 1
40,3670	C: 61674 0	I: 67130 1	C: 03000 1	C: 03001 0	I: 43014 0	C: 01671 0	C: 02676 1	I: 77776 1
40,3700	15534 1	I: 40020 1	C: 00051 0	C: 61704 0	I: 77624 1	C: 27442 0	I: 71331 0	C: 00051 0
40,3710	C: 00006 1	C: 15335 0	C: 02321 0	C: 02323 1	C: 02325 1	I: 77770 1	C: 00044 1	I: 47573 0
40,3720	C: 02445 0	I: 77615 0	C: 02321 0	C: 02321 0	I: 47573 0	C: 02533 0	I: 77615 0	C: 02323 1
40,3730	C: 02323 1	I: 75500 0	C: 61717 1	C: 16323 1	C: 02321 0	I: 77766 0	C: 02321 0	I: 52000 0
40,3740	C: 61742 1	C: 61746 0	I: 77745 1	C: 15343 1	C: 02321 0	C: 02323 1	I: 45345 1	C: 02321 0
40,3750	C: 21765 0	I: 71240 1	C: 61755 1	C: 21765 0	C: 02321 0	I: 66150 0	C: 00051 0	C: 00052 0
40,3760	I: 77776 1	04701 0	C: 27457 1	C: 01543 1	C: 01670 1	C: 17000 1	C: 00002 0	C: 00000 1
40,3770	C: 03770 1	C: 03771 0	CKSM 62422 1	@	@	@	@	@

OCTAL LISTING FOR PARAGRAPH # 224. WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

41,2000	03544 1	02775 0	35021 1	55015 0	34233 1	54136 1	11013 0	02035 0
41,2010	02035 0	02012 0	32033 0	61013 1	00006 1	12027 1	36214 0	71000 1
41,2020	10000 0	02023 1	02027 0	10777 1	02351 1	02351 1	02027 0	41013 0
41,2030	55013 0	04447 1	01013 1	C: 03431 1	C: 00034 0	35021 1	55000 1	44374 1
41,2040	54777 1	41001 0	55041 1	62034 1	00006 1	62133 1	00006 1	32114 1
41,2050	52006 0	50140 1	02052 1	02055 0	02221 1	10146 0	02131 0	02351 1
41,2060	02064 1	25017 0	04325 1	02120 0	35001 0	55015 0	44233 0	60136 0
41,2070	00006 1	12073 0	02116 0	02307 1	11000 1	04161 0	44374 1	54777 1
41,2100	11042 1	02104 0	02105 1	02104 0	04443 0	57005 0	04317 0	00006 1
41,2110	32114 1	52006 0	02133 1	C: 02062 1	C: 64101 0	C: 77772 0	30156 0	04317 0
41,2120	45022 0	61001 1	00006 1	12133 0	34335 0	54777 1	31017 0	03363 1
41,2130	02133 1	65017 1	04317 0	42145 1	61001 1	10000 0	65017 1	02141 1
41,2140	02146 0	54154 0	04473 0	04701 0	C: 66000 1	C: 00050 1	51001 1	32151 0
41,2150	04704 0	C: 62351 1	C: 62365 0	C: 62373 1	C: 62400 1	C: 62360 0	C: 62353 0	C: 62523 1
41,2160	C: 60677 1	C: 62351 1	C: 62351 1	C: 61325 1	C: 63230 0	C: 63230 0	C: 63230 0	C: 63230 0
41,2170	C: 63230 0	C: 63230 0	C: 63230 0	C: 62351 1	C: 62351 1	C: 62351 1	C: 62732 0	C: 62743 0
41,2200	C: 62760 1	C: 62703 1	C: 62616 1	C: 62351 1	C: 63353 1	C: 62351 1	C: 62351 1	C: 63466 0
41,2210	C: 63512 1	C: 61364 1	C: 61347 0	C: 61355 0	C: 63613 0	C: 12342 1	C: 63430 0	C: 62351 1
41,2220	C: 62351 1	10146 0	02226 0	02351 1	02226 0	02226 0	46211 1	61001 1
41,2230	00006 1	62233 1	02133 1	35016 0	54117 1	62260 1	54145 0	50117 0
41,2240	30150 0	54122 1	03034 0	02261 0	02246 0	24122 0	30122 0	74372 1
41,2250	04327 0	50000 1	30000 1	50145 1	56000 1	10117 1	02234 0	02133 1
41,2260	00125 1	50000 1	12263 0	00002 0	00002 0	00002 0	00002 0	12301 0
41,2270	12301 0	00002 0	12301 0	00002 0	00002 0	12301 0	00002 0	00002 0
41,2300	12301 0	50002 0	00001 0	34333 0	12310 0	34334 1	12310 0	34335 0
41,2310	54777 1	40002 1	55013 0	04662 1	C: 60437 1	04443 0	00136 0	55002 0
41,2320	56002 0	54117 1	00006 1	32114 1	52006 0	10146 0	65017 1	12332 0
41,2330	12333 1	12333 1	04317 0	34375 1	54777 1	31002 1	12345 0	55001 0
41,2340	56002 0	54117 1	34374 0	54777 1	31001 1	04701 0	C: 61224 1	00117 0
41,2350	04161 0	04701 0	C: 61325 1	45016 1	02424 1	50145 1	40002 1	56132 1
41,2360	45017 0	02424 1	50145 1	40001 1	56131 1	02443 0	02466 1	50145 1
41,2370	40000 0	56130 0	02405 1	45017 0	02437 0	50145 1	40001 1	02371 0

OCTAL LISTING FOR PARAGRAPH # 225. WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD. "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

41,2400	45016 1	02437 0	50145 1	40002 1	02371 0	45016 1	61001 1	10000 0
41,2410	02413 0	00136 0	02413 0	54122 1	50000 1	34333 0	54777 1	50122 0
41,2420	40130 1	03363 1	56122 0	02407 0	54123 0	22002 0	02515 1	04345 1
41,2430	76214 1	60123 1	10000 0	00001 0	05747 0	02351 1	00001 0	54123 0
41,2440	22002 0	02443 0	02426 0	00006 1	22156 0	02515 1	75002 1	10000 0
41,2450	02351 1	00156 0	22002 0	02515 1	75002 1	10000 0	04161 0	00001 0
41,2460	22002 0	02515 1	10000 0	00001 0	00001 0	02351 1	22002 0	30146 1
41,2470	65017 1	00006 1	12504 0	50140 1	02474 1	02477 1	00001 0	03026 0
41,2500	02261 0	00001 0	24145 1	00001 0	31017 0	75046 1	00006 1	50000 1
41,2510	00000 1	40000 0	12371 1	C: 00147 0	C: 00146 1	50140 1	32512 0	50000 1
41,2520	30000 1	74364 0	00002 0	02515 1	04345 1	76214 1	54117 1	54122 1
41,2530	60145 1	50000 1	40000 0	50122 0	57003 0	10122 1	02527 0	35021 1
41,2540	54155 1	54156 1	50117 0	34333 0	54777 1	50117 0	41003 1	54154 0
41,2550	03047 1	54123 0	00006 1	32565 0	52006 0	50140 1	02556 0	02562 1
41,2560	03034 0	02575 1	03026 0	02575 1	C: 02120 0	C: 64101 0	04662 1	C: 61133 1
41,2570	10117 1	02573 1	00136 0	54117 1	02537 1	50000 1	32600 0	04704 0
41,2600	C: 61323 1	C: 62566 0	C: 60516 0	C: 60603 1	C: 60614 1	C: 60621 1	C: 60524 1	C: 60623 0
41,2610	C: 65143 1	C: 65216 1	C: 60621 1	C: 60610 0	C: 60636 1	C: 60653 1	45016 1	02424 1
41,2620	02460 1	33006 1	02337 1	02303 0	33007 0	02337 1	02305 0	33010 0
41,2630	02337 1	02307 1	46211 1	03011 1	00006 1	32114 1	52006 0	35021 1
41,2640	03075 0	50145 1	54000 0	35017 1	03075 0	50145 1	54001 1	35016 0
41,2650	03075 0	50145 1	54002 1	45023 1	61002 1	00006 1	12660 1	02775 0
41,2660	31003 0	04320 1	31005 0	00004 0	00006 1	12674 1	50145 1	40000 0
41,2670	71004 0	50145 1	26000 0	02701 0	41004 0	50145 1	70000 0	50145 1
41,2700	54000 0	00003 1	02775 0	45017 0	02424 1	02460 1	33006 1	02337 1
41,2710	02303 0	33007 0	02337 1	02305 0	45022 0	03011 1	00006 1	32114 1
41,2720	52006 0	35021 1	03075 0	50145 1	54000 0	35017 1	03075 0	50145 1
41,2730	54001 1	02775 0	02303 0	00006 1	32114 1	52006 0	35021 1	03075 0
41,2740	50145 1	54000 0	02775 0	45017 0	02424 1	35001 0	55015 0	02305 0
41,2750	00006 1	32114 1	52006 0	35017 1	03075 0	50145 1	54001 1	02775 0
41,2760	45016 1	02424 1	35001 0	55015 0	02307 1	00006 1	32114 1	52006 0
41,2770	35016 0	03075 0	50145 1	54002 1	02775 0	35021 1	55000 1	45021 0

OCTAL LISTING FOR PARAGRAPH # 226, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "∅" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

41,3000	55014 1	04473 0	44374 1	54777 1	04701 0	C: 61454 0	C: 00025 0	C: 00026 0
41,3010	C: 00027 1	54117 1	41000 1	54021 0	40021 0	40021 0	10000 0	13021 0
41,3020	00002 0	60117 0	00006 1	13025 1	04161 0	00002 0	56002 0	54114 1
41,3030	34363 0	70147 1	04336 0	00114 0	56002 0	54114 1	50117 0	33066 1
41,3040	54001 1	50117 0	34362 1	70153 1	50001 0	00000 1	00114 0	56002 0
41,3050	54114 1	50140 1	03052 0	03071 1	50117 0	33066 1	54001 1	50117 0
41,3060	34362 1	70147 1	50001 0	00000 1	60000 1	00114 0	03025 0	04336 0
41,3070	04345 1	34362 1	70147 1	60000 1	00114 0	54117 1	56002 0	54115 0
41,3100	35021 1	54162 0	50117 0	57006 0	54155 1	50117 0	57003 0	54154 0
41,3110	50140 1	03111 0	03137 1	50117 0	30150 0	74372 1	04317 0	00006 1
41,3120	60117 0	54145 0	11000 1	03174 0	02452 0	03034 0	02261 0	03155 0
41,3130	24145 1	30145 1	26117 1	35021 1	50117 0	53777 0	03155 0	04325 1
41,3140	11000 1	03174 0	02452 0	03026 0	02261 0	03151 1	35021 1	54117 1
41,3150	03130 0	30146 1	65017 1	00006 1	13161 0	56154 1	00115 1	C: 02126 0
41,3160	C: 64101 0	45023 1	61017 0	00006 1	12775 1	31017 0	75046 1	56154 1
41,3170	00006 1	50154 1	01000 0	02775 0	03047 1	54123 0	00006 1	33160 0
41,3200	52006 0	50140 1	03202 1	03206 0	03034 0	03207 1	03026 0	50000 1
41,3210	33212 0	04704 0	C: 62350 0	C: 60776 1	C: 60716 1	C: 60766 0	C: 61021 0	C: 61046 1
41,3220	C: 61004 1	C: 61021 0	C: 65365 1	C: 61325 1	C: 61053 0	C: 61001 1	C: 61325 1	C: 61032 1
41,3230	43237 0	71017 1	54155 1	40136 1	64233 1	10000 0	03245 1	C: 60000 1
41,3240	03245 1	35002 0	26155 1	35021 1	55022 1	36043 0	71001 0	04345 1
41,3250	54022 0	40022 0	56022 1	61002 1	54154 0	35021 1	55012 1	11042 1
41,3260	03262 1	04516 1	00004 0	11020 0	03271 0	35017 1	05245 1	C: 03275 1
41,3270	C: 62101 0	52155 1	53021 1	00003 1	00136 0	04414 1	11021 1	03303 1
41,3300	03303 1	03314 1	03314 1	33320 0	05245 1	C: 03275 1	C: 62101 0	34371 0
41,3310	05134 1	C: 03321 1	C: 62101 0	05324 1	35021 1	55020 0	55021 1	05324 1
41,3320	C: 00144 0	11021 1	03326 0	03326 0	05217 0	05217 0	11012 1	03351 0
41,3330	36043 0	71020 0	02317 0	34160 1	71020 0	63347 1	54023 1	30023 0
41,3340	55001 0	33350 1	54136 1	43237 0	71021 1	54156 1	02046 1	C: 75377 0
41,3350	C: 04140 0	04410 0	05217 0	34333 0	54777 1	31047 0	54001 1	31017 0
41,3360	04715 0	03363 1	05217 0	54022 0	56002 0	54115 0	35002 0	26777 1
41,3370	35015 0	54137 0	40022 0	40022 0	40022 0	40000 0	75023 1	50000 1

OCTAL LISTING FOR PARAGRAPH # 227. WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD. "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

41,3400	34072 0	74352 0	54124 1	56777 0	54143 0	10000 0	54777 1	04701 0
41,3410	C: 61317 0	10137 0	03371 1	44374 1	54777 1	00115 1	54020 1	56002 0
41,3420	54115 0	35017 1	54137 0	40020 1	40020 1	56020 0	54022 0	03376 0
41,3430	03452 1	35013 0	60777 0	00006 1	13436 1	04161 0	35021 1	57002 1
41,3440	54154 0	34375 1	54777 1	04662 1	C: 60502 0	44374 1	54777 1	30154 1
41,3450	04701 0	C: 10011 0	40002 1	55013 0	34375 1	54777 1	35021 1	55002 0
41,3460	04662 1	C: 60502 0	04443 0	35017 1	55000 1	00136 0	35017 1	71045 0
41,3470	10000 0	03510 0	34365 0	54154 0	45017 0	71045 0	54160 1	04473 0
41,3500	34233 1	54157 0	00006 1	31047 0	52156 1	30160 0	00004 0	00154 1
41,3510	34370 1	03473 1	34366 0	54154 0	31045 1	03476 1	65023 0	00004 0
41,3520	54124 1	45004 1	50124 0	57023 1	10000 0	25016 1	03527 1	10124 1
41,3530	03520 0	00003 1	50123 1	03540 0	03535 1	55001 0	55002 0	55015 0
41,3540	44374 1	54777 1	04447 1	03566 1	33570 0	54136 1	10123 0	03553 1
41,3550	02351 1	03516 0	02351 1	36043 0	70123 0	54157 0	30123 1	54023 1
41,3560	30023 0	54160 1	10157 0	03571 1	30160 0	02337 1	35021 1	55013 0
41,3570	04216 0	10160 1	03576 0	30157 1	02317 0	04216 0	30156 0	54161 0
41,3600	30160 0	02337 1	30157 1	02317 0	35021 1	55014 1	55015 0	55013 0
41,3610	30161 1	54156 1	02035 0	04662 1	C: 66730 0	00004 0	45017 0	71321 1
41,3620	65017 1	55321 1	33656 1	00006 1	05011 1	33657 0	55036 1	35006 1
41,3630	00006 1	05013 0	34377 0	54117 1	43654 1	50117 0	55023 0	10117 1
41,3640	03633 1	43655 0	55024 1	55027 1	55031 0	35024 1	55016 0	33661 0
41,3650	05245 1	C: 03662 0	C: 62102 0	05217 0	C: 05675 0	C: 07675 1	C: 00175 1	C: 40650 0
41,3660	C: 00115 1	C: 00764 1	34371 0	05134 1	C: 03667 0	C: 62102 0	05324 1	43660 0
41,3670	00004 0	00006 1	03011 1	45006 0	00006 1	03013 0	35014 1	00006 1
41,3700	02012 0	65001 0	55036 1	43725 0	71321 1	65070 0	55321 1	43726 0
41,3710	71320 0	65067 0	55320 0	41331 0	75011 0	27331 0	00003 1	04662 1
41,3720	C: 10566 0	04220 0	04447 1	04701 0	C: 61376 1	C: 16001 1	C: 55000 1	22007 0
41,3730	35021 1	53052 0	23742 1	33775 1	04662 1	C: 20561 1	15534 1	13741 1
41,3740	13733 1	53052 0	00006 1	13764 0	52155 1	06006 1	I: 52034 1	C: 45716 0
41,3750	C: 65521 1	I: 47145 1	C: 00037 0	C: 45544 0	C: 01052 1	I: 77776 1	33776 1	04662 1
41,3760	C: 20561 1	15534 1	15534 1	13733 1	56001 0	00006 1	13771 1	56001 0
41,3770	13744 1	06006 1	I: 52034 1	C: 45510 1	C: 65521 1	C: 01420 0	C: 01532 1	CKSM 04445 0

OCTAL LISTING FOR PARAGRAPH # 230, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

42,2000	35057 0	54003 0	35003 1	05210 1	32061 1	04662 1	C: 20561 1	05534 0
42,2010	02012 0	02004 1	31466 1	75014 0	10000 0	12054 0	05560 1	C: 00212 0
42,2020	04662 1	C: 40347 0	32060 0	04662 1	C: 20561 1	05534 0	02030 0	02022 0
42,2030	31466 1	74371 1	00006 1	12046 0	40000 0	74371 1	00006 1	12046 0
42,2040	00004 0	04740 0	C: 13366 0	00003 1	04662 1	C: 40500 0	32057 1	04662 1
42,2050	C: 20561 1	05534 0	05534 0	02046 1	05546 0	C: 00212 0	02020 1	C: 01460 1
42,2060	C: 01457 0	C: 01056 0	52152 0	51002 1	32133 1	54146 0	51002 1	32277 1
42,2070	54147 1	41002 0	65033 1	00006 1	62100 1	35017 1	54140 0	02116 0
42,2100	35016 0	54140 0	51002 1	32777 1	54153 1	35054 0	70146 0	54002 1
42,2110	50000 1	32563 0	54150 1	00006 1	50002 0	32565 0	52152 0	52006 0
42,2120	52124 1	00006 1	50000 1	32514 0	52124 1	52006 0	52124 1	00006 1
42,2130	50000 1	32444 1	12124 0	C: 00000 1	C: 40000 0	C: 40000 0	C: 40000 0	C: 00000 1
42,2140	C: 01045 1	C: 01131 0	C: 01003 0	C: 01363 0	C: 00375 0	C: 77776 1	C: 02636 0	C: 01051 1
42,2150	C: 02634 1	C: 00000 1	C: 77777 0	C: 01051 1	C: 01333 0	C: 01155 1	C: 01155 1	C: 00032 0
42,2160	C: 00037 0	C: 01155 1	C: 00000 1	C: 01051 1	C: 01045 1	C: 01045 1	C: 01362 1	C: 00000 1
42,2170	C: 01045 1	C: 01045 1	C: 01045 1	C: 02345 1	C: 03412 0	C: 01045 1	C: 03660 1	C: 00024 1
42,2200	C: 03662 0	C: 01516 1	C: 02640 1	C: 64000 0	C: 02003 0	C: 24006 1	C: 24011 1	C: 64014 0
42,2210	C: 64017 0	C: 02022 0	C: 22025 0	C: 22030 1	C: 24033 1	C: 64036 0	C: 22041 1	C: 00044 1
42,2220	C: 24047 1	C: 24052 0	C: 24055 1	C: 22060 1	C: 20063 0	C: 24066 1	C: 24071 1	C: 24074 1
42,2230	C: 24077 1	C: 24102 1	C: 64105 1	C: 24110 1	C: 24113 1	C: 24116 1	C: 24121 0	C: 24124 0
42,2240	C: 24127 0	C: 04132 0	C: 04135 1	C: 24140 1	C: 04143 0	C: 04146 0	C: 64151 0	C: 00000 1
42,2250	C: 00000 1	C: 00000 1	C: 00000 1	C: 64170 0	C: 24173 1	C: 24176 1	C: 24201 1	C: 24204 1
42,2260	C: 24207 1	C: 24212 0	C: 02215 0	C: 24220 1	C: 24223 1	C: 24226 1	C: 02231 0	C: 02234 0
42,2270	C: 04237 0	C: 02242 1	C: 04245 0	C: 04250 1	C: 04253 1	C: 04256 1	C: 24261 1	C: 00000 1
42,2300	C: 04040 1	C: 04140 0	C: 04102 0	C: 00000 1	C: 00504 0	C: 02000 0	C: 04000 0	C: 04000 0
42,2310	C: 04000 0	C: 00000 1	C: 24400 0	C: 02000 0	C: 24400 0	C: 00000 1	C: 00000 1	C: 24400 0
42,2320	C: 04102 0	C: 04102 0	C: 04102 0	C: 04102 0	C: 04140 0	C: 04102 0	C: 00000 1	C: 24400 0
42,2330	C: 04140 0	C: 04000 0	C: 00140 1	C: 00000 1	C: 20102 0	C: 04140 0	C: 24400 0	C: 24400 0
42,2340	C: 24400 0	C: 24400 0	C: 24400 0	C: 24400 0	C: 24400 0	C: 24400 0	C: 24400 0	C: 24500 1
42,2350	C: 00542 1	C: 24410 1	C: 20204 0	C: 00410 1	C: 10000 0	C: 00000 1	C: 00306 1	C: 00614 1
42,2360	C: 00510 0	C: 00417 0	C: 00204 1	C: 00004 0	C: 10507 1	C: 10507 1	C: 10200 1	C: 00444 0
42,2370	C: 00010 0	C: 24510 0	C: 24512 1	C: 10440 0	C: 00204 1	C: 20451 0	C: 00457 1	C: 36460 0

OCTAL LISTING FOR PARAGRAPH # 231, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

42,2400	C: 00000 1	C: 37044 0	C: 10217 1	C: 34444 1	C: 35004 0	C: 00000 1	C: 00000 1	C: 00404 1
42,2410	C: 10450 1	C: 40444 1	C: 00010 0	C: 00000 1	C: 00000 1	C: 00000 1	C: 00000 1	C: 22440 1
42,2420	C: 24512 1	C: 24512 1	C: 24512 1	C: 24512 1	C: 24512 1	C: 22451 1	C: 00102 1	C: 00000 1
42,2430	C: 16143 0	C: 10507 1	C: 00102 1	C: 00102 1	C: 06143 1	C: 00102 1	C: 04102 0	C: 04102 0
42,2440	C: 00000 1	C: 00000 1	C: 01162 0	C: 00006 1	C: 03240 1	C: 00000 1	C: 00000 1	C: 00000 1
42,2450	C: 00000 1	C: 10707 0	C: 03435 0	C: 13070 1	C: 34345 1	C: 00005 1	C: 21616 0	C: 26113 0
42,2460	C: 31713 0	C: 00070 0	C: 20460 1	C: 01065 0	C: 05740 1	C: 11414 0	C: 31463 1	C: 07475 0
42,2470	C: 16051 1	C: 00001 0	C: 03434 1	C: 00002 0	C: 22245 1	C: 00014 1	C: 35607 0	C: 07606 0
42,2500	C: 06300 1	C: 16631 1	C: 11307 0	C: 12000 1	C: 00000 1	C: 27176 1	C: 14235 0	C: 01670 1
42,2510	C: 20000 0	C: 07475 0	C: 16051 1	C: 05174 0	C: 13261 0	C: 00000 1	C: 00000 1	C: 00000 1
42,2520	C: 00000 1	C: 00714 0	C: 31463 1	C: 13412 1	C: 07534 1	C: 05605 1	C: 03656 1	C: 00001 0
42,2530	C: 16170 0	C: 00441 0	C: 34306 0	C: 07176 0	C: 21603 1	C: 15340 1	C: 15340 1	C: 01031 1
42,2540	C: 21032 0	C: 34631 1	C: 23146 0	C: 14340 0	C: 24145 1	C: 02363 0	C: 03721 0	C: 20373 1
42,2550	C: 02122 1	C: 00424 0	C: 30446 1	C: 00631 0	C: 23146 0	C: 00260 0	C: 06213 1	C: 04231 0
42,2560	C: 27400 0	C: 01031 1	C: 21032 0	C: 03660 1	C: 03772 0	C: 03425 1	C: 01045 1	C: 01046 1
42,2570	C: 00000 1	C: 02363 0	C: 02365 0	C: 03772 0	C: 01103 1	C: 01105 1	C: 01107 0	C: 02351 1
42,2600	C: 02353 0	C: 02343 1	C: 01125 0	C: 03660 1	C: 03625 0	C: 03066 1	C: 03067 0	C: 00000 1
42,2610	C: 03074 1	C: 03073 0	C: 00000 1	C: 03023 0	C: 03024 1	C: 00000 1	C: 03501 0	C: 03503 1
42,2620	C: 03505 1	C: 02355 0	C: 02353 0	C: 02343 1	C: 02320 1	C: 02322 0	C: 00000 1	C: 02632 1
42,2630	C: 00000 1	C: 00000 1	C: 02320 1	C: 02322 0	C: 02324 0	C: 02320 1	C: 02322 0	C: 02324 0
42,2640	C: 03765 0	C: 03743 1	C: 03753 0	C: 03633 1	C: 03631 0	C: 00000 1	C: 02610 1	C: 00000 1
42,2650	C: 00000 1	C: 02640 1	C: 02634 1	C: 02636 0	C: 02610 1	C: 02612 0	C: 02614 0	C: 03721 0
42,2660	C: 03766 0	C: 03770 1	C: 03400 0	C: 03402 1	C: 03326 0	C: 03722 0	C: 03736 0	C: 03734 1
42,2670	C: 03713 1	C: 03724 0	C: 03726 1	C: 03637 0	C: 03722 0	C: 03713 1	C: 00013 0	C: 00013 0
42,2700	C: 00013 0	C: 03315 0	C: 03675 0	C: 03715 1	C: 03713 1	C: 01103 1	C: 01105 1	C: 03315 0
42,2710	C: 03722 0	C: 03677 1	C: 03315 0	C: 03174 0	C: 03766 0	C: 00735 0	C: 02751 0	C: 02752 0
42,2720	C: 00735 0	C: 02751 0	C: 02752 0	C: 02616 1	C: 03753 0	C: 01132 0	C: 03620 0	C: 03622 1
42,2730	C: 03624 1	C: 03315 0	C: 03722 0	C: 03637 0	C: 02632 1	C: 02546 1	C: 03655 1	C: 00000 1
42,2740	C: 00000 1	C: 00000 1	C: 00000 1	C: 00000 1	C: 00000 1	C: 00000 1	C: 00000 1	C: 00000 1
42,2750	C: 00000 1	C: 00000 1	C: 00000 1	C: 03660 1	C: 03772 0	C: 03425 1	C: 03404 1	C: 03406 0
42,2760	C: 03410 1	C: 03404 1	C: 03406 0	C: 03410 1	C: 03674 1	C: 03676 0	C: 03700 0	C: 03537 0
42,2770	C: 03541 1	C: 03543 0	C: 03664 0	C: 03666 1	C: 03670 0	C: 03404 1	C: 03406 0	C: 03410 1

OCTAL LISTING FOR PARAGRAPH # 232. WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

42,3000	C: 03730 0	C: 03732 1	C: 00000 1	C: 03704 1	C: 03706 0	C: 03710 1	C: 01103 1	C: 02357 1
42,3010	C: 02361 1	C: 02320 1	C: 02322 0	C: 02324 0	C: 00036 1	C: 00035 1	C: 00000 1	C: 02773 0
42,3020	C: 02775 0	C: 00000 1	C: 02757 0	C: 02761 0	C: 02763 1	C: 03730 0	C: 03732 1	C: 00000 1
42,3030	C: 03722 0	C: 03723 1	C: 03724 0	C: 01333 0	C: 01334 1	C: 01335 0	C: 01045 1	C: 01046 1
42,3040	C: 01047 0	C: 01050 0	C: 01051 1	C: 01052 1	C: 02320 1	C: 02322 0	C: 02324 0	C: 16351 1
42,3050	C: 00142 0	C: 16347 0	C: 16512 0	C: 22347 1	C: 24454 1	C: 00000 1	C: 00553 1	C: 00143 1
42,3060	C: 06347 1	C: 22347 1	C: 00512 1	C: 00012 1	C: 24344 1	C: 24344 1	C: 24503 1	C: 00512 1
42,3070	C: 00007 0	C: 16347 0	C: 16347 0	C: 24503 1	C: 06512 1	C: 16512 0	C: 22507 0	C: 16505 0
42,3100	C: 20410 0	C: 16352 1	C: 24507 0	C: 24512 1	C: 24252 1	C: 00000 1	C: 00000 1	C: 06352 0
42,3110	C: 24507 0	C: 12512 1	C: 22447 0	C: 00000 1	C: 00000 1	C: 00000 1	C: 00000 1	C: 24511 1
42,3120	C: 16347 0	C: 16347 0	C: 16347 0	C: 16347 0	C: 16347 0	C: 24512 1	C: 00302 0	C: 32655 0
42,3130	C: 10347 0	C: 24344 1	C: 00302 0	C: 00302 0	C: 16347 0	C: 00302 0	C: 04102 0	C: 04102 0
42,3140	C: 06143 1	C: 06043 0	C: 06247 0	04662 1	C: 60655 1	07226 0	03332 0	07052 1
42,3150	C: 03204 1	34335 0	54777 1	04662 1	C: 61133 1	03350 1	33206 0	56154 1
42,3160	55007 0	33207 1	56155 0	04431 0	34334 1	54777 1	04662 1	C: 61133 1
42,3170	00006 1	33213 1	52155 1	31007 1	04431 0	34333 0	54777 1	04662 1
42,3200	C: 61133 1	00136 0	C: 25660 0	C: 31742 1	C: 01727 1	C: 01217 1	C: 00011 1	C: 32445 0
42,3210	C: 02104 0	C: 10422 1	C: 05174 0	C: 13261 0	C: 00000 1	C: 00062 0	04662 1	C: 60655 1
42,3220	07226 0	10154 0	03224 0	03255 0	63312 1	10000 0	03241 0	03255 0
42,3230	03255 0	10155 1	03234 1	03255 0	63313 0	10000 0	03241 0	03255 0
42,3240	03255 0	10154 0	33315 0	03252 1	43315 1	54154 0	43316 1	54155 1
42,3250	33314 1	03333 1	54154 0	33316 0	03247 0	03317 1	33310 0	07256 1
42,3260	46214 1	26777 1	04662 1	C: 61173 0	35021 1	54124 1	45016 1	50117 0
42,3270	64333 0	54143 0	04662 1	C: 61227 1	03350 1	56155 0	00006 1	73311 0
42,3300	52155 1	50117 0	34333 0	54777 1	04662 1	C: 61173 0	04701 0	C: 62570 1
42,3310	C: 23147 1	C: 23346 1	C: 77753 0	C: 41126 1	C: 03256 0	C: 00025 0	C: 37016 1	10155 1
42,3320	13327 0	13327 0	13323 1	00006 1	43215 0	20155 1	13332 1	00006 1
42,3330	33215 1	13325 1	56002 0	54144 1	07052 1	C: 03202 1	00006 1	30155 0
42,3340	53010 0	04420 0	04420 0	35021 1	56156 0	56155 0	56154 1	00144 0
42,3350	56002 0	54144 1	31010 1	00006 1	75015 1	00006 1	75003 0	22155 0
42,3360	31007 1	54154 0	07052 1	C: 03210 1	00144 0	03506 1	07052 1	C: 03447 0
42,3370	03456 0	35021 1	54156 1	33451 1	54154 0	33452 1	56155 0	07256 1

OCTAL LISTING FOR PARAGRAPH # 233, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

42,3400	03467 1	52156 1	52124 1	31004 1	23007 1	52155 1	07052 1	C: 03447 0
42,3410	03456 0	43454 0	03474 0	56155 0	00006 1	73453 1	20124 1	00006 1
42,3420	13422 1	04161 0	31005 0	23010 1	52155 1	07052 1	C: 03447 0	03456 0
42,3430	43455 1	03474 0	52124 1	20155 1	00006 1	13437 0	04161 0	35021 1
42,3440	54156 1	07226 0	52155 1	50145 1	52001 1	04701 0	C: 62775 0	C: 00006 1
42,3450	C: 03240 1	C: 00025 0	C: 37100 1	C: 13560 0	C: 00073 0	C: 13557 1	56156 0	60000 1
42,3460	54156 1	35021 1	60155 0	54155 1	35021 1	60154 1	56154 1	10154 0
42,3470	04161 0	00002 0	04161 0	00002 0	54156 1	10155 1	65017 1	13501 1
42,3500	65017 1	60156 0	00006 1	63505 1	04161 0	00002 0	43513 1	71000 1
42,3510	63513 0	10000 0	03516 0	C: 77743 1	03516 0	00002 0	44113 1	55041 1
42,3520	04161 0	C: 00041 1	I: 70535 0	C: 02343 1	I: 45030 0	C: 65531 0	C: 27071 1	I: 77650 1
42,3530	C: 65533 1	I: 77624 1	C: 27105 0	I: 63375 0	C: 00007 0	C: 00001 0	C: 02327 0	I: 63256 0
42,3540	I: 53435 0	I: 77626 0	C: 61442 1	C: 00015 0	C: 00041 1	I: 70535 0	C: 02343 1	I: 45030 0
42,3550	C: 65554 0	C: 27105 0	I: 77650 1	C: 65556 1	I: 77624 1	C: 27071 1	I: 63375 0	C: 00007 0
42,3560	C: 00001 0	I: 77725 1	C: 00015 0	C: 24037 0	I: 41406 0	I: 63245 1	C: 02327 0	I: 72441 0
42,3570	C: 02335 0	C: 26321 0	C: 00001 0	I: 72441 0	C: 02335 0	C: 26323 1	C: 00007 0	I: 41456 0
42,3600	I: 47235 0	C: 00001 0	C: 00023 0	I: 53552 0	I: 52056 0	C: 61600 0	45007 1	00006 1
42,3610	03012 1	31465 1	00006 1	75015 1	76214 1	50000 1	13617 0	13631 1
42,3620	13624 0	13624 0	04701 0	C: 67215 0	00004 0	04740 0	C: 42024 1	00003 1
42,3630	13646 1	00006 1	33651 0	53313 0	05560 1	C: 00132 1	05560 1	C: 00133 0
42,3640	00004 0	04740 0	C: 42632 0	00003 1	35017 1	55332 0	04701 0	C: 66121 0
42,3650	C: 03153 0	C: 12106 0	04662 1	C: 17653 1	06006 1	I: 45034 1	C: 45510 1	C: 47477 0
42,3660	C: 34041 0	C: 27114 0	I: 46135 1	C: 00050 1	C: 65677 1	I: 77775 1	C: 00001 0	C: 00003 1
42,3670	I: 45145 0	C: 00015 0	C: 54115 0	I: 57455 1	C: 00003 1	I: 77650 1	C: 65701 1	I: 57575 1
42,3700	C: 00001 0	I: 64201 0	C: 00003 1	C: 01736 1	I: 65372 1	C: 15335 0	C: 24025 0	C: 00003 1
42,3710	I: 77624 1	C: 47644 1	C: 00003 1	I: 63256 0	C: 00003 1	I: 72431 1	C: 15327 0	I: 40045 1
42,3720	C: 00003 1	C: 65722 0	I: 40056 0	C: 65737 1	I: 50206 0	C: 15333 0	I: 65552 0	I: 50315 0
42,3730	C: 00017 1	C: 15331 1	I: 51152 0	C: 65737 1	I: 45345 1	C: 15343 1	I: 77606 1	I: 50375 0
42,3740	C: 00011 1	C: 15327 0	I: 65552 0	I: 77625 0	C: 15325 1	C: 16321 0	C: 00025 0	C: 02323 1
42,3750	I: 77776 1	31044 0	75013 1	00006 1	15534 1	33771 0	04662 1	C: 20600 0
42,3760	05625 0	05625 0	05217 0	35015 0	05526 0	35017 1	04662 1	C: 01732 0
42,3770	13654 1	C: 01463 1	C: 03772 0	C: 03773 1	CKSM 77543 0	@	@	@

OCTAL LISTING FOR PARAGRAPH # 234, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

43,2000	50154 1	02002 1	02124 1	02150 1	02240 0	02420 0	03207 1	03212 0
43,2010	02524 0	03102 1	02552 1	12543 0	02275 0	02275 0	03157 1	02275 0
43,2020	02612 0	02326 1	02653 0	02607 1	02510 1	02275 0	02303 0	02311 0
43,2030	02314 0	02321 0	02500 0	02375 1	03034 0	03201 1	02513 1	02037 1
43,2040	03726 1	03730 0	03732 1	03734 1	02721 1	02725 0	03015 0	03020 0
43,2050	02406 1	02120 0	02713 0	02716 0	02562 1	02567 1	02120 0	02601 1
43,2060	02646 1	03023 0	03027 1	02745 0	03142 0	02762 0	02360 0	02755 1
43,2070	03126 1	02120 0	13150 1	02275 0	02120 0	02275 0	11044 1	02120 0
43,2100	30100 0	72123 1	10000 0	02120 0	34112 1	55044 1	30002 0	54155 1
43,2110	45016 1	04170 0	02113 0	00155 0	04400 1	05534 0	35021 1	02105 1
43,2120	04400 1	04701 0	C: 21272 0	C: 24100 0	02136 1	02127 1	02120 0	02271 1
43,2130	04662 1	C: 16577 0	04662 1	C: 17577 1	02135 1	02121 1	44112 0	61002 1
43,2140	00006 1	12476 1	24002 0	62147 1	00006 1	12476 1	02120 0	C: 77670 0
43,2150	02136 1	02153 1	02175 0	02271 1	02076 1	32173 0	04662 1	C: 20561 1
43,2160	05534 0	12162 1	32174 1	04662 1	C: 21042 1	04662 1	C: 16663 0	04662 1
43,2170	C: 17577 1	05534 0	05534 0	C: 06226 1	C: 12200 0	31323 1	02272 1	02076 1
43,2200	35056 1	54003 0	11314 1	02210 0	02205 1	04400 1	05650 1	C: 00115 1
43,2210	11303 1	02217 1	02217 1	02217 1	05650 1	C: 00117 0	05534 0	32237 0
43,2220	04662 1	C: 20561 1	05534 0	02224 1	31773 0	55161 1	31775 0	55160 0
43,2230	32174 1	04662 1	C: 21042 1	35017 1	55303 1	05534 0	05534 0	C: 06134 1
43,2240	02271 1	02076 1	32267 0	04662 1	C: 20561 1	05534 0	02247 1	32270 0
43,2250	04662 1	C: 21042 1	04662 1	C: 17073 0	04662 1	C: 17577 1	05534 0	32266 1
43,2260	04662 1	C: 17206 0	04662 1	C: 17577 1	05534 0	05534 0	C: 02757 0	C: 06335 1
43,2270	C: 12400 0	31322 0	00006 1	16711 1	02120 0	04447 1	34215 0	00006 1
43,2300	01007 1	04701 0	C: 62001 1	00006 1	30033 1	53334 0	30034 0	55335 1
43,2310	02121 1	05560 1	C: 00006 1	02121 1	05546 0	C: 00006 1	05546 0	C: 00220 1
43,2320	02121 1	05546 0	C: 00006 1	05560 1	C: 00220 1	02121 1	02076 1	32357 1
43,2330	04662 1	C: 20561 1	05534 0	05534 0	42356 1	60154 1	00006 1	12341 1
43,2340	05534 0	00004 0	35021 1	54156 1	54001 1	52025 1	52155 1	53052 0
43,2350	20155 1	07226 0	52155 1	20025 1	00003 1	05534 0	C: 00027 1	C: 06230 0
43,2360	02730 1	30075 0	75004 1	00006 1	12367 0	05721 0	C: 01521 0	02734 0
43,2370	35002 0	05147 0	C: 02002 1	C: 66065 1	02121 1	05364 0	C: 00002 0	02120 0

OCTAL LISTING FOR PARAGRAPH # 235. WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD. "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

43,2400	00004 0	35070 0	05147 0	C: 02000 0	C: 66065 1	02121 1	05364 0	C: 00002 0
43,2410	02120 0	35070 0	05147 0	C: 03742 0	C: 66065 1	05412 0	C: 00174 0	02121 1
43,2420	02730 1	32477 1	00006 1	02012 0	10000 0	12120 1	02465 1	02076 1
43,2430	45033 0	00006 1	03012 1	32173 0	04662 1	C: 20561 1	12452 1	02440 0
43,2440	35057 0	54003 0	04662 1	C: 42443 1	04662 1	C: 42462 1	35016 0	05245 1
43,2450	C: 02455 1	C: 66106 0	02465 1	15534 1	02121 1	00006 1	31156 1	53477 0
43,2460	31157 0	55500 1	04740 0	C: 42476 1	05324 1	35013 0	70101 0	10000 0
43,2470	00002 0	35013 0	00006 1	02030 0	10000 0	16706 1	00002 0	C: 00030 1
43,2500	02730 1	02076 1	00004 0	35004 0	05147 0	C: 03652 0	C: 64104 0	05217 0
43,2510	05560 1	C: 00020 0	02121 1	40102 0	74105 0	00006 1	62120 0	34371 0
43,2520	05134 1	C: 03501 0	C: 40106 1	02121 1	35057 0	54003 0	40102 0	74105 0
43,2530	00006 1	62541 0	31466 1	75002 1	00006 1	62540 1	04701 0	C: 36351 0
43,2540	02120 0	04701 0	C: 65606 1	02730 1	02076 1	35003 1	05147 0	C: 02330 0
43,2550	C: 56102 1	05217 0	40102 0	74105 0	00006 1	62557 1	02120 0	02076 1
43,2560	04662 1	C: 64000 0	02076 1	35063 1	05210 1	04701 0	C: 46332 1	02076 1
43,2570	00004 0	40105 1	75014 0	26105 1	35061 0	05134 1	C: 02000 0	C: 62064 1
43,2600	05217 0	02076 1	00004 0	45014 0	70105 1	54105 1	02574 0	05560 1
43,2610	C: 00025 0	02614 0	05546 0	C: 00025 0	02076 1	30074 1	75011 0	00006 1
43,2620	12643 0	30075 0	75013 1	00006 1	12643 0	30075 0	75007 1	00006 1
43,2630	12636 1	35070 0	05134 1	C: 02470 0	C: 76067 1	05217 0	35070 0	05134 1
43,2640	C: 02466 1	C: 76067 1	05217 0	05650 1	C: 00406 0	05534 0	35060 1	56003 1
43,2650	37716 0	55725 1	02121 1	35011 1	70074 0	00006 1	12121 0	05560 1
43,2660	C: 00010 0	35013 0	70075 1	00006 1	12121 0	05560 1	C: 00031 0	05560 1
43,2670	C: 00027 1	05560 1	C: 00007 0	35057 0	54003 0	00004 0	04526 1	37716 0
43,2700	55303 1	06006 1	I: 77624 1	C: 27442 0	I: 77776 1	05372 1	C: 00002 0	C: 00001 0
43,2710	00004 0	04701 0	C: 12651 0	05560 1	C: 00026 0	12121 0	05546 0	C: 00026 0
43,2720	12121 0	32724 1	54335 0	02121 1	C: 03722 0	05546 0	C: 00125 1	02121 1
43,2730	31011 0	00006 1	16711 1	12120 1	00006 1	32744 1	53313 0	44105 0
43,2740	70102 0	54102 0	00002 0	C: 03153 0	C: 12106 0	02730 1	02076 1	00004 0
43,2750	35003 1	05147 0	C: 03712 0	C: 70064 1	15217 1	05560 1	C: 00131 1	05560 1
43,2760	C: 00066 1	02121 1	02730 1	02076 1	35017 1	55376 0	35021 1	55362 0
43,2770	33247 0	55361 0	03524 1	23372 0	23373 1	33246 1	54156 1	33010 0

OCTAL LISTING FOR PARAGRAPH # 236. WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

43,3000	04662 1	C: 20561 1	03005 1	03635 1	02775 0	33247 0	55371 1	05534 0
43,3010	C: 01201 0	31376 1	00006 1	13340 1	03524 1	05546 0	C: 00120 1	02121 1
43,3020	05560 1	C: 00120 1	02121 1	06006 1	I: 77414 0	C: 04466 1	02121 1	06006 1
43,3030	I: 77414 0	C: 04666 0	05631 0	02121 1	35003 1	05147 0	C: 03041 1	C: 66103 0
43,3040	05217 0	06006 1	I: 77624 1	C: 27442 0	I: 43014 0	C: 04064 1	C: 04303 0	C: 67052 1
43,3050	I: 77614 1	C: 04264 0	I: 77776 1	33100 0	05606 1	C: 01554 1	C: 01626 1	00003 1
43,3060	06006 1	I: 77624 1	C: 26731 0	I: 45154 0	C: 02150 1	C: 20237 0	I: 77624 1	C: 20263 1
43,3070	I: 77776 1	33101 1	50120 1	54052 1	04701 0	C: 27457 1	I: 77634 0	C: 21272 0
43,3100	C: 00051 0	C: 67076 1	35003 1	05147 0	C: 03107 1	C: 66103 0	05217 0	06006 1
43,3110	I: 77624 1	C: 27442 0	I: 43014 0	C: 04063 0	C: 04304 1	C: 67120 0	I: 77614 1	C: 04263 1
43,3120	I: 77776 1	33100 0	05606 1	C: 01626 1	C: 01554 1	13057 1	35005 1	70105 1
43,3130	00006 1	12120 1	05560 1	C: 00213 1	05364 0	C: 00027 1	02120 0	05412 0
43,3140	C: 00112 0	02710 0	02076 1	35063 1	05147 0	C: 02164 0	C: 40104 0	15217 1
43,3150	05546 0	C: 00221 0	05546 0	C: 00204 1	35021 1	04701 0	C: 10011 0	05364 0
43,3160	C: 00026 0	02120 0	33200 0	54003 0	45063 0	71751 1	55751 1	31330 0
43,3170	54021 0	30021 1	30021 1	75063 0	40000 0	65061 0	27751 1	02121 1
43,3200	C: 02751 0	02076 1	35061 0	05147 0	C: 03624 1	C: 60105 0	05217 0	05546 0
43,3210	C: 00177 0	12121 0	05560 1	C: 00177 0	12121 0	00006 1	33233 0	00004 0
43,3220	53313 0	34777 1	54030 0	40102 0	74105 0	26102 0	04740 0	C: 42632 0
43,3230	00003 1	02121 1	C: 02765 1	C: 46106 1	C: 00061 0	C: 01373 1	C: 01461 0	C: 01773 0
43,3240	C: 00060 1	C: 60017 1	C: 17777 0	C: 25252 0	C: 52400 1	C: 76777 1	C: 01371 0	C: 03340 0
43,3250	31360 0	00006 1	13261 0	00006 1	31376 1	51377 0	52001 1	35021 1
43,3260	55360 1	00004 0	30002 0	55357 0	55363 1	25365 0	05652 0	C: 01102 0
43,3270	11362 0	35021 1	55362 0	03340 0	01357 1	10000 0	13250 1	13250 1
43,3300	10000 0	13250 1	00002 0	00006 1	23371 0	03334 0	11362 0	03314 1
43,3310	03305 1	03314 1	25366 0	01371 0	65731 1	00006 1	63320 0	03271 0
43,3320	25366 0	65023 0	50000 1	03324 1	01371 0	01371 0	01371 0	03341 1
43,3330	03522 1	01371 0	01371 0	01371 0	00006 1	23361 1	04701 0	C: 03231 1
43,3340	03303 1	35017 1	55372 1	35021 1	54003 0	33236 0	55377 1	35054 0
43,3350	55373 0	03371 1	35051 0	55377 1	35054 0	55373 0	03371 1	35051 0
43,3360	55377 1	33237 1	55373 0	03371 1	55372 1	33234 1	55377 1	33235 0
43,3370	55373 0	00004 0	30003 1	55374 1	00006 1	51377 0	30001 0	53376 0

OCTAL LISTING FOR PARAGRAPH # 237. WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

43,3400	31377 0	55360 1	54001 1	24001 0	50000 1	52001 1	51377 0	40001 1
43,3410	51377 0	60000 1	03275 1	31360 0	00006 1	13441 1	00006 1	51377 0
43,3420	40001 1	51377 0	52001 1	51377 0	40000 0	51377 0	60001 0	03275 1
43,3430	31360 0	00006 1	13441 1	00006 1	31376 1	51377 0	52001 1	35021 1
43,3440	55360 1	00003 1	03334 0	31374 0	54003 0	25377 0	41377 1	61373 1
43,3450	00006 1	13453 1	03371 1	11372 1	03364 0	25372 0	30003 1	65007 0
43,3460	54003 0	63245 1	00006 1	13357 1	10003 0	03352 0	35051 0	54003 0
43,3470	35033 1	55372 1	65014 1	50000 1	40000 0	11372 1	03471 0	33243 1
43,3500	54020 1	54022 0	54021 0	54023 1	60020 0	60022 1	60021 1	60023 0
43,3510	63244 0	03275 1	60020 0	60022 1	60021 1	60023 0	65017 1	03275 1
43,3520	25367 1	03303 1	35020 0	55376 0	35021 1	55374 1	35017 1	55377 1
43,3530	35021 1	55371 1	55373 0	35017 1	55375 0	31374 0	54001 1	74364 0
43,3540	61373 1	04715 0	03565 1	65005 1	03576 0	40000 0	55377 1	00006 1
43,3550	13553 0	35004 0	03554 0	35062 0	55373 0	35021 1	55371 1	35017 1
43,3560	55375 0	51373 1	30000 1	03565 1	03576 0	55372 1	61371 0	55371 1
43,3570	35021 1	61371 0	55371 1	41372 1	61373 1	00002 0	22000 1	31373 1
43,3600	75054 1	64364 1	00006 1	13672 0	11375 0	03610 0	03610 0	03672 1
43,3610	10001 1	03620 0	03620 0	03620 0	11375 0	03621 1	37716 0	03621 1
43,3620	35017 1	55375 0	11376 0	10067 1	05164 1	03627 1	03334 0	25373 1
43,3630	11377 1	03535 1	03535 1	03561 0	03561 0	41374 1	63725 1	00006 1
43,3640	13011 0	31374 0	65005 1	55374 1	03650 1	35001 0	27374 1	03664 0
43,3650	74364 0	00006 1	13662 1	63242 0	00006 1	13657 1	03664 0	33240 1
43,3660	27374 1	03664 0	63241 0	27374 1	11377 1	03527 1	35017 1	03545 0
43,3670	35011 1	03527 1	31374 0	74364 0	04345 1	54001 1	31374 0	74373 0
43,3700	00006 1	13707 0	54021 0	30001 0	75023 1	60021 1	54001 1	31376 1
43,3710	00006 1	13713 0	02773 0	11371 1	03716 1	03717 0	65017 1	55371 1
43,3720	40001 1	61371 0	67716 0	03275 1	03635 1	C: 66100 0	35021 1	13735 1
43,3730	35017 1	13735 1	35016 0	13735 1	36214 0	54331 1	02076 1	31011 0
43,3740	00006 1	13743 0	03753 0	31011 0	54301 1	30331 0	54302 1	35017 1
43,3750	54303 0	04701 0	C: 57373 1	40101 0	75010 1	10000 0	13764 0	45016 1
43,3760	71011 1	10000 0	13764 0	00002 0	04701 0	C: 57754 0	C: 03766 0	C: 03767 1
43,3770	CKSM 02714 1	@	@	@	@	@	@	@

OCCUPIED LOCATIONS	PAGE	OCCUPIED LOCATIONS	PAGE	OCCUPIED LOCATIONS	PAGE	OCCUPIED LOCATIONS	PAGE
4000 TO 4044	131	5324 TO 5341	1232	6437 TO 6471	1124	00,2172 TO 00,2213	1157
4045 TO 4071	132	5342 TO 5343	1233	6472 TO 6525	1125	00,2214 TO 00,2235	1158
4072 TO 4105	133	5344 TO 5353	1234	6526 TO 6573	1126	00,2236 TO 00,2276	1159
4106 TO 4111	194	5354 TO 5371	1404	6574	1127	00,2277 TO 00,2331	1160
4112 TO 4113	197	5372 TO 5420	1409	6575 TO 6635	1128	00,2332 TO 00,2352	1161
4114 TO 4137	221	5421 TO 5465	1410	6636 TO 6671	1129	00,2353 TO 00,2421	1162
4140 TO 4160	357	5466 TO 5473	1411	6672 TO 6715	1130	00,2422 TO 00,2436	1163
4161 TO 4167	364	5474 TO 5477	1413	6716 TO 6751	1131	00,2437 TO 00,2477	1164
4170 TO 4217	370	5500 TO 5506	1415	6752 TO 6753	1132	00,2500 TO 00,2537	1165
4220 TO 4222	372	5507 TO 5514	1417	6754 TO 7030	1133	00,2540 TO 00,2567	1166
4223 TO 4256	373	5515 TO 5520	1418	7031 TO 7037	1134	00,2570 TO 00,2607	1167
4257 TO 4316	374	5521 TO 5525	1420	7040 TO 7051	1135	00,2610 TO 00,2624	1168
4317 TO 4350	378	5526 TO 5545	1465	7052 TO 7104	1136	00,2625 TO 00,2641	1169
4351 TO 4413	379	5546 TO 5574	1486	7105 TO 7122	1137	00,2642 TO 00,2653	1170
4414 TO 4452	380	5575 TO 5605	1487	7123 TO 7163	1138	00,2654 TO 00,2720	1171
4453 TO 4473	382	5606 TO 5624	1490	7164 TO 7205	1139	00,2721 TO 00,2747	1172
4474 TO 4525	383	5625 TO 5630	1491	7206 TO 7223	1140	00,2750 TO 00,3006	1173
4526 TO 4552	418	5631 TO 5647	1492	7224 TO 7264	1141	00,3007 TO 00,3022	1174
4553 TO 4574	431	5650 TO 5700	1493	7265 TO 7277	1142	00,3023 TO 00,3072	1175
4575 TO 4613	484	5701 TO 5720	1494	7300 TO 7310	1143	00,3073	1176
4614 TO 4621	485	5721 TO 5740	1495	7311 TO 7347	1144	00,3074 TO 00,3132	1177
4622	631	5741 TO 5772	1496	7350 TO 7373	1145	00,3133 TO 00,3150	1178
4623 TO 4626	632	5773 TO 5774	27	7374 TO 7426	1146	00,3151 TO 00,3173	1179
4627 TO 4655	648	6000 TO 6005	1065	7427 TO 7474	1147	00,3174 TO 00,3206	1180
4656 TO 4661	662	6006 TO 6025	1107	7475 TO 7540	1148	00,3207 TO 00,3231	1181
4662 TO 4710	1103	6026 TO 6051	1108	7541 TO 7572	1149	00,3232 TO 00,3277	1182
4711 TO 4737	1104	6052 TO 6063	1109	7573 TO 7623	1150	00,3300 TO 00,3342	1183
4740 TO 4772	1105	6064 TO 6112	1110	7624 TO 7656	1151	00,3343 TO 00,3403	1184
4773 TO 4775	1106	6113 TO 6161	1111	7657 TO 7673	1202	00,3404 TO 00,3454	1185
4776 TO 5025	1200	6162 TO 6163	1112	7674 TO 7716	1203	00,3455 TO 00,3515	1186
5026 TO 5054	1201	6164 TO 6215	1113	7717 TO 7721	1225	00,3516 TO 00,3551	1187
5055 TO 5073	1202	6216 TO 6231	1114	7722 TO 7754	1485	00,3552 TO 00,3606	1188
5074 TO 5133	1207	6232 TO 6242	1115	7755 TO 7774	1495	00,3607 TO 00,3650	1189
5134 TO 5170	1208	6243 TO 6302	1116	7775 TO 7776	27	00,3651 TO 00,3712	1190
5171 TO 5174	1209	6303 TO 6322	1117	00,2000 TO 00,2016	1118	00,3713 TO 00,3731	1191
5175 TO 5226	1210	6323 TO 6340	1119	00,2017 TO 00,2040	1152	00,3732 TO 00,3763	1488
5227 TO 5234	1220	6341 TO 6362	1120	00,2041 TO 00,2100	1153	00,3764 TO 00,3767	1489
5235 TO 5275	1223	6363 TO 6402	1121	00,2101 TO 00,2120	1154	00,3770 TO 00,3771	27
5276 TO 5303	1224	6403 TO 6426	1122	00,2121 TO 00,2143	1155	01,2000 TO 01,2027	212
5304 TO 5323	1225	6427 TO 6436	1123	00,2144 TO 00,2171	1156	01,2030 TO 01,2070	213

OCCUPIED LOCATIONS	PAGE	OCCUPIED LOCATIONS	PAGE	OCCUPIED LOCATIONS	PAGE	OCCUPIED LOCATIONS	PAGE
01,2071 TO 01,2132	214	04,2006 TO 04,2010	195	04,3757 TO 04,3760	28	06,2161 TO 06,2173	138
01,2133 TO 01,2176	215	04,2011 TO 04,2032	197	05,2000	170	06,2174 TO 06,2211	139
01,2177 TO 01,2244	216	04,2033 TO 04,2106	198	05,2001 TO 05,2052	171	06,2212 TO 06,2230	140
01,2245 TO 01,2306	217	04,2107 TO 04,2150	199	05,2053 TO 05,2106	172	06,2231	141
01,2307 TO 01,2351	218	04,2151 TO 04,2210	200	05,2107 TO 05,2142	173	06,2232 TO 06,2275	142
01,2352 TO 01,2370	219	04,2211 TO 04,2256	201	05,2143 TO 05,2206	175	06,2276 TO 06,2342	143
01,2371 TO 01,2416	1192	04,2257 TO 04,2325	202	05,2207 TO 05,2256	177	06,2343 TO 06,2366	144
01,2417 TO 01,2453	1193	04,2326 TO 04,2377	203	05,2257 TO 05,2265	178	06,2367 TO 06,2410	145
01,2454 TO 01,2473	1194	04,2400 TO 04,2402	204	05,2266 TO 05,2331	179	06,2411 TO 06,2426	146
01,2474 TO 01,2513	1195	04,2403 TO 04,2415	205	05,2332 TO 05,2341	180	06,2427 TO 06,2452	147
01,2514 TO 01,2542	1196	04,2416 TO 04,2456	206	05,2342 TO 05,2406	183	06,2453 TO 06,2506	148
01,2543 TO 01,2557	1197	04,2457 TO 04,2517	207	05,2407 TO 05,2454	184	06,2507 TO 06,2525	149
01,2560 TO 01,2601	1198	04,2520 TO 04,2527	208	05,2455 TO 05,2525	185	06,2526 TO 06,2550	150
01,2602 TO 01,2625	1199	04,2530 TO 04,2565	209	05,2526 TO 05,2573	186	06,2551 TO 06,2554	151
01,2626 TO 01,2660	1211	04,2566 TO 04,2575	375	05,2574 TO 05,2646	187	06,2555 TO 06,2602	152
01,2661 TO 01,2724	1212	04,2576	376	05,2647 TO 05,2720	188	06,2603	153
01,2725 TO 01,3000	1213	04,2577 TO 04,2605	382	05,2721 TO 05,2766	189	06,2604 TO 06,2631	154
01,3001 TO 01,3012	1214	04,2606 TO 04,2612	422	05,2767 TO 05,3036	190	06,2632 TO 06,2652	155
01,3013 TO 01,3043	1215	04,2613 TO 04,2644	452	05,3037 TO 05,3112	191	06,2653 TO 06,2664	156
01,3044 TO 01,3112	1216	04,2645 TO 04,2711	493	05,3113 TO 05,3164	192	06,2665 TO 06,2710	157
01,3113 TO 01,3123	1217	04,2712 TO 04,2741	494	05,3165 TO 05,3217	193	06,2711 TO 06,2736	158
01,3124 TO 01,3170	1218	04,2742 TO 04,2764	526	05,3220 TO 05,3227	676	06,2737 TO 06,2764	159
01,3171 TO 01,3222	1219	04,2765 TO 04,3046	527	05,3230 TO 05,3276	680	06,2765 TO 06,3026	160
01,3223 TO 01,3245	1220	04,3047 TO 04,3114	528	05,3277 TO 05,3360	681	06,3027 TO 06,3076	161
01,3246 TO 01,3271	1226	04,3115 TO 04,3165	529	05,3361 TO 05,3365	682	06,3077 TO 06,3137	162
01,3272 TO 01,3321	1227	04,3166 TO 04,3206	530	05,3366 TO 05,3430	953	06,3140 TO 06,3206	163
01,3322 TO 01,3365	1228	04,3207 TO 04,3253	531	05,3431 TO 05,3462	954	06,3207 TO 06,3223	164
01,3366 TO 01,3402	1229	04,3254 TO 04,3302	532	05,3463 TO 05,3520	955	06,3224 TO 06,3261	165
01,3403 TO 01,3415	1230	04,3303 TO 04,3341	652	05,3521 TO 05,3542	1096	06,3262 TO 06,3324	297
01,3416 TO 01,3460	1231	04,3342 TO 04,3410	653	05,3543 TO 05,3621	1097	06,3325 TO 06,3330	298
01,3461 TO 01,3505	1234	04,3411 TO 04,3436	654	05,3622 TO 05,3663	1098	06,3331 TO 06,3366	299
01,3506 TO 01,3517	1235	04,3437 TO 04,3514	658	05,3664 TO 05,3721	1099	06,3367 TO 06,3376	300
01,3520 TO 01,3556	1414	04,3515 TO 04,3555	659	05,3722 TO 05,3771	1101	06,3377 TO 06,3440	301
01,3557 TO 01,3577	1415	04,3556	660	05,3772 TO 05,3775	1102	06,3441 TO 06,3473	302
01,3600 TO 01,3650	1416	04,3557 TO 04,3601	1206	05,3776	28	06,3474 TO 06,3541	303
01,3651 TO 01,3700	1417	04,3602 TO 04,3636	1288	06,2000 TO 06,2011	133	06,3542 TO 06,3613	304
01,3701 TO 01,3734	1418	04,3637 TO 04,3650	1289	06,2012 TO 06,2023	134	06,3614 TO 06,3616	305
01,3735 TO 01,3767	1419	04,3651 TO 04,3701	1290	06,2024 TO 06,2074	135	06,3617 TO 06,3650	306
01,3770 TO 01,3771	27	04,3702 TO 04,3736	1291	06,2075 TO 06,2115	136	06,3651 TO 06,3703	663
04,2000 TO 04,2005	194	04,3737 TO 04,3756	1305	06,2116 TO 06,2160	137	06,3704 TO 06,3752	664

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07,2517 TO 07,2532	669	10,2440 TO 10,2450	1404	11,2735 TO 11,3007	1340	12,3703 TO 12,3750	1303
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07,2577 TO 07,2635	1421	10,2471 TO 10,2537	1412	11,3067 TO 11,3147	1342	12,3754 TO 12,3776	1516
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07,2663 TO 07,2722	1423	10,2553 TO 10,2554	1465	11,3220 TO 11,3277	1344	13,2002 TO 13,2035	210
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13,3071 TO 13,3127	1318	14,3322 TO 14,3376	773	15,3525 TO 15,3571	1087	16,3676 TO 16,3703	997
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14,2754 TO 14,3023	761	15,3133 TO 15,3200	1079	16,3272 TO 16,3330	989	17,3350 TO 17,3356	1054
14,3024 TO 14,3066	762	15,3201 TO 15,3206	1080	16,3331 TO 16,3374	990	17,3357 TO 17,3376	1055
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20,3340 TO 20,3410	975	21,3362 TO 21,3427	1028	22,3510 TO 22,3544	1508	23,3441 TO 23,3472	1362
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20,3501 TO 20,3521	981	21,3575 TO 21,3651	1032	22,3653 TO 22,3657	1512	23,3555 TO 23,3605	1367
20,3522 TO 20,3551	982	21,3652 TO 21,3724	1033	22,3660 TO 22,3711	1513	23,3606 TO 23,3635	1368
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24,2000	TO 24,2001	35	25,2165	TO 25,2234	849	26,2367	TO 26,2404	794	27,2200	TO 27,2252	395
24,2002	TO 24,2013	670	25,2235	TO 25,2257	850	26,2405	TO 26,2426	795	27,2253	TO 27,2326	396
24,2014	TO 24,2072	671	25,2260	TO 25,2316	853	26,2427	TO 26,2432	796		27,2327	397
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24,2326	TO 24,2345	688	25,2565	TO 25,2570	858	26,2527	TO 26,2530	801	27,2570	TO 27,2613	589
24,2346	TO 24,2421	689	25,2571	TO 25,2636	859	26,2531	TO 26,2543	802	27,2614	TO 27,2630	688
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24,2463	TO 24,2526	691	25,2705	TO 25,2750	861	26,2551	TO 26,2621	804	27,2645	TO 27,2670	816
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24,2555	TO 24,2573	693	25,3014	TO 25,3032	863	26,2651	TO 26,2707	808	27,2737	TO 27,2756	1333
24,2574	TO 24,2611	694	25,3033	TO 25,3077	864	26,2710	TO 26,2750	809	27,2757	TO 27,3006	1376
24,2612	TO 24,2657	695	25,3100	TO 25,3151	865	26,2751	TO 26,3017	810	27,3007	TO 27,3025	1377
24,2660	TO 24,2726	696	25,3152	TO 25,3220	866	26,3020	TO 26,3027	811	27,3026	TO 27,3063	1379
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24,2771	TO 24,3036	698	25,3272	TO 25,3312	868	26,3046	TO 26,3073	814	27,3133	TO 27,3173	1383
24,3037	TO 24,3112	699	25,3313	TO 25,3332	869	26,3074	TO 26,3135	851	27,3174	TO 27,3243	1384
24,3113	TO 24,3167	700	25,3333	TO 25,3375	870	26,3136	TO 26,3144	852	27,3244	TO 27,3310	1385
24,3170	TO 24,3247	701	25,3376	TO 25,3453	871	26,3145	TO 26,3171	879	27,3311	TO 27,3333	1386
24,3250	TO 24,3257	702	25,3454	TO 25,3525	872	26,3172	TO 26,3251	880	27,3334	TO 27,3352	1387
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24,3574	TO 24,3603	714	25,3774	TO 25,3775	31	26,3536	TO 26,3572	1248	27,3700	TO 27,3736	1506
24,3604	TO 24,3661	715	26,2000	TO 26,2053	778	26,3573	TO 26,3624	1249	27,3737	TO 27,3762	1507
24,3662	TO 24,3743	716	26,2054	TO 26,2107	779	26,3625	TO 26,3635	1250	27,3763	TO 27,3764	32
24,3744	TO 24,3760	717	26,2110	TO 26,2117	786	26,3636	TO 26,3657	1251	30,2000	TO 30,2051	565
24,3761	TO 24,3764	735	26,2120	TO 26,2201	787	26,3660	TO 26,3716	1446	30,2052	TO 30,2125	566
24,3765	TO 24,3766	31	26,2202	TO 26,2216	788	26,3717	TO 26,3752	1447	30,2126	TO 30,2207	567
25,2000	TO 25,2023	844	26,2217	TO 26,2227	789	26,3753	TO 26,3776	1448	30,2210	TO 30,2271	568
25,2024	TO 25,2074	845	26,2230	TO 26,2300	790	27,2000	TO 27,2034	390	30,2272	TO 30,2311	569
25,2075	TO 25,2114	846	26,2301	TO 26,2313	791	27,2035	TO 27,2104	391	30,2312	TO 30,2322	598

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30,2401	TO 30,2462	600	31,3506	TO 31,3546	640	32,3770	TO 32,3771	32	34,2345	TO 34,2415	542
30,2463	TO 30,2544	601	31,3547	TO 31,3573	641	33,2000	TO 33,2003	422	34,2416	TO 34,2424	544
30,2545	TO 30,2626	602	31,3574	TO 31,3607	642	33,2004	TO 33,2041	423	34,2425	TO 34,2502	545
30,2627	TO 30,2710	603	31,3610	TO 31,3653	673	33,2042	TO 33,2121	424	34,2503	TO 34,2564	546
30,2711	TO 30,2772	604	31,3654	TO 31,3661	674	33,2122	TO 33,2177	425	34,2565	TO 34,2627	547
30,2773	TO 30,3054	605	31,3662	TO 31,3677	677	33,2200	TO 33,2260	426	34,2630	TO 34,2673	579
30,3055	TO 30,3136	606	31,3700	TO 31,3741	915	33,2261	TO 33,2275	427	34,2674	TO 34,2755	580
30,3137	TO 30,3220	607	31,3742	TO 31,3760	916	33,2276	TO 33,2351	428	34,2756	TO 34,3037	581
30,3221	TO 30,3301	608	31,3761	TO 31,3762	32	33,2352	TO 33,2367	429	34,3040	TO 34,3121	582
30,3302	TO 30,3341	609	32,2000	TO 32,2016	430	33,2370	TO 33,2426	430	34,3122	TO 34,3203	583
30,3342	TO 30,3356	610	32,2017	TO 32,2043	643	33,2427	TO 33,2452	431	34,3204	TO 34,3265	584
30,3357	TO 30,3440	611	32,2044	TO 32,2120	644	33,2453	TO 33,2517	434	34,3266	TO 34,3342	585
30,3441	TO 30,3522	612	32,2121	TO 32,2200	645	33,2520	TO 33,2521	435	34,3343	TO 34,3346	592
30,3523	TO 30,3604	613	32,2201	TO 32,2256	646	33,2522	TO 33,2567	436	34,3347	TO 34,3423	593
30,3605	TO 30,3644	614	32,2257	TO 32,2261	647	33,2570	TO 33,2631	437	34,3424	TO 34,3473	594
30,3645	TO 30,3701	712	32,2262	TO 32,2276	900	33,2632	TO 33,2667	438	34,3474	TO 34,3551	595
30,3702	TO 30,3747	713	32,2277	TO 32,2315	901	33,2670	TO 33,2744	439	34,3552	TO 34,3632	596
30,3750	TO 30,3751	32	32,2316	TO 32,2332	902	33,2745	TO 33,3022	440	34,3633	TO 34,3711	597
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31,2332	TO 31,2350	609	32,2660	TO 32,2741	910	33,3421	TO 33,3435	447	35,2157	TO 35,2215	468
31,2351	TO 31,2402	610	32,2742	TO 32,3020	911	33,3436	TO 33,3507	449	35,2216	TO 35,2275	469
31,2403	TO 31,2431	619	32,3021	TO 32,3070	912	33,3510	TO 33,3562	450	35,2276	TO 35,2357	470
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31,2771	TO 31,3051	625	32,3352	TO 32,3427	922	34,2000	TO 34,2001	35	35,2616	TO 35,2660	477
31,3052	TO 31,3133	626	32,3430	TO 32,3456	923	34,2002	TO 34,2032	535	35,2661	TO 35,2665	478
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THE SUBROUTINES IN THIS PROGRAM ARE AS FOLLOWS:

COMERASE.030
COMAID .029
COMEKISS.020
TROUBLE .043
TVCDAPS .011
CHIEFTAN.028

THE ASSEMBLY WAS GOOD AND MANUFACTURABLE. NO LINES WERE CUSSED.

BINARY RECORDS FOR "COMANCHE.055" SUCCESSFULLY STORED.